DOE/CF-008
Volume 7

DEPARTMENT OF ENERGY

FY 2007 CONGRESSIONAL BUDGET REQUEST

FOSSIL ENERGY AND OTHER

FOSSIL ENERGY RESEARCH AND DEVELOPMENT
NAVAL PETROLEUM & OIL SHALE RESERVES
ELK HILLS SCHOOL LANDS FUND
STRATEGIC PETROLEUM RESERVE
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ENERGY INFORMATION ADMINISTRATION

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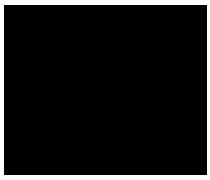
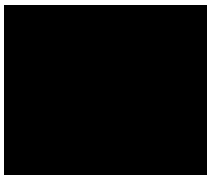
Fossil Energy Research and Development

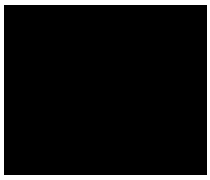
Naval Petroleum & Oil Shale Reserves



Elk Hills School Lands Fund



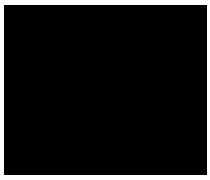
Strategic Petroleum Reserve



Clean Coal Technology

Energy Information Administration

Fossil Energy Research and Development



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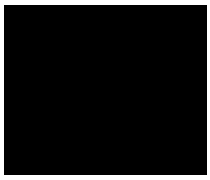

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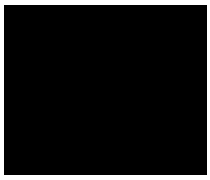

Strategic Petroleum Reserve

Clean Coal Technology

Energy Information Administration

Volume 7

Table of Contents

The Department of Energy's FY 2007 Congressional Budget justification is available on the Office of Chief Financial Officer/CFO homepage at http://www.mbe.doe.gov/budget/

Department of Energy
Appropriation Account Summary
(dollars in thousands - OMB Scoring)

	FY 2005 Current Approp.	FY 2006 Current Approp.	FY 2007 Congressional Request	FY 2007 vs. FY 2006 $	FY 2007 vs. FY 2006 %
Discretionary Summary By Appropriation					
Energy And Water Development, And Related Agencies Appropriation Summary:					
Energy Programs					
Energy supply and Conservation	1,801,815	1,812,627	1,923,361	+110,734	+6.1%
Fossil energy programs					
Clean coal technology	-160,000	-20,000	——	+20,000	+100.0%
Fossil energy research and development	560,852	592,014	469,686	-122,328	-20.7%
Naval petroleum and oil shale reserves	17,750	21,285	18,810	-2,475	-11.6%
Elk Hills school lands fund	36,000	84,000	——	-84,000	-100.0%
Strategic petroleum reserve	126,710	207,340	155,430	-51,910	-25.0%
Northeast home heating oil reserve	4,930	——	4,950	+4,950	N/A
Strategic petroleum account	43,000	-43,000	——	+43,000	+100.0%
Total, Fossil energy programs	629,242	841,639	648,876	-192,763	-22.9%
Uranium enrichment D&D fund	495,015	556,606	579,368	+22,762	+4.1%
Energy information administration	83,819	85,314	89,769	+4,455	+5.2%
Non-Defense environmental cleanup	439,601	349,687	310,358	-39,329	-11.2%
Science	3,635,650	3,596,391	4,101,710	+505,319	+14.1%
Nuclear waste disposal	343,232	148,500	156,420	+7,920	+5.3%
Departmental administration	128,598	128,519	128,825	+306	+0.2%
Inspector general	41,176	41,580	45,507	+3,927	+9.4%
Total, Energy Programs	7,598,148	7,560,863	7,984,194	+423,331	+5.6%
Atomic Energy Defense Activities					
National nuclear security administration:					
Weapons activities	6,625,542	6,369,597	6,407,889	+38,292	+0.6%
Defense nuclear nonproliferation	1,507,966	1,614,839	1,726,213	+111,374	+6.9%
Naval reactors	801,437	781,605	795,133	+13,528	+1.7%
Office of the administrator	363,350	338,450	386,576	+48,126	+14.2%
Total, National nuclear security administration	9,298,295	9,104,491	9,315,811	+211,320	+2.3%
Environmental and other defense activities:					
Defense environmental cleanup	6,800,848	6,130,447	5,390,312	-740,135	-12.1%
Other defense activities	687,149	635,578	717,788	+82,210	+12.9%
Defense nuclear waste disposal	229,152	346,500	388,080	+41,580	+12.0%
Total, Environmental & other defense activities	7,717,149	7,112,525	6,496,180	-616,345	-8.7%
Total, Atomic Energy Defense Activities	17,015,444	16,217,016	15,811,991	-405,025	-2.5%
Power marketing administrations:					
Southeastern power administration	5,158	5,544	5,723	+179	+3.2%
Southwestern power administration	29,117	29,864	31,539	+1,675	+5.6%
Western area power administration	171,715	231,652	212,213	-19,439	-8.4%
Falcon & Amistad operating & maintenance fund	2,804	2,665	2,500	-165	-6.2%
Colorado River Basins	——	-23,000	-23,000	——	——
Total, Power marketing administrations	208,794	246,725	228,975	-17,750	-7.2%
Federal energy regulatory commission	——	——	——	——	——
Subtotal, Energy And Water Development and Related Agencies	24,822,386	24,024,604	24,025,160	+556	+0.0%
Uranium enrichment D&D fund discretionary payments	-459,296	-446,490	-452,000	-5,510	-1.2%
Excess fees and recoveries, FERC	-18,452	-15,542	-16,405	-863	-5.6%
Total, Discretionary Funding	**24,344,638**	**23,562,572**	**23,556,755**	**-5,817**	**-0.0%**

Fossil Energy Research and Development

Fossil Energy Research and Development

Table of Contents

The Department of Energy's FY 2007 Congressional Budget justification is available on the Office of Chief Financial Officer/CFO homepage at http://www.mbe.doe.gov/budget/

