



# FY 2016 Budget Request Office of Fossil Energy

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U.S. DEPARTMENT OF  
**ENERGY**

Fossil  
Energy

“Over the past six years, we’ve done more than ever before to combat climate change, from the way we produce energy, to the way we use it.”

President Barack Obama  
State of the Union Address  
January 20, 2015



*Photo courtesy of the White House, Pete Souza*



## Oil & Gas

- Promote prudent development of domestic oil and natural gas resources
- Quantify and mitigate impacts/risks of resource development, with a focus on unconventional resources
- Manage the DOE's natural gas regulatory process



## CCS & Power Systems

- Reduce cost of pre- and post-combustion CO<sub>2</sub> capture from coal and natural gas fired power plants and industrial sources through R&D and major demonstrations
- Quantify and mitigate risks of long term CO<sub>2</sub> storage through R&D and major demonstrations
- Increase efficiency of power generation through R&D of systems and materials
- Research new power generation systems that can be cost-effectively integrated with carbon capture and storage



## Petroleum Reserves

- To ensure U.S. energy security by reducing the impacts of potential disruptions
- Provide protection from potential energy supply disruptions in the Northeast from winter shortages through the Northeast Home Heating Oil Reserve
- Northeast Gasoline Supply Reserve provides an emergency supply of gasoline in commercial terminals in the Northeast.



## NETL

- NETL is owned and operated by the DOE. NETL supports the DOE mission to advance the energy security of the United States.
- NETL enables domestic coal, natural gas, and oil to economically power our Nation's homes, industries, businesses, and transportation while reducing the environmental impacts of energy production and generation.
- NETL has expertise in coal, natural gas, and oil technologies; contract and project management; analysis of energy systems; and international energy issues.

# FY 16 Congressional Budget Request

(\$ in thousands)	FY 2015 Omnibus	FY 2016 Congressional Request	FY 2016 Rquest vs FY 2015 Omnibus
<b>FOSSIL ENERGY R&amp;D</b>			
Coal	400,000	369,357	-7.7%
Natural Gas Technologies	25,121	44,000	75.2%
Unconventional Fossil Energy Technologies	4,500	0	-100.0%
Program Direction	119,000	114,202	-4.0%
Plant & Capital Equipment	15,782	18,044	14.3%
Environmental Restoration	5,897	8,197	39.0%
Supercomputer	0	5,500	100.0%
Special Recruitment Program	700	700	0.0%
Subtotal, Fossil Energy R&D	571,000	560,000	-1.9%
Rescission of prior year balances	-10,413	0	100.0%
<b>TOTAL FOSSIL ENERGY R&amp;D</b>	<b>560,587</b>	<b>560,000</b>	<b>-0.1%</b>
<b>TOTAL, STRATEGIC PETROLEUM RESERVE</b>	<b>200,000</b>	<b>257,000</b>	<b>28.5%</b>
<b>NORTHEAST HOME HEATING OIL RESERVE</b>	<b>7,600</b>	<b>7,600</b>	<b>0.0%</b>
Rescission of prior year balances	-6,000	0	100.0%
<b>TOTAL, NORTHEAST HOME HEATING OIL RESERVE</b>	<b>1,600</b>	<b>7,600</b>	<b>375.0%</b>
<b>TOTAL, NAVAL PETROLEUM &amp; OIL SHALE</b>	<b>19,950</b>	<b>17,500</b>	<b>-12.3%</b>
<b>CLEAN COAL TECHNOLOGY PRIOR YEAR</b>	<b>-6,600</b>	<b>0</b>	<b>100.0%</b>
<b>ELK HILLS SCHOOL LANDS FUNDS</b>	<b>15,580</b>	<b>0</b>	<b>-100.0%</b>
<b>TOTAL FOSSIL ENERGY PROG.</b>	<b>791,117</b>	<b>842,100</b>	<b>6.4%</b>

- ☞ **DOE Cross-cut: Supercritical CO<sub>2</sub> (Coal: \$34.8 Million) *FE co-chair***
- ☞ **DOE Cross-cut: Subsurface Engineering (Coal: \$110.5 Million & Natural Gas Technologies: \$10 Million) *FE co-chair***
- ☞ **2<sup>nd</sup> generation large pilots: Carbon Capture and Advanced Energy systems**
  - **Up to two 10+ MW post-combustion capture pilots**
  - **Up to two 5 -10 MW advanced combustion pilots**
- ☞ **Refresh process on Supercomputer at NETL**
- ☞ **Reducing methane emissions from natural gas infrastructure and better quantifying methane emissions from the natural gas value chain**

The FY 2016 budget maximizes RD&D value and synchronizes program and technology expertise across the Department through coordinated, crosscutting program proposals. FE contributes to four FY16 crosscuts:

## ∞ **Supercritical CO<sub>2</sub> (Coal - \$34.8 Million)**

- Focused on technology development for supercritical carbon dioxide-based power cycles that offer significant improvements in efficiency, cost, footprint and water use. The directly-fired cycle also can provide significant benefits for carbon capture and storage.

