Statement by Dr. James J. Markowsky
Assistant Secretary for Fossil Energy
U.S. Department of Energy

FY 2011 Appropriations Hearing
House Committee on Appropriations
Subcommittee on Energy and Water Development

March 17, 2010

Mr. Chairman, Ranking Member Frelinghuysen, and Members of the Committee, it is my pleasure to appear before you today to present the Office of Fossil Energy's (FE) proposed Budget for Fiscal Year 2011 (FY 2011).

The Office of Fossil Energy's primary objective is to ensure that we can continue to utilize our traditional fuel sources for clean, affordable, reliable energy. Fossil fuels are anticipated to play a critical role in meeting our Nation's future energy needs. Making use of the Nation's fossil fuel assets in an environmentally responsible manner will help the United States to meet its energy requirements, minimize detrimental environmental impacts, positively contribute to energy security and compete in the global marketplace.

First and foremost, FE's research and development (R&D) program supports the U.S. Department of Energy's (DOE) overall mission to achieve national energy security in an economic and environmentally sound manner. In the Coal Program, there are four key priorities: 1) developing technologies for globally competitive carbon dioxide (CO_2) capture for power plants and industrial sources, 2) establishing the basis for long-term geologic storage and CO_2 reuse, 3) improving the efficiency of both existing and new coal-fired power generation plants, and 4) implementing computer modeling and simulation to accelerate the R&D path from discovery to commercialization and reduce costs.

Currently, we are pursuing the demonstration of first generation carbon capture and storage (CCS) technologies with existing and new power plants and industrial facilities using a range of capture technologies and storing CO_2 in a variety of geologic formations, including enhanced oil recovery. The goal is to have five to ten large-scale demonstrations in operation by 2016. In parallel, to drive down the high costs of CCS, the FE Coal Program is pursuing R&D to increase base power plant efficiency and thereby reduce the carbon emissions intensity of fossil energy systems. FE is developing a spectrum of technologies to evolve coal into a low-carbon energy source that is economically competitive in 2020 and beyond.

I would note that both President Obama and Congress previously emphasized their support for CCS by investing $3.4 billion in the technology and related programs through the American Recovery and Reinvestment Act (ARRA). These appropriations are currently helping fund activities targeted at expanding and accelerating deployment of CCS technology.

FE also manages the Nation's 727-million-barrel U.S. Strategic Petroleum Reserve that serves as the largest stockpile of government-owned emergency crude oil in the world.

The SPR is vital to ensuring U.S. energy security. This stockpile of crude oil provides energy and economic security against foreign or domestic disruptions in U.S. critical oil supplies and also allows the United States to meet part of its International Energy Agency obligation to maintain emergency oil stocks. In addition, FE oversees the Northeast Home Heating Oil Reserve and the Naval Petroleum Reserves.

Fiscal Year 2011 Budget Request

DOE is requesting $760.4 million for FE programs in FY 2011. Included in this budget are $586.6 million for FE Research and Development; $138.9 million for the Strategic Petroleum Reserve; $11.3 million for the Northeast Home Heating Oil Reserve; and $23.6 million for the Naval Petroleum Reserves.

The FY 2011 budget request will allow FE to fulfill the mission I just outlined: to provide the nation with the best opportunity to tap the full potential of its abundant fossil energy resources in an environmentally sound and affordable manner; and to ensure America's readiness to respond to short-term energy supply disruptions.

Fossil Energy R&D

Our nation has rich deposits of coal, oil and natural gas. We have more energy in our domestic coal reserves, for example, than the rest of the world has in its recoverable oil. Our nation has rich deposits of coal, oil, and natural gas. We have more energy in our domestic coal reserves, for example, than the rest of the world has in its recoverable oil. Our natural gas deposits are extensive with an estimated 40 percent increase in potential resources realized over the past 2 years, or roughly a 90 year supply at current rates of consumption.

The FE Research and Development FY 2011 budget request of $586.6 million represents more than 75 percent of FE's total FY 2011 budget request. It is comprised of several R&D programs designed to advance our ability to use the nation's abundant fossil resources in an environmentally benign way that avoids environmental damage, including greenhouse gas emissions, and benefits our economy for years to come.