Fossil Energy Research and Development

Proposed Appropriation Language

For necessary expenses in carrying out fossil energy research and development activities, under the authority of the Department of Energy Organization Act (Public Law 95–91), including the acquisition of interest, including defeasible and equitable interests in any real property or any facility or for plant or facility acquisition or expansion, [the hire of passenger motor vehicles, the hire, maintenance, and operation of aircraft, the purchase, repair, and cleaning of uniforms, the reimbursement to the General Services Administration for security guard services,]and for conducting inquiries, technological investigations and research concerning the extraction, processing, use, and disposal of mineral substances without objectionable social and environmental costs (30 U.S.C. 3, 1602, and 1603), [$597,994,000] *$469,686,000* to remain available until expended, of which [$18,000,000 is] $*54,000,000 shall be derived by transfer from "Clean Coal Technology" and is available* to continue a multi-year project coordinated with the private sector for FutureGen, without regard to the terms and conditions applicable to clean coal [technological] *technology* projects: *Provided*, That the initial planning and research stages of the FutureGen project shall include a matching requirement from non-Federal sources of at least 20 percent of the costs: *Provided further*, That any demonstration component of such project shall require a matching requirement from non-Federal sources of at least 50 percent of the costs of the component: *Provided further*, That of the amounts provided, [$50,000,000] *$4,957,000* is available, after coordination with the private sector, for a request for proposals for **[**a**]** *the* Clean Coal Power Initiative providing for competitively-awarded research, development, and demonstration projects to reduce the barriers to continued and expanded coal use: *Provided further*, That no project may be selected for which sufficient funding is not available to provide for the total project: *Provided further*, That funds shall be expended in accordance with the provisions governing the use of funds contained under the heading "Clean Coal Technology" in 42 U.S.C. 5903d as well as those contained under the heading "Clean Coal Technology" in prior appropriations: *Provided further*, That the Department may include provisions for repayment of Government contributions to individual projects in an amount up to the Government contribution to the project on terms and conditions that are acceptable to the Department including repayments from sale and licensing of technologies from both domestic and foreign transactions: *Provided further*, That such repayments shall be retained by the Department for future coal-related research, development and demonstration projects: *Provided further*, That any technology selected under this program shall be considered a Clean Coal Technology, and any project selected under this program shall be considered a Clean Coal Technology Project, for the purposes of 42 U.S.C. 7651n, and chapters 51, 52, and 60 of title 40 of the Code of Federal Regulations: *Provided further*, That no part of the sums herein made available shall be used for the field testing of nuclear explosives in the recovery of oil and gas[: *Provided further*, That up to 4 percent of program direction funds available to the National Energy Technology Laboratory may be used to support Department of Energy activities not included in this account: *Provided further*, That for fiscal year 2006 salaries for Federal employees performing research and development activities at the National Energy Technology Laboratory can continue to be funded from program accounts: *Provided further*, That the Secretary of Energy is authorized to accept fees and contributions from public and private sources, to be deposited in a contributed funds account, and prosecute projects using such fees and contributions in cooperation with other Federal, State, or private agencies or concerns: *Provided further*, That revenues and other moneys received by or for the account of the Department of Energy or otherwise generated by sale of products in connection with projects of the Department appropriated under the Fossil Energy Research

and Development account may be retained by the Secretary of Energy, to be available until expended, and used only for plant construction, operation, cost, and payments to cost-sharing entities as provided in appropriate cost-sharing contracts or agreements]. *In addition, $203,000,000 to become available on October 1, 2007 and remain available until expended, to continue the FutureGen project, subject to the terms and conditions under this heading.*

Explanation of Change

Changes reflect revisions to funding amounts and fiscal year references. Other changes include:

…. the hire of passenger motor vehicles, the hire, maintenance, and operation of aircraft, the purchase, repair, and cleaning of uniforms, the reimbursement to the General Services Administration for security guard services,

Fossil Energy Research and Development does not require this language in FY 2007 because the vehicles are leased, there are no aircraft and there are no reimbursements to GSA for uniforms.

..... Provided further, *That up to 4 percent of program direction funds available to the National Energy Technology Laboratory may be used to support Department of Energy activities not included in this account:*

Language is eliminated in the FY 2007 budget request. Adequate funding is provided in the program direction account to accommodate these activities.

……Provided further, *that for fiscal year 2006 salaries for Federal employees performing research and development activities at the National Energy Technology Laboratory can continue to be funded from program accounts*

Language is no longer required because Congress directed that all Federal employees performing research and development activities at the National Energy Technology Laboratory must be funded in Program Direction beginning in FY 2007.

…….Provided further, *That the Secretary of Energy is authorized to accept fees and contributions from public and private sources, to be deposited in a contributed funds account, and prosecute projects using such and contributions in cooperation with other Federal, State, or private agencies or concerns:*

Language is eliminated in 2007 budget request because the authority exists under current Law to establish research partnerships and accept funds from other organizations.

..... *In addition, $203,000,000 to become available on October 1, 2007 and remain available until expended, to continue the FutureGen project, subject to the terms and conditions under this heading.*

Language provides for an advance appropriation of $203,000,000 of new budget authority for FY 2008 for the FutureGen Project.

Fossil Energy Research and Development
Office of Fossil Energy

Overview

Appropriation Summary by Program [a]

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[b]	FY 2006 Current Appropriation	FY 2007 Request
Fossil Energy Research and Development					
Coal	342,502	379,998	-3,800	376,198	330,119
Natural Gas Technologies	43,632	33,000	-330	32,670	0
Petroleum - Oil Technology	32,985	32,000	-320	31,680	0
Program Direction	105,602	106,941	-1,069	105,872	129,196
Plant and Capital Equipment	6,902	20,000	-200	19,800	0
Fossil Energy Environmental Restoration	9,467	9,600	-96	9,504	9,715
Import/Export Authorization	1,774	1,799	-18	1,781	0
Advanced Metallurgical Research	9,861	8,000	-80	7,920	0
National Academy of Sciences Program Review	493	0	0	0	0
Special Recruitment Programs	656	656	-7	649	656
Cooperative Research and Development	8,052	6,000	-60	5,940	0
Subtotal, Fossil Energy Research and Development	561,926	597,994	-5,980	592,014	469,686
Use of Prior-Year Balances	-1,074	0	0	0	0
Total, Fossil Energy Research and Development	560,852	597,994	-5,980	592,014	469,686
Clean Coal Technology					
Deferral of Unobligated Balances, FY 2005	0	257,000	0	257,000	0

[a] SBIR/STTR funding in the amount of $11,002,000 was transferred to the Science Appropriation in FY 2005. Estimates for SBIR/STTR budgeted in FY 2006 and FY 2007 are $11,345,000 and $8,887,000 respectively.

[b] Includes a rescission of $7,855,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006, and the transfer from and return to the SPR Facilities Account of $43,000,000 to finance the Hurricane Katrina Drawdown.

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[b]	FY 2006 Current Appropriation	FY 2007 Request
Advance Appropriation	97,000	0	0	0	0
Deferral of Unobligated Balances, FY 2007	0	-257,000	0	-257,000	257,000
Rescission	0	0	0	0	-203,000
Rescission Uncommitted Balances	0	-20,000	0	-20,000	0
Transfer to Fossil Energy R&D	0	0	0	0	-54,000
Deferral	-257,000	0	0	0	0
Total, Clean Coal Technology	-160,000	-20,000	0	-20,000	0
Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund					
Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	0	0	0	50,000
Receipts Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	0	0	0	-50,000
Repeal Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	0	0	0	-50,000
Repeal Receipts Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	0	0	0	50,000
Total, Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	0	0	0	0
Strategic Petroleum Reserve	126,710	166,000	+41,340	207,340	155,430
Strategic Petroleum Reserve Petroleum Account	43,000	0	-43,000	-43,000	0
Northeast Home Heating Oil Reserve	4,930	0	0	0	4,950
Naval Petroleum Reserves	17,750	21,500	-215	21,285	18,810
Elk Hills School Lands Funds	36,000	84,000	0	84,000	0
Total, Office of Fossil Energy	629,242	849,494	-7,855	841,639	648,876

Preface

Secure, affordable, and environmentally acceptable energy sources are essential for our Nation to maintain our high quality living standards for current and future generations. In support of this, the Fossil Energy (FE) Research and Development Program addresses issues related to the reliable, efficient, affordable and environmentally sound use of fossil fuels.

The Fossil Energy Research and Development program implements several key Presidential Initiatives. The President's Hydrogen Fuel Initiative will work through partnerships with industry to develop the technologies and infrastructure needed to produce, store, and distribute hydrogen, and to use it in stationary, portable, and vehicular applications. The President's Clean Coal Power Initiative will partner with industry to demonstrate advanced clean coal technologies at commercial scale. The President's FutureGen project will partner with industry to build and operate the world's first near-zero atmospheric emissions power plant that will produce electricity and hydrogen from coal while capturing and storing carbon dioxide.