## ∞ **Subsurface Engineering (Coal - \$110.5 Million & Natural Gas Technologies - \$10 Million)**

- Addresses challenges in the subsurface through highly focused and coordinated research in Wellbore Integrity, Stress State and Induced Seismicity, Permeability Manipulation, and New Subsurface Signals

## ∞ **Energy - Water Nexus (Coal - \$6 Million & Natural Gas Technologies - \$6 Million)**

- Invests and collaborates across programs that support a national data, modeling, and analysis platform and strategically target key technology opportunities in linked water-energy applications.

## ∞ **Cybersecurity (Program Direction - \$1.7 Million, SPR - \$2.1 Million)**

- Supports the DOE enterprise on a range of cyber threats, bolsters the U.S. Government's capabilities to address cyber threats, and improves cybersecurity in the power and oil-natural gas subsector.

## ∞ Carbon Capture & Storage and Power Systems Program

- Carbon Capture
- Carbon Storage
- Advanced Energy Systems
- Cross-cutting Research
- Supercritical Carbon Dioxide Technology

## ∞ CCS Demonstrations (funded in large part through Recovery Act)

*R&D and scale-up of 2<sup>nd</sup> generation and transformational technologies for capturing CO<sub>2</sub> from new and existing industrial and power-producing plants*

**FY 2016 Request: \$116.6 Million**

- **Post-Combustion Capture Systems**  
(\$104.6 Million)
- **Pre-Combustion Capture Systems**  
(\$12 Million)



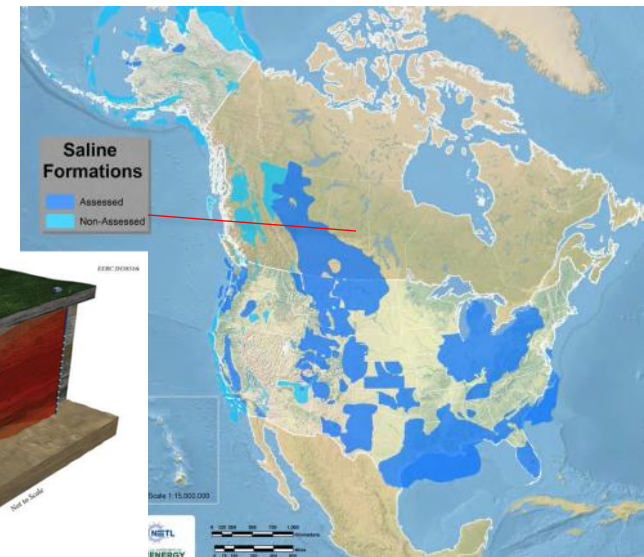
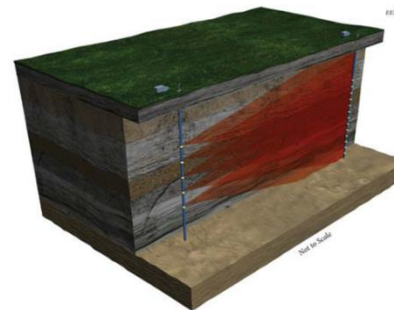
*The National Carbon Capture Center  
in Wilsonville, Alabama*



*Addressing climate change through safe, cost-effective, and permanent geologic storage of CO<sub>2</sub>*

**FY 2016 Request: \$108.8 Million**

- **Storage Infrastructure** [*formerly Regional Carbon Sequestration Partnerships*]  
(\$63.1 Million)
- **Advanced Storage R&D Technologies**  
(\$17.4 Million)
- **Sub-Disciplinary Storage R&D**  
(\$28.3 Million)



**Saline Formations**  
**2,102 - 20,043 BMT CO<sub>2</sub> Storage**  
**Resource**

*Long-term, transformational technologies that greatly improve plant efficiencies, reduce CO<sub>2</sub> capture costs, increase plant availability, and maintain the highest environmental standards.*

## **FY 2016 Request: \$39.4 Million**

- **Advanced Combustion Systems**  
(\$10.4 Million)
- **Gasification Systems**  
(\$11.0 Million)
- **Advanced Turbines**  
(\$9.0 Million)
- **Solid Oxide Fuel Cells**  
(\$9.0 Million)



*Supports development of new materials, catalysts, instrumentation, sensors, and advanced computer systems for future power plants and energy systems integrated with CCS.*