($ in Thousands)	FY 2010 Final Appropriation	FY 2011 Budget Request	% Change
Fossil Energy R&D	$672,383	$586,583	-13%

As part of R&D, the FY 2011 budget request for FE's Fuels and Power Systems program is $403.9 million. Initiatives will focus on research, development and deployment of technologies to use fossil fuels more cleanly and efficiently at large power and industrial facilities. The core research and development efforts of the Fuels and Power Systems program focus on: the creation of a portfolio of technologies that can capture and permanently store carbon dioxide from power plants and industrial processes; carbon capture from existing coal-fired power plants; efficiency improvements for existing and new power generation, such as: improved gasification technologies, development of

stationary power fuel cells, advanced materials for plant efficiency improvement, and coal-to-hydrogen conversion and improved turbines for future coal-based combined cycle plants.

The Fuels and Power Systems program supports technologies that can then be tested for commercial readiness in our carbon capture and storage demonstration program including the Clean Coal Power Initiative (CCPI).

($ in Thousands)	FY 2010 Final Appropriation	FY 2011 Budget Request	% Change
Fuels & Power Systems R&D	$404,000	$403,850	0%

Carbon Storage. The Department's Sequestration Program focuses on the key technology challenges that confront the wide-scale industrial deployment of CCS. These challenges are being addressed through industry/government cooperative research on cost-effective capture technologies; monitoring, verification, and accounting technologies to assess permanence of storage; permitting issues; liability issues; public outreach; and infrastructure needs. The Department of Energy is requesting $143.0 million for FE's Carbon Sequestration program. Developing low-cost pre-combustion capture technologies and establishing the technical basis for carbon sequestration will lead to a decrease in the atmospheric release of CO_2, thus allowing us to use our domestic fossil fuel resources responsibly by reducing their impacts on global climate change.

Essential to these objectives are the Regional Carbon Sequestration Partnerships (RCSPs). The Partnerships are a central piece of our CCS research efforts with the goal of developing the knowledge base and infrastructure for the wide-scale deployment of geologic storage technologies. The Partnerships are addressing key infrastructure issues related to permitting, pore space (underground reservoir) ownership, site access, liability, public outreach, and education. The Partnerships are also conducting field tests across the United States where these tests reflect the geographic differences in fossil fuel use, potential storage sites and different regional approaches in addressing CCS. The Partnerships encompass essentially all the geologic storage sites in the country that can potentially be available for carbon sequestration. The Regional Partnerships represent more than 350 unique organizations in 43 States, three Native American Indian Nations, and four Canadian Provinces.

In FY 2011, several of the nine large-scale RCSP CO_2 injection projects are scheduled to begin injecting CO_2 for large volume (1 million tons/year) geologic storage tests. Most of the large-scale field tests will have completed the first stage of the projects consisting of site selection and characterization, NEPA, pre-injection monitoring, and permitting. One project will have concluded its injection of 1.5 million tons of CO_2 by FY 2011 and will be conducting post injection monitoring at the site. These large-volume injections are needed to demonstrate that the formations selected for storage have the capability and capacity to store CO_2 from coal-based energy systems.

Innovations for Existing Plants (IEP). The FY 2011 budget request for the IEP program is $65.0 million. The IEP program is focused on developing post-combustion CO_2 retrofit

capture technologies. The FY 2011 request represents a $13.0 million increase over FY 2010 to continue work initiated under an FY 2010 Funding Opportunity Announcement for bench-scale and slipstream development and testing of advanced post-combustion CO_2 capture technologies. Research initiated under an FY 2008 FOA directed at laboratory and bench-scale research in the areas of oxy-combustion, membranes, advanced solvents and sorbents and chemical looping will also continue.

Advanced Integrated Gasification Combined Cycle (IGCC). Advanced IGCC technology utilizes a pre-combustion pathway to convert coal or other carbon-containing feedstocks into synthesis gas, a mixture composed primarily of carbon monoxide and hydrogen used as fuel for power generation. The Department is developing advanced gasification technologies to meet the most stringent environmental regulations and facilitate the efficient capture of CO_2 for subsequent sequestration. Gasification plants are complex systems that rely on a large number of interconnected processes and technologies. Advances in the current state-of-the-art, as well as development of novel approaches, are required to make these systems affordable and reliable for commercial deployment. The Department is requesting $55.0 million in FY 2011 for the IGCC program. The program continues to focus on developing the next generation technology in gasification systems related to fuel flexible gasifiers, coal feed systems, high temperature clean-up, and revolutionary oxygen supply technology. These combined developments will significantly reduce the cost of future systems, improve their reliability, and facilitate smooth transition to future systems with carbon capture and storage.