Within the Energy and Water Development Appropriation, Fossil Energy Research and Development has ten programs: Coal, Natural Gas Technologies, Petroleum - Oil Technologies, Program Direction, Plant and Capital Equipment, Environmental Restoration, Import/Export Authorization, Advanced Metallurgical Research, Cooperative Research and Development, and the Special Recruitment Program. Other programs which make up the Office of Fossil Energy include the Clean Coal Technology Program, the Strategic Petroleum Reserve, the Northeast Home Heating Oil Reserve, the Naval Petroleum and Oil Shale Reserves, and the Elk Hills School Lands Funds. Natural Gas Technologies and Oil Technology are being terminated in FY 2007. The Energy Policy Act of 2005 (Public Law 109-58) created a mandatory Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research program that would begin in 2007. The Budget proposes to cancel the program through a future legislative proposal.

This Overview will describe Strategic Context, Mission, Benefits, Strategic Goals, and Funding by General and Program Goal. These items together put the appropriation in perspective. The Means and Strategies section addresses how the goals will be achieved and how performance will be measured. Finally, this Overview will address the Program Assessment Rating Tool (PART) and Significant Program Shifts.

Strategic Context

Following publication of the Administration's National Energy Policy, the Department developed a Strategic Plan that defines its mission, four strategic goals for accomplishing that mission, and seven general goals to support the strategic goals. Each appropriation has developed quantifiable goals to support the general goals. Thus, the "goal cascade" is the following:

Department Mission → Strategic Goal (25 yrs) → General Goal (10-15 yrs) → Program Goal (GPRA Unit) (10-15 yrs)

To provide a concrete link between budget, performance, and reporting, the Department developed a "GPRA[c] Unit" concept. Within DOE, a GPRA Unit defines a major activity or group of activities that

[c] Government Performance and Results Act of 1993

support the core mission and aligns resources with specific goals. Each GPRA Unit has completed or will complete a Program Assessment Rating Tool (PART). A unique program goal was developed for each GPRA Unit. A numbering scheme has been established for tracking performance and reporting.[d]

The goal cascade accomplishes two things. First, it ties major activities for each program to successive goals and, ultimately, to DOE's mission. This helps ensure the Department focuses its resources on fulfilling its mission. Second, the cascade allows DOE to track progress against quantifiable goals and to tie resources to each goal at any level in the cascade. Thus, the cascade facilitates the integration of budget and performance information in support of the GPRA and the President's Management Agenda (PMA).

Another important component of our strategic planning – the President's Management Agenda – includes use of the Administration's R&D investment criteria to plan and assess programs and projects. The criteria were developed in 2001 and further refined with input from agencies, Congressional staff, the National Academy of Sciences, and numerous private sector and nonprofit stakeholders.

The chief elements of the R&D investment criteria are quality, relevance, and performance. Programs must demonstrate fulfillment of these elements. For example, to demonstrate relevance, programs are expected to have complete plans with clear goals and priorities. To demonstrate quality, programs are expected to commission periodic independent expert reviews. There are several other requirements, many of which R&D programs have and continue to undertake.

An additional set of criteria were established for R&D programs developing technologies that address industry issues. Some key elements of the criteria include: the ability of the programs to articulate the appropriateness and need for Federal assistance; relevance to the industry and the marketplace; identification of transition points to industry commercialization (or of an off-ramp if progress does not meet expectations) and the potential public benefits, compared to alternative investments, that may accrue if the technology is successfully deployed.

The OMB-OSTP guidance memo to agencies dated August 12, 2004, describes the R&D investment criteria fully and identified steps agencies should take to fulfill them. (The memo is available on line at www.ostp.gov/html/fy05developingpriority.pdf.) Where appropriate throughout these justification materials, especially in Significant Program Shifts and Explanation of Funding Changes subheadings, specific R&D investment criteria and requirements are cited to explain the Department's allocations of resources.

Mission

The mission of the Fossil Energy (FE) R&D Program is to create public benefits by enhancing U.S. economic, environmental, and energy security. The program carries out three types of activities: (1) managing and performing energy-related research that reduces market barriers to the reliable, efficient and environmentally sound production and use of fossil fuels for domestic consumption and power generation and conversion to other fuels such as hydrogen; (2) partnering with industry and others to advance clean and efficient fossil energy technologies toward commercialization in the U.S. and

[d] The number scheme uses the following numbering convention: First 2 digits identify the General Goal (01 through 07); second two digits identify the GPRA Unit; last four digits are reserved for future use.

international markets; and (3) supporting the development of information and policy options that benefit the public by ensuring access to adequate supplies of affordable and clean energy.

Benefits

The extent to which future public benefits are realized from FER&D activities are a complex function of factors including: success meeting R&D goals; competition from other advanced technologies; future energy prices; and the future regulatory environment. Since the future of markets and regulations are uncertain, alternative, credible scenarios need to be considered. The methodologies, sensitivities, and assumptions used to develop benefits estimates are very important, and must be considered before drawing conclusions based on benefits estimates.

FE, in coordination with other Department R&D programs, has developed benefit estimates for its applied R&D programs. The Department is working to improve consistency across programs in the methodology and assumptions used in estimating program costs and benefits. The assumptions and methods underlying the modeling efforts have significant impact on the estimated benefits. Results could vary significantly if external factors differ from the baseline case or alternative scenarios assumed for this analysis. The modeling includes competing technologies. Possible changes in public policy and disruptions in the energy system which may affect estimated benefits are not modeled. External factors such as unexpected changes in competing technology costs, identified in the Means and Strategies section for each of the individual contributing programs, could also affect FE's ability to achieve its strategic goals. Projections of future benefits depend on assumptions relating to how the economy will evolve over time and how rapidly improved technologies will be developed and adopted. The estimated benefits here are predicated in the assumptions included in the EIA Annual Energy Outlook 2005 Reference Case projections.

Some key assumptions about macroeconomic activity, energy demand, and technology results include the following "business-as-usual" assumptions used in the EIA Reference Case:

- Average economic growth of 3.1 percent annually between 2003 and 2025
- World oil price reaching about $30 (2003 dollars) in 2025
- Price per thousand cubic feet of natural gas delivered to all users of $6.77/mcf in 2025

EIA also provides projections under alternative economic assumptions form 2.5 to 3.6 annual growth between 2003 and 2025. Across this range, total energy consumption may grow by anywhere from 27 to 44 percent between 2003 and 2025. EIA also offers a range of technology assumptions, which also affect consumption. Changing assumptions on important variables such as these would likely affect the estimated benefits in this budget.

NEMS-based estimates for the FE R&D portfolio show cumulative savings through 2025 due to lower cost electricity generation options ranging from $44 to $235 billion dollars ($2004 dollars, non-discounted). Savings discounted at 3 percent, consistent with National Research Council guidelines, range from $25 to $147 billion. These are gross estimates – costs to achieve them are not included. The ranges are based on outputs from alternative scenarios, including two with higher (compared to the AEO Reference Case) oil and gas prices, and two with carbon emission constraints. In the highest fuel price scenario, the 2025 world oil price is $48/barrel and the average price for natural gas delivered to all users is $9.53/mcf . Documentation of the 2005 FE benefits results, methodology, and assumptions

is expected to be completed by March 31, 2006, and will be provided at www.netl.doe.gov. Benefits from advanced technology deployment beyond 2025 are not considered, since the 2005 NEMS is limited to a 2025 time frame. Other types of benefits may also occur, such as reduced mercury emissions, and derivative technology and products. In addition, there may be economic benefits, particularly from longer-term activities such as those from the hydrogen, methane hydrates, and portions of carbon sequestration which are not currently modeled in NEMS and are therefore not included in these reported benefits.