## **FY 2016 Request: \$51.2 Million**

- **Plant Optimization Technologies** (\$27.5 Million)  
Sensors and Controls; Cross-cutting Materials R&D; Advanced Ultra Supercritical Materials R&D; Water Management R&D
- **Coal Utilization Science** (\$18.8 Million)  
National Risk Assessment Program (NRAP) and Carbon Capture Simulation (CCSI)
- **Energy Analyses** (\$0.85 Million)  
Environmental Activities; Technical and Economic Analysis
- **University Training and Research** (\$3.0 Million)  
University Coal Research; Historically Black Colleges and Universities Education and Training
- **International Activities** (\$1.1 Million)

*The Department's Supercritical Carbon Dioxide Technology (sCO<sub>2</sub>) tech team focuses on technology development for supercritical carbon dioxide-based power conversion cycles.*

## **FY 2016 Request: \$19.3 Million**

- Significant benefits include much higher efficiency, low water consumption, reduced emissions, and enabling a new technology and industrial base.
- Fossil Energy's ultimate goal is a directly-fired supercritical CO<sub>2</sub> fuel cycle which could also provide significant benefits for Carbon Capture and Storage (CCS) by reducing the costs and parasitic load of carbon capture and CO<sub>2</sub> compression.
- This new subprogram supports the supercritical CO<sub>2</sub> crosscut being undertaken in conjunction with the offices of Nuclear Energy and Energy Efficiency and Renewable Energy.

*Develop technologies to minimize the environmental impact of natural gas production and transport*

**FY 2016 Request: \$44.0 Million**

- **Environmentally Prudent Development** (\$19 Million)  
R&D collaboration with EPA & USGS on water quality and availability, air quality, induced seismicity, and mitigating shale gas development intensity
- **Emissions Mitigation from Midstream Infrastructure** (\$15 Million) new program focused on detecting and reducing methane emissions from natural gas infrastructure
- **Emissions Quantification from Natural Gas Infrastructure** (\$10 Million) new program focused on better quantifying methane emissions from natural gas value chain

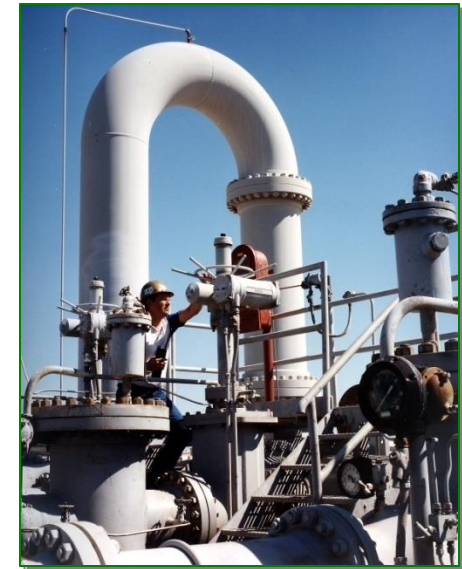


*Provides “Emergency Stockpile” of crude oil to respond to potential disruptions in U.S. petroleum supplies (international or domestic)*

**FY 2016 Request: \$257.0 Million**

**FY 2016 funding provides for:**

- Operations and security of SPR’s four storage facilities
- Cavern inspections and well remediations
- Increased support for major maintenance requirements, including buydown of deferred maintenance back log.
- Degasification of crude oil inventory to ensure its availability
- Acquisition of a custody transfer flow metering skid



## **Northeast Home Heating Oil Reserve**

**FY 2016 Request: \$7.6 Million**

- Established in 2000 as “Emergency Stockpile” to respond rapidly to winter related shortages of heating oil
- Maintain one million barrels of ultra-low sulfur diesel at locations in New England

## **Naval Petroleum & Oil Shale Reserves**

**FY 2016 Request: \$17.5 Million**

- NPR-1 (Elk Hills, CA): Accelerates environmental assessment and remediation to address the environmental findings related to the sale of NPR-1
- NPR-3 (Casper, WY): Supports closeout activities following final disposition of NPR-3.

- ☞ **9 million tons stored so far: anticipated to total 10 million tons by end of FY 2015**
  
- ☞ **Large-scale 1<sup>st</sup> generation demo projects and field injection tests progressing:**
  - Air Products and Chemicals Demonstration and the Illinois Basin-Decatur RCSP Project have injected one million metric tons of CO<sub>2</sub>
  - Petra Nova Post-Combustion Capture Demonstration Project began construction
  - Skyonic utilization project now operating in San Antonio
  
- ☞ **Natural Gas**
  - Foamed cement technologies for spill prevention
  
- ☞ **Petroleum Reserves**
  - SPR Test Sale
  - Establishment of Northeast Gasoline Supply Reserve





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