Fuels. The FY 2011 budget request for the Fuels program is $12.0 million. The Fuels Program is focused on reducing technological market barriers for the reliable, efficient, and environmentally friendly conversion of coal to hydrogen with CCS for stationary applications. Efforts for hydrogen production will focus on generation at the plant for large-scale, central power applications, and not transportation. In FY 2011, activities include support for the bench-scale development of hydrogen separation technologies and components.

Fuel Cells. Fuel cells systems when coupled with coal gasification for large scale power generation hold great potential for leapfrog advances in efficiency. Fuel cells also produce very low emissions and are modular in nature so that can be scaled to almost any size deployment need. The ultimate goal of the program is the development of low-cost large (>100 MW) fuel cell power systems that will produce affordable, efficient, and environmentally friendly electrical power from coal with very high efficiency, including integrated coal gasification and carbon dioxide separation processes and capture at least 90 percent of the CO_2 emissions from the system. The program is driving to reduce the cost of large scale fuel cell by an order of magnitude compared to current technology. The FY 2011 budget request for the Fuel Cells program is $50.0 million. The Fuel Cells Program will continue to increase reliability of the Solid State Energy Conversion Alliance, or SECA, fuel cell technology and provide the technology base to permit continued improvement to low-cost fuel cells scalable to MW class ultra-clean systems with potential for up to 60 percent electrical efficiency for central power generation.

Advanced Turbines. The Advanced Turbine Program consists of a portfolio of laboratory and field research and development projects focused on performance-improvement technologies with great potential for increasing efficiency and reducing emissions and costs in coal-based applications. Future gasification based power systems outfitted with carbon capture and storage will require high efficiency hydrogen turbines. Hence, the current focus of the Advanced Turbine Program is the combustion of pure hydrogen fuels in MW-scale turbines greater than 100 MW size range and the compression of large volumes of CO_2. In FY 2011, the Advanced Turbines program aims to continue improving the firing temperature and throughput for the next generation of combustion turbines for coal-based integrated gasification combined cycle power systems that capture and sequester CO_2. The Department is requesting $31.0 million for this activity in FY 2011.

Advanced Research. The Advanced Research Program is a bridge between basic research and the development and deployment of innovative systems capable of creating highly efficient and environmentally benign electricity and power. The objective of the program is to support development of critical enabling components that provide cross cutting benefits across the entire coal research program. Example developments that are being pursued include high-temperature materials, revolutionary sensors and controls, and advanced computing/visualization techniques. The proposed $47.9 million FY2011 budget will continue to push revolutionary advances in efficiency improvements, computational analyses and projects aimed at a greater understanding of the physical, chemical, and thermo-dynamic barriers that currently limit the use of coal and other fossil fuels.

Additionally in FY 2011, a multi-lab partnership will be initiated to develop a comprehensive, integrated suite of computational models for accelerating the development of carbon capture technologies. The scientific underpinnings of the suite of models will ensure that learning from successive generations of a technology or learning from even competing technologies is maximized. The simulation-based confidence will reduce the risk in incorporating multiple innovative technologies into a new plant design, thereby significantly reducing the development cycle required to move novel technologies to commercialization.

Clean Coal Power Initiative. The 2011 Budget maintains the 2010 funding level for R&D, but does not request any demonstration funds because these projects are already strongly supported through the American Recovery and Reinvestment Act (ARRA). ARRA provided $3.4 billion for CCS, of which $800 million will support CCPI demonstration projects, increasing the total available funding for CCPI round 3 to roughly $1.4 billion. In FY 2011, FE will focus on project execution in all Rounds of CCPI, and completion of National Environmental Policy Act procedures for ongoing projects.

Tapping the Nation's Unconventional Oil and Gas Resources

FE's Natural Gas Technologies and Oil Technology programs have focused on science and technology to find and produce oil and gas from non-conventional reservoirs and reduce the environmental impact of resource development.

Natural Gas Technologies. In FY 2011, the Office of Basic Energy Sciences within the Office of Science will initiate a new research program in gas hydrates. Therefore, no funding is requested in the FE budget.

Petroleum – Oil Technology. No funding is requested for the Oil Technology program in FY 2011.