FE is continuing to work on important methodological challenges affecting benefits estimates. One of the most important challenges concerns finding a generally acceptable approach for reflecting the impacts of technology risk. This is critical since high-risk R&D is characteristic of much of the Government-supported energy research portfolio. Risk is one of the areas that the National Research Council is focusing on as part of its ongoing study of the prospective benefits of Government-supported energy R&D.

Strategic, General and Program Goals

The Department's Strategic Plan identifies four strategic goals (one each for defense, energy, science, and environmental aspects of the mission) plus seven general goals that are linked to the strategic goals. The Fossil Energy Research and Development appropriation supports the following goals:

Energy Strategic Goal: To protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy.

General Goal 4, Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The programs funded within the Fossil Energy Research and Development appropriation have three Program Goals that contribute to the General Goals in the "goal cascade". These goals are:

Program Goal 04.55.00.00**:** "Zero Emissions" Coal-Based Electricity and Hydrogen Production: Create public/private partnerships to provide technology to ensure continued electricity generation and hydrogen production from the extensive U.S. fossil fuel resource, including control technologies to permit reasonable-cost compliance with emerging regulations, and ultimately, by 2015, "zero emission" plants (including carbon) that are fuel-flexible, and capable of multi-product output and energy efficiencies over 60 percent with coal and 75 percent with natural gas.

Program Goals 04.56.00.00 and 04.57.00.00 cover oil and gas activities, and will not be achieved with the termination of these programs in FY 2007.

Contribution to General Goal

FE contributes to General Goal 4 through its Coal Program. The Coal Program pursues Goal 04.55 above and encompasses the following activities:

- The Clean Coal Power Initiative, by 2010 will initiate demonstration of advanced coal-based power generation technologies capable of achieving: 45 percent electrical efficiency; greater than 90 percent mercury removal at a cost of 70 percent of current technology; and 0.15 lb/MMBtu NO_x at 75 percent of the cost of current technology (selective catalytic reactors). These technologies can be configured to co-produce heat, fuels, chemicals or other useful byproducts, and provide a deployment-ready suite of advanced technologies that can produce substantial near-, mid-, and long-range economic and environmental public benefits.
- The FutureGen project will prove the technical feasibility and economic viability of the "near-zero atmospheric emission" (including carbon) coal concepts. By 2012, begin operation of a nominal 275 –megawatt prototype plant that will produce electricity and hydrogen with "near-zero" atmospheric emissions and prove the effectiveness, safety, and performance of CO_2 sequestration. By 2016, the replication of "near-zero" atmospheric emission coal plants could produce electricity at no more than 10 percent increase in cost and produce hydrogen at $4/million Btu (wholesale).
- The Innovations for Existing Plants subprogram will provide a portfolio of advanced, cost-effective emissions controls that can: reduce mercury emissions by 50 -70%. The Administration's Research and Development Investment Criteria states that the presence of a regulatory-driven market incentive reduces the need for Federal funding of R&D. Promulgation of the Clean Air Interstate Rule and the Clean Air Mercury Rule in 2005 provided a market incentive for developing many advanced, cost-effective emissions controls and should reduce the need for Federally funded R&D for existing plants.
- The Advanced Integrated Gasification Combined Cycle (IGCC) program will develop by 2010 advanced gasification combined cycle technologies that can produce electricity from coal at 45-50 percent efficiency at a capital cost of $1000/kW. By 2012, gasification technology will be integrated with CO_2 separation, capture, and sequestration into "near-zero" atmospheric emissions configurations that can provide electricity with less than a 10 percent increase in cost. The Advanced Turbines Program will by 2010, develop advanced turbine combined cycle technologies that can produce electricity from coal at 45-50 percent efficiency. By 2012, advanced turbines, capable of firing up to 100% hydrogen, will be integrated with CO_2 separation, capture, and sequestration into "near-zero" atmospheric emissions configurations. The goal of the Sequestration R&D program is 90 percent CO_2 capture with 99 percent storage permanence at less than 10 percent increase in the cost of energy services in 2012.
- The Carbon Sequestration subprogram, by 2007, will demonstrate at a pilot plant scale, technologies to reduce the cost of carbon separation and capture from new coal-based power systems by 75 percent compared to commercial systems ($200/tonne carbon in year 2000). By 2012, the program will develop technologies to separate, capture, transport, and sequester carbon using either direct or indirect systems that result in less than 10 percent increase in the cost of electricity.
- The Department's Fuels program is a key component of the President's Hydrogen Fuel Initiative as well as providing the Hydrogen production supporting R&D for the FutureGen project (a Presidential priority). It is a major contributor to reaching the FE Program Goal 04.55.00.00, i.e. Near-Zero Emissions Coal-Based Electricity and Hydrogen Production. By 2010 the Fuels Program will complete the development of modules capable of producing hydrogen from coal at $5.50 per million Btu ($0.70 per gallon gasoline equivalent, without incentives or tax credits) when integrated with advanced coal power systems.

- The Advanced Research program conducts research that sustains U.S. preeminence in fossil fuel technology by supporting development of materials, computational methods, and control system knowledge needed to bridge gaps between science and advanced engineering. Advanced Research efforts will allow development, by 2010, of enabling technologies that support the goals of "near-zero" atmospheric emissions energy (FutureGen) systems.
- The objectives of the Fuel Cells activity are to enable by 2015 the generation of efficient, cost-effective, carbon-free electricity from domestic coal with "near-zero" atmospheric emissions in central station applications; and provide the technology base to permit, by 2010, low cost ($400/kW, a 10-fold reduction versus the 2000 baseline), ultra-clean, 40-60 percent electrical efficiency (when coal fueled), 3-20 kilowatt solid oxide fuel cell modules for grid-independent distributed generation applications. The Fuel Cells program directly supports the President's FutureGen Project through development of cost effective, highly efficient, power blocks that facilitate sequestration in coal based systems.
- The Natural Gas Technologies and Oil Technology Programs are being terminated in FY 2007. Prior year funds will be used to conduct ongoing projects.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
General Goal 4, Energy Security			
Program Goal 04.55.00.00, Zero Emissions Coal-Based Electricity and Hydrogen Production	342,502	376,198	330,119
Program Goal 04.56.00.00, Natural Gas Technologies, Abundant	43,632	32,670	0
Program Goal 04.57.00.00, Petroleum - Oil Technology, Abundant Oil	32,985	31,680	0
Total General Goal 4, Energy Security	419,119	440,548	330,119
All Other			
Program Direction	105,602	105,872	129,196
Plant and Capital Equipment	6,902	19,800	0
Fossil Energy Environmental Restoration	9,467	9,504	9,715
Import/Export Authorization	1,774	1,781	0
Advanced Metallurgical Research	9,861	7,920	0
National Academy of Sciences Program Review	493	0	0
Special Recruitment Programs	656	649	656
Cooperative Research and Development	8,052	5,940	0
Total, All Other	142,807	151,466	139,567
Total, General Goal 4 (Fossil Energy Research and Development)	561,926	592,014	469,686

Program Assessment Rating Tool (PART)

The Department implemented a tool to evaluate selected programs. PART was developed by the Office of Management and Budget (OMB) to provide a standardized way to assess the effectiveness of the

Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews.

The current focus is to establish outcome and output-oriented goals, the successful completion of which will lead to benefits to the public, such as increased national security and energy security, and improved environmental conditions.

Based in part on their "Ineffective" rating of the PART for the FY 2005 Budget, the Oil and Natural Gas Technology programs will be terminated in FY 2007. In the PART for the FY 2007 Budget, Coal Energy Technology was rated as "Adequate".

Based on the PART analysis, it was decided that the program participate in the development of a consistent framework for the Department to analyze the costs and benefits of its R&D investments, and to apply this guidance as part of FY 2007 Budget Development. FE has made a commitment to improve the quality of its benefits estimates. This commitment includes incorporation of comments by national experts who reviewed the benefits methodology, working closely with DOE's Office of Energy Efficiency and Renewable Energy, the Office of Nuclear Energy, and the Office of Electricity Delivery and Energy Reliability to develop common energy-related scenarios for National Energy Modeling System (NEMS) and approaches for exploring technology risk, and working intensively with a National Research Council Committee as part of an ongoing study of methodologies to estimate the prospective benefits of DOE energy R&D. The Department prepared preliminary benefits estimates for its applied R&D programs, but still needs to improve and augment the NEMS methodology and consistency across programs in the methodology and assumptions used in estimating program costs and benefits.

Significant Policy or Program Shifts

Budget discipline necessitated close scrutiny of all Fossil Energy programs, using strict guidelines to determine their effectiveness and compare them to other programs offering more clearly demonstrated and substantial benefits. As a result, the Budget proposes to conduct orderly termination of the Oil and Gas programs in FY 2007. Consistent with this decision, the budget proposes to repeal the Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund through a future legislative proposal.

Other significant budget increases will ensure that R&D supporting the FutureGen project is completed on schedule. FutureGen will employ advanced generation coal gasification technology integrated with combined cycle electricity generation, hydrogen production, and capture and sequestration of carbon dioxide (CO_2). The aim of FutureGen is to prove out the technical feasibility and potential economic viability of a near-zero atmospheric emission coal energy system deployable by 2020. This increase is consistent with the FutureGen project plan; maintains the commitment to FutureGen, which is a Presidential priority; is consistent with the R&D Investment Criteria; and strengthens the Climate Change Technology Program.

In FY 2007, as directed by Congress, Fossil Energy has budgeted in Program Direction the salaries and expenses of Federal employees performing research and development activities. The direct program funding provides funds for Federal staff such as Technicians, Engineers and Scientists in support of the National Energy Technology Laboratory's Office of Science and Engineering Research (In-House Research & Development) and the Albany Research Center.

Facilities Maintenance and Repair

The Department's Facilities Maintenance and Repair activities are tied to its programmatic missions, goals, and objectives. Facilities Maintenance and Repair activities funded by this budget are displayed below.

Direct-Funded Maintenance and Repair

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
National Energy Technology Laboratory	7,925	8,131	8,326
Total, Direct-Funded Maintenance and Repair, Fossil Energy Research and Development	7,925	8,131	8,326

Fossil Energy Research and Development
Office of Fossil Energy

Funding by Site by Program

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Ames National Laboratory			
Coal	520	930	1,020
Argonne National Laboratory (East)			
Coal	3,534	3,512	3,489
Natural Gas Technologies	210	0	0
Petroleum – Oil Technology	575	230	0
Total, Argonne National Laboratory (East)	4,319	3,742	3,489
Brookhaven National Laboratory			
Coal	100	100	200
Natural Gas Technologies	150	150	0
Total, Brookhaven National Laboratory	250	250	200
Idaho National Engineering and Environmental Laboratory			
Coal	690	875	1,025
Natural Gas Technologies	395	65	0
Petroleum – Oil Technology	0	80	0
Total, Idaho National Engineering and Environmental Lab	1,085	1,020	1,025
Lawrence Berkeley National Laboratory			
Coal	150	781	1,238
Natural Gas Technologies	569	360	0

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Petroleum – Oil Technology	435	1,113	0
Total, Lawrence Berkeley National Laboratory	1,154	2,254	1,238
Lawrence Livermore National Laboratory			
Coal	0	160	310
Natural Gas Technologies	250	0	0
Petroleum – Oil Technology	170	150	0
Total, Lawrence Livermore National Laboratory	420	310	310
Los Alamos National Laboratory			
Coal	1,428	654	1,071
Natural Gas Technologies	250	0	0
Petroleum – Oil Technology	453	610	0
Total, Los Alamos National Laboratory	2,131	1,264	1,071
National Energy Technology Laboratory			
Coal	308,708	346,098	299,072
Natural Gas Technologies	37,744	29,617	0
Petroleum – Oil Technology	27,819	26,187	0
Program Direction	77,931	79,176	94,449
Plant and Capital Equipment	6,902	19,800	0
Fossil Energy Environmental Restoration	7,214	6,033	6,300
Cooperative Research and Development	8,013	5,900	0
Advanced Metallurgical Research	9,861	7,920	0
Total, National Energy Technology Laboratory	484,192	520,731	399,821
Oak Ridge National Laboratory			
Coal	6,951	6,157	5,966

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Natural Gas Technologies	573	125	0
Petroleum – Oil Technology	500	500	0
Total, Oak Ridge National Laboratory	8,024	6,782	5,966
Pacific Northwest Laboratory			
Coal	11,240	5,620	5,450
Natural Gas Technologies	560	200	0
Petroleum – Oil Technology	352	0	0
Total, Pacific Northwest Laboratory	12,152	5,820	5,450
Sandia National Laboratories			
Coal	820	949	1,175
Petroleum – Oil Technology	300	0	0
Total, Sandia National Laboratories	1,120	949	1,175
Washington Headquarters			
Coal	8,361	10,362	10,103
Natural Gas Technologies	2,931	2,153	0
Petroleum – Oil Technology	2,381	2,810	0
Program Direction	27,671	26,696	34,747
Fossil Energy Environmental Restoration	2,253	3,471	3,415
Import/Export Authorization	1,774	1,781	0
Special Recruitment Programs	656	649	656
National Academy of Sciences Program Review	493	0	0
Cooperative Research and Development	39	40	0
Total, Washington Headquarters	46,559	47,962	48,921
Total, Fossil Energy Research and Development	561,926	592,014	469,686

Site Description

Ames National Laboratory

The Ames National Laboratory is located in Ames, Iowa.

Coal
Ames National laboratory conducts advanced research on virtual simulations and high temperature materials.

Argonne National Laboratory (East)

The Argonne National Laboratory (ANL), located in Argonne, Illinois, is a major multi-program laboratory managed and operated for the U.S. Department of Energy (DOE) by the University of Chicago under a performance-based contract.

Coal
Argonne research supports concepts for various technologies supporting FutureGen; supports DOE strategies to capture CO_2 from existing and advanced fossil fuel conversion systems in Carbon Sequestration; supports DOE strategies to develop non-destructive testing examination of materials and mineral sequestration kinetics in the Advanced Research; and supports the core technology program in the Fuel Cells program.

Natural Gas Technologies
Argonne research for the Fossil Energy Natural Gas Technologies program in FY 2005 supported Drilling, Completion and Stimulation technology development and Environmental Science R&D. No activities are planned in FY 2006 and FY 2007.

Brookhaven National Laboratory

The Brookhaven National Laboratory (BNL) is located on Long Island, New York.

Coal
The Brookhaven National Laboratory conducts research on various technologies for central systems.

Natural Gas Technologies
Brookhaven research for the Fossil Energy Natural Gas Technologies program in FY 2005 supports Drilling, Completion and Stimulation technology development and Environmental Science R&D. No activities are planned in FY 2006 and FY 2007.

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) is located outside of Idaho Falls, Idaho.