($ in Thousands)	FY 2010 Final Appropriation	FY 2011 Budget Request	% Change
Natural Gas Technologies R&D	$17,833	$0	-100%
Unconventional Fossil Energy Technologies	$20,000	$0	-100%
Petroleum R&D	$0	$0	0%

Petroleum Reserves

The Office of Petroleum Reserves manages the Strategic Petroleum Reserve and Northeast Home Heating Oil Reserve programs**,** which provide critical protection to the Nation and the public against economic damages from potential disruptions in foreign and domestic petroleum supplies; and the Naval Petroleum and Oil Shale Reserves, involving the Department's environmental legacy responsibilities from the sale of the Naval Petroleum Reserve No. 1 (NPR-1) in California and the operation of the NPR-3 stripper oil field and Rocky Mountain Oilfield Testing Center, both located near Casper, Wyoming.

Strategic Petroleum Reserve. The Strategic Petroleum Reserve (SPR) provides strategic and economic security against disruptions in oil supplies with an emergency stockpile of crude oil. The SPR is currently filled to capacity at 727 million barrels, which provides 75 days of U.S. petroleum import protection.

The FY 2011 budget request of $138.9 million for SPR is a decrease from FY 2010 funding. The decrease assumes a one-time cancellation of $71 million in balances from prior year appropriations for a 1 billion barrel expansion at the Richton, MS site and the use of these balances to partially fund the $209.9 million operations and management activities of the SPR.

FY 2011 budget includes funding for the SPR's cavern replacement project which is required to eliminate current environmental risks. The funds will provide for activities associated with the integration of a new storage cavern into site infrastructure at the Bayou Choctaw site.

Additionally, FY 2011 provides for the assessment of energy efficiency and greenhouse gas (GHG) control at SPR facilities toward meeting the DOE goal to lower GHG emissions at all DOE facilities. The SPR budget request will continue vapor pressure mitigation activities to ensure the availability of crude oil inventories at SPR sites within environmental and safety constraints and includes funding needed to move a degas plant to the West Hackberry site beginning in FY 2011.

Northeast Home Heating Oil Reserve. The Northeast heating oil reserve, which was established in 2000, is capable of assuring a short-term supplement to private home heating oil supplies in the event of a supply disruption or shortage in the northeast region. The two million barrel Reserve protects the Northeast against a supply disruption for up to 10 days, the time required for ships to carry heating oil from the Gulf of Mexico to New York Harbor.

The FY 2011 budget request of $11.3 million will fund continuing operation of the Reserve with the lease of commercial storage space, and provides funding for the award of new storage contracts in late FY 2011.

Naval Petroleum and Oil Shale Reserves. To date, three of the four original Naval Petroleum Reserves (NPR-1, NPR-2, and NPR-4) have been sold or transferred to the Department of the Interior. The only remaining oil reserve managed by the DOE is the Teapot Dome field (NPR-3) in Casper, WY, which is now a stripper field that also serves as an oilfield technology testing center (Rocky Mountain Oilfield Testing Center).

The FY 2011 budget request for this program is $23.6 million, which will continue to fund the equity finalization and environmental remediation of the former NPR-1 and the production operations for NPR-3. In FY 2011, all fossil energy related research and development at the Rocky Mountain Oilfield Testing Center will be funded through fully reimbursable (funds-in) agreements.

($ in Thousands)	**FY 2010 Final Appropriation**	**FY 2011 Budget Request**	**% Change**
Strategic Petroleum Reserve	$243,823	$138,861	-43%
Northeast Home Heating Oil Reserve	$11,300	$11,300	0%
Naval Petroleum and Oil Shale Reserves	$23,627	$23,614	0%

Conclusion

Our FY 2011 budget request will help maintain DOE's leadership role in addressing the issue of global climate change. FE is 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 a clean environment. We believe this budget will produce results. The investments we are proposing will help us deliver to the nation: superior electricity generating technologies that give us an affordable way to reduce greenhouse gases, particularly CO_2 emissions; and a fully capable Strategic Petroleum Reserve, Northeast Home Heating Oil Reserve, and Naval Petroleum and Oil Shale Reserves to effectively counter the economic disruptions of an energy emergency.

We look forward to working with this Subcommittee to achieve these goals.

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.

DOE's Fossil Energy Budget Summary

($ in Thousands)	**FY 2010 Final Appropriation**	**FY 2011 Budget Request**	**% Change**
Coal Technology R&D	$404,000	$403,850	0%
Natural Gas and Unconventional Fossil Energy Technology	$37,833	$0	-100%
Petroleum Reserves	$278,750	$173,775	-38%
Program Direction/Other R&D/Management Support	$230,550	$182,733	-21%
Total, Fossil Energy	**$951,133**	**$760,358**	**-20%**