Coal
Research conducted at INEEL supports concepts for various technologies for central systems; conducts research on breakthrough concepts to separate and capture CO_2 in Carbon Sequestration; and conducts research and development on materials development and bio-processing research in Advanced Research.

Natural Gas Technologies
Research conducted in FY 2005 supported environmental technology development, drilling technology and microbial analysis of gas hydrates, and small pipe development. In FY 2006 and FY 2007 no activity is planned.

Lawrence Berkeley National Laboratory

The Lawrence Berkeley National Lab (LBNL) is located in Berkeley, California.

Coal
The Lawrence Berkeley National Lab conducts research which supports concepts for various technologies for central systems; and conducts research and development on geologic sequestration approaches and measurement, monitoring, and verification protocols in Carbon Sequestration.

Natural Gas Technologies
Research conducted in FY 2005 supports environmental analysis and modeling, heavy oil upgrading, reservoir characterization, and gas hydrates characterization. No new activity is planned in FY 2006 and FY 2007.

Petroleum – Oil Technology
Research supports enhanced oil recovery (EOR) and environmental modeling.

Lawrence Livermore National Laboratory

The Lawrence Livermore National Lab (LLNL) is located in Livermore, California.

Natural Gas Technologies
Research conducted in FY 2005 supported environmental emissions analysis, reservoir geophysics, and hydrates properties, and hyperspectral remote leak detection. No activity is planned in FY 2006 or FY 2007.

Petroleum – Oil Technology
Research supports environmental and reservoir modeling. No new activity is planned in FY 2006 and FY 2007.

Los Alamos National Laboratory

The Los Alamos National Laboratory (LANL) is located in Los Alamos, New Mexico.

Coal
Research conducted by the Los Alamos National Laboratory supports concepts for various technologies for central systems; conducts research and development in the area of Carbon Sequestration to lower the

costs of CO_2 capture, provide fundamental scientific information on engineered terrestrial sequestration approaches, and develop advanced instrumentation to measure and validate terrestrially sequestered carbon; and conducts research and development in the area of Advanced Research to model mineral sequestration and develop hydrogen separation membranes.

Natural Gas Technologies
Research conducted in FY 2005 supported multi-purpose energy meter. No activity is planned in FY 2006 or FY 2007.

Petroleum – Oil Technology
Research conducted in FY 2005 supported seismic and drilling research. No activity is planned in FY 2006 or FY 2007.

National Energy Technology Laboratory

The National Energy Technology Laboratory (NETL), located in Morgantown, West Virginia, Pittsburgh, Pennsylvania, and Tulsa, Oklahoma, is a multi-purpose laboratory, owned and operated by the U.S. Department of Energy. NETL conducts and implements science and technology development programs for the Department in energy and energy-related environmental systems. NETL's key functions are to shape, fund, and manage extramural (external) RD&D projects, conduct on-site science and technology research, and support energy policy development and best business practices within the Department.

Coal
Scientists and engineers at the National Energy Technology Laboratory (NETL) conduct basic and applied research and development in support of the Coal programs. In-house research in the coal gasification area involves advanced materials testing; gas-stream pollutant removal; sorbents development; particulate removal; and membrane separations. NETL researchers are also working to improve the next generation of gas turbines, fuel cells, and coupled turbine-fuel cell systems. In-house emissions control research focuses on the problems of Hg and $PM_{2.5}$ because these will be regulated in the relatively near future, while the by-product utilization in-house research solves environmental problems related to wastes and by-products formed during combustion processes. Research in carbon sequestration science studies the scientific basis for carbon sequestration options for large stationary sources of CO_2. Finally, research in computational energy science is being conduced to utilize advanced simulation techniques to improve and speed the development of cleaner, more efficient energy devices and plants.

Natural Gas Technologies
Within the Natural Gas Program, NETL has capability in hydrogen testing, computational chemistry, laser ignition development, and plastic pipe defect detection and these functions will continue in FY 2005. No new activity is planned in FY 2006 and FY 2007.

Petroleum – Oil Technology
Specific onsite expertise in enhanced oil recovery (EOR), environmental science, computational chemistry, and policy analysis supports the Oil Technology Program. No new activity is planned in FY 2006 and FY 2007.

Program Direction and Management Support
This activity provides funding for salaries, benefits and overhead expenses for management of the Fossil Energy (FE) program at the National Energy Technology Laboratory (NETL), with sites in Morgantown, WV, Pittsburgh, PA, and Tulsa, OK.

Plant and Capital Equipment
This activity provides funding for general plant projects at the National Energy Technology Laboratory (NETL), with sites in Morgantown, WV, Pittsburgh, PA, and Tulsa, OK; and the Albany Research Center. In FY 2005 funding is included for construction, renovation, furnishing, and demolition or removal of buildings at NETL facilities in Morgantown, West Virginia, and Pittsburgh, Pennsylvania. No new activity is planned in FY 2006 and FY 2007.

Fossil Energy Environmental Restoration
Activities are to ensure protection of workers, the public, and the environment in performing the mission of the National Energy Technology Laboratory (NETL) at the Morgantown, West Virginia, Pittsburgh, Pennsylvania, and Tulsa, Oklahoma sites, and the Albany Research Center at Albany, Oregon.

Oak Ridge National Laboratory

The Oak Ridge National Laboratory (ORNL) is located in Oak Ridge, Tennessee.

Coal
The Oak Ridge National Laboratory conducts research on advanced materials that are applicable to advanced coal based power generation systems such as Vision 21 in Fuels and Power Systems; conducts research and development in the area of Carbon Sequestration to further geologic sequestration concepts, including measurement, monitoring and verification, and to understand the important soil parameters that facilitate terrestrial sequestration; and conducts research and development in the area of Advanced Research to develop materials and perform bio-processing research.

Natural Gas Technologies
Research conducted in FY 2005 supported oil processing environmental mitigation technologies and characterization of gas hydrates. ORNL has capabilities in petroleum product physical measurements, and EMAT sensor development. No activity is planned in FY 2006 or FY 2007.

Pacific Northwest Laboratory

The Pacific Northwest Laboratory (PNNL) is located in Richland, Washington.

Coal
The Pacific Northwest Laboratory conducts research and development in the area of Advanced Research to perform materials research and environmental analyses; and conducts research and development in the area of Fuel Cells in support of the DOE-SECA program.

Natural Gas Technologies
Research conducted in FY 2005 supported reservoir geophysics, hydrate characterization, and ultrasonic strain detection. No activity is planned in FY 2006 or FY 2007.

Sandia National Laboratories

The Sandia National Laboratory (SNL) is located in Albuquerque, New Mexico, and Livermore, California.

Coal
The Sandia National Laboratories conducts research and development in the area of Carbon Sequestration on injection of CO_2 into depleted oil and gas formations, and advanced monitoring methodologies based on advanced seismic concepts; and conducts research and development in the area of Advanced Research to develop hydrogen separation membranes and conduct fundamental combustion research.

Natural Gas Technologies
Research conducted in FY 2005 supported air emissions detection, measurement while drilling technology, reservoir geomechanical analysis, and airborne leak detection. No activity is planned in FY 2006 or FY 2007.

Washington Headquarters

Coal
This funding provides program support and technical support for each of the program within the Coal Program.

Natural Gas Technologies
The funding provides program support and technical support.

Petroleum – Oil Technology
The funding provides program support and technical support.

Program Direction
This activity provides funding for salaries, benefits and overhead expenses for management of the Fossil Energy (FE) program at Headquarters.

Fossil Energy Environmental Restoration
The funding provides program support and technical support.

Import/Export Authorization
The Office of Import/Export Authorization manages the regulatory review of natural gas imports and exports, exports of electricity, and the construction and operation of electric transmission lines which cross U.S. international borders.

National Academy of Sciences Program Review
This program provide for a study, in FY 2005, by the National Research Council (NRC) of prospective future benefits of Fossil Energy R&D.

Cooperative Research and Development
The funding provides program support and technical support.

Coal

Funding Profile by Subprogram [a]

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[b]	FY 2006 Current Appropriation	FY 2007 Request
Coal					
Clean Coal Power Initiative	47,944	50,000	-500	49,500	4,957
FutureGen	17,258	18,000	-180	17,820	54,000
Fuels and Power Systems.....	277,300	311,998	-3,120	308,878	271,162
Total, Coal	342,502	379,998	-3,800	376,198	330,119

Mission

The mission of the Coal program is to assure the availability of abundant low cost, domestic energy (including hydrogen) to fuel economic prosperity and strengthen energy security.

Benefits

The Coal program supports DOE's mission to achieve national energy security in an economic and environmentally sound manner by developing the technological capability to dramatically reduce pollutant emissions from coal-fueled electricity generation plants, and dramatically reduce carbon emissions to achieve near-zero atmospheric emissions power production. In the near term this means removing technological obstacles to economically meeting all existing and anticipated environmental regulations and to increase the power generation efficiency for existing and new plants. In the longer term, the aim is to nearly double energy plant efficiencies (from 33% to 60%), create the capability to achieve near-zero atmospheric emissions in producing low cost hydrogen from coal and sequester (capture and store) carbon from future coal plants at affordable costs of electricity, allowing coal to remain a key, strategic fuel for the Nation. The program mission is carried out in support of several Presidential Initiatives including the Coal Research Initiative, Clear Skies Initiative, Hydrogen Fuel Initiative, and the FutureGen project. The Climate Change Technology Program is also a priority for the Department.

Strategic and Program Goals

The Department's Strategic Plan identifies four strategic goals (one each for defense, energy, science, and environmental aspects of the mission) plus seven general goals that tie to the strategic goals. The Coal program supports the following goal:

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a SBIR/STTR funding in the amount of $8,627,000 was transferred to the Science Appropriation in FY 2005. Estimates for SBIR/STTR budgeted in FY 2006 and FY 2007 are $9,437,000 and $8,887,000 respectively.

b Includes a rescission of $3,800,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006.

Energy Strategic Goal

General Goal 4: Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The Coal program has one program goal which contributes to General Goal 4 in the "goal cascade".

Program Goal 04.55.00.00: Create public/private partnerships to provide technology that ensures continued electricity generation and hydrogen production from the extensive U.S. fossil fuel resource (especially coal), including control technologies to permit reasonable-cost compliance with emerging regulations, and ultimately, by 2015, near-zero atmospheric emission plants (including carbon) that are fuel-flexible, and capable of multi-product output and efficiencies over 60 percent with coal and 75 percent with hydrogen or natural gas.

Contribution to Program Goal 04.55.00.00 (Near-Zero Atmospheric Emissions Coal-Based Electricity and Hydrogen Production)

- The Clean Coal Power Initiative subprogram by 2010 will initiate demonstration project(s) for a suite of advanced coal-based power generation technologies. The technologies considered for demonstration will focus on the capability to achieve 45 percent electrical efficiency, to attain environmental and economic performance greater than 90 percent Hg removal at a cost of 70 percent of current technology, and to achieve less than 0.15 lb/MMBtu NO_x at 75 percent of the cost of current technology (selective catalytic reactors). Demonstration project(s) may also include technologies that can be configured to co-produce heat, fuels, chemicals or other useful byproducts, and thus, provide a deployment-ready suite of advanced technologies that can produce substantial near-, mid-, and long-range economic and environmental public benefits.
- The FutureGen project will prove the technical feasibility and economic viability of the near-zero atmospheric emissions (including carbon) coal concept.
- The Fuels and Power Systems subprograms contribute as follows:
  - The Innovations for Existing Plants subprogram supports the President's Clear Air Interstate Rule and the Clean Air Mercury Rule by creating technologies that will be ready for commercial demonstration by 2007 with the potential to reduce mercury by 50-70 percent at 70 percent of today's cost of $50,000-$70,000/lb of mercury; and $PM_{2.5}$ by 99.99 percent for less than $50-$70/Kw. By 2010, our goals are to test technologies for reducing mercury emissions by 90 percent at 50 to 70 percent of today's cost of $50,000-$70,000/lb. of mercury.
  - The Advanced Integrated Gasification Combined Cycle subprogram will, by 2010, complete R&D for advanced gasification combined cycle technology that can produce electricity from coal at 45-50% efficiency (HHV). By 2012, the subprogram will complete R&D to integrate this technology with CO_2 separation, capture and sequestration into a near-zero atmospheric emission configuration(s) that can provide electricity with less than a 10% increase in cost.

- Advanced Turbines capable of burning pure hydrogen will be available for validation testing at the FutureGen plant.
- The Carbon Sequestration subprogram, by 2007, will demonstrate at a pilot plant scale, technologies to reduce the cost of carbon separation and capture from new coal-based power systems by 75 percent compared to commercial systems ($200/tonne carbon in year 2000). By 2012, develop technologies that result in less than 10 percent increase in the cost of new energy services to separate, capture, transport, and sequester carbon using either direct or indirect systems.
- The Fuels subprogram, by 2010, will complete development of modules capable of co-producing hydrogen from coal at $30/barrel crude oil equivalent (no incentives or tax credits) when integrated with advanced coal power systems.
- The Fuel Cells subprogram supports FutureGen and will make available megawatt class fuel cells for validation testing at the FutureGen plant. By 2010, the Fuel Cells subprogram will increase the robustness of distributed generation and thereby lower vulnerability of the electricity grid. Prototypes will be developed of 3-10 kilowatt solid oxide fuel cell modules with 10-fold cost reduction versus 2000 baseline ($400/Kw), with 40-60 percent electrical efficiency adaptable for near-zero atmospheric emission coal systems. By 2015, the subprogram will create MW-class, coal and carbon sequestration ready fuel cell or fuel cell/turbine hybrid systems with 50 percent HHV efficiency and adaptable to hydrogen or natural gas with 75 percent LHV efficiency. Ultimately, by 2020, technology will be developed for 100 MW-class fuel cell/turbine hybrid systems being fueled by coal-based gasification.
- The Advanced Research subprogram sustains U.S. preeminence in fossil fuel technology by supporting development of materials, computational method, and control system knowledge needed to bridge gaps between science and advanced engineering. Advanced Research efforts will allow development, by 2010, of enabling technologies that support the goals of near-zero atmospheric emissions energy (FutureGen) systems.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
General Goal 4, Energy Security			
Program Goal 04.55.00.00, Near-Zero Emissions Coal-Based Electricity and Hydrogen Production			
Clean Coal Power Initiative	47,944	49,500	4,957
FutureGen	17,258	17,820	54,000
Fuels and Power Systems	277,300	308,878	271,162
Total, General Goal 4 (Coal)	342,502	376,198	330,119

Background

The goal of the President's Coal Research Initiative and other activities related to coal is to remove technological market obstacles and produce public benefits by conducting research and development on coal-related technologies that will improve coal's competitiveness in future energy supply markets. The Administration strongly supports coal as an important part of our energy portfolio. This request carries out the President's commitment to invest $2 billion on clean coal research over 10 years.

The Coal Research Initiative consists of the Clean Coal Power Initiative, an industry-led, cost-shared research and development program; FutureGen, a prototype facility that will produce electricity and hydrogen while sequestering one million metric tons of carbon dioxide per year; advances to central station power generation equipment including low cost emissions control technology (especially mercury); advanced turbines and gasification technology; carbon sequestration, researching ways to mitigate or separate and dispose of greenhouse gas from combustion; and Advanced Research, a set of cross-cutting long-term research projects that can potentially contribute to many aspects of the coal research program. Advanced stationary fuel cell technology is also developed with benefits to coal-based applications. Each of these programs is described in detail in separate sections below.

Annual Performance Results and Targets

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
Program Goal 04.55.00.00 Zero Emissions Coal-Based Electricity and Hydrogen Production					
Clean Coal Power Initiative					
No targets reported	Completed CCPI Round 1 solicitation, proposal evaluations and project selections to assemble the initial portfolio of advanced technologies capable of improving the economic and environmental performance of coal-based electric power generation facilities. (MET GOAL) Completed NEPA process for 3 out of the 6 active PPII projects and initiate construction or operations phases for several of the projects. (NOT MET) Completed sufficient implementation activities on remaining projects to resolve any barrier issues. (MET GOAL)	Made go/no go decisions regarding award of cooperative agreements for up to 5 Round 1 CCPI projects and issued a Round 2 CCPI solicitation. (GPRA 4.55.6.1 – MET GOAL)	Initiated 100% of the active industrial projects selected under the first round of the competitive CCPI solicitation and made project selections from the second round CCPI solicitation. (GPRA 4.55.6.1)	Make go/no go decisions regarding award of cooperative agreements for all projects selected under Round 2 CCPI. Issue site selection solicitation and evaluate sites.	Award CCPI-2 projects based on decisions made in FY 2006 Site selection for FutureGen.
Fuels and Power Systems					
Innovations for Existing Plants					
Completed Phase I report characterizing concentration and composition of ambient $PM_{2.5}$ emissions as input to the EPA $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) review. This data will help identify the impact of emission sources on air quality. (MET GOAL)	Initiated projects for developing technologies to address emerging electric utility/water issues and combustion byproducts utilization and disposal. (MET GOAL) Completed preliminary field testing of alternative mercury control technologies representing two approaches for achieving 50% or greater	Completed bench- and pilot-scale testing of five novel mercury control concepts capable of achieving ≥90% mercury capture by 2010 and initiated seven new projects under second phase of field testing of mercury control technology capable of achieving 50-70% mercury capture. (GPRA 4.55.1.1 – MET GOAL)	Developed field performance and cost data for emission control technologies and established baseline for emissions transport from coal-fired boilers in support of proposed mercury and air quality regulations. (GPRA 4.55.1.1)	Conduct initial pilot scale slipstream field test of at least one technology capable of 90% mercury removal.	Validate technology improvements for mercury capture technology that translate to 50-75% capture at 75% of the 2003 cost of conventional technology of $50,000-$70,000 per pound of mercury captured.

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
	removal. (MET GOAL) Completed fine particulate monitoring in the Upper Ohio River Valley region; complete field testing of alternative particulate matter collection technologies representing at least two approaches for achieving 99.99% removal; initiate research on $PM_{2.5}$ and mercury transport and deposition. (MET GOAL) Initiated developmental testing of SCR catalysts for reducing NO_x emissions from alternatively fueled boilers. (MET GOAL)				
Advanced Integrated Gasification Combined Cycle					
Complete initial tests of the IGCC transport gasifier to confirm the feasibility of the technology to significantly improve reliability, cost effectiveness, and efficiency for producing electricity and other products. (MET GOAL)	Established a 1-5 tpd facility capable of determining engineering feasibility, defining technical performance, and establishing operating costs for oxygen separation using membrane technology. (MET GOAL) Completed initial laboratory-scale performance testing of hydrogen separation membranes using simulated gas streams. (MET GOAL) Completed initial laboratory tests to determine performance capabilities of sorbents, sieves, and membranes for removing mercury, sulfur, nitrogen, and CO_2 from gas streams. (MET GOAL)	Completed Ion Transport Membrane (ITM) designs with target oxygen production of 95% purity, to obtain engineering data for further technology scale-up, ultimately leading to cost reductions of $75-$100/KW, and efficiency improvements of 1-2 points by 2010. (GPRA 4.55.2.1 – NOT MET) Completed at least 250 hours of high efficiency desulfurization process units operating with coal-derived synthesis gas. Eventual process units improvements are targeted to contribute a 60-80 $/KW capital cost reduction and a 1 point efficiency gain to the gasification system performance by 2010. (GPRA 4.55.2.3 – NOT MET)	Began construction of slipstream test units, test planning, and testing of advanced gas cleanup concepts using real coal-derived synthesis gas. In FY 2005, the Gasification Technologies program moved ultra-clean cleanup, including economical and efficient sulfur removal and/or multi-contaminant cleanup, a significant step closer to commercialization, eventually leading to capital cost reductions of $60-$80 kW and efficiency improvements of >1 efficiency points and the turbine technology area of Advanced Power showed progress towards the contribution of 2-3 percentage points improvement in combined cycle turbine efficiency. (GPRA 4.55.2.1)	Begin construction and testing of advanced gas separation technologies. In FY 2006, the Gasification Technologies program will move gas separation, including ceramic membrane, hydrogen separation, CO2 hydrate formation and ceramic membrane air separation, closer to commercialization, eventually leading to capital cost reductions of $60-$80 per kW from the baseline of $1200/kW for IGCC systems and efficiency improvements of >1 efficiency points.	Validate technology improvements in gas cleanup, air separation, gasifier, and turbine technology that translate to a system with 42% efficiency at a capital cost of $1200/kW and progress toward the 2010 goal of an advanced coal-based power system capable of achieving 45-50% efficiency at a capital cost of $1000/kW or less.

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
	Conducted gasification support tests on leachability of gasifier residues, improved refractories, and oxygen-blown gasification of alternative fossil fuel feedstocks, and develop a simulator for a Vision 21 plant. (MET GOAL) Developed technical and cost information sufficient for DOE decision-making on the viability of proceeding with plans for construction of a co-production plant. (MET GOAL)	Initiated testing on advanced hydrogen separation membranes in simulated coal gasification product streams and completed design of a hydrate pilot-scale slipstream test unit. Advanced hydrogen separation technologies target eventual sequestering of CO_2 with a less than 10% increase in electricity cost by 2012. (GPRA 4.55.2.2 – MET GOAL) Performed modeling, facility modifications, and conducted pilot-scale tests for identifying technology opportunities to increase reliability, improved performance and increased feed flexibility of advanced gasifiers. Gasification improvements target eventual capital cost reductions and a 90% single train availability by 2010. (GPRA 4.55.2.4 – MET GOAL)			
Advanced Turbines					
No targets reported	In the area of advanced systems initiated work on gas turbine combustor and nozzle systems for fuel flexible low-NO_x performance in IGCC applications for designs that are capable of meeting Vision 21 performance requirements. (MET GOAL) Continued technology base development in the areas of thermal barrier coatings, emission reductions, combustion stability, heat transfer and aerodynamics in	Performed a thermal analysis of syngas turbine blades, initiated testing of an H2 delivery system, and perform a systems study of an optimized IGCC turbine design. Ultimately by 2008 these and follow-on efforts will reduce IGCC NOx emissions toward 2 ppm, reduce turbine cost by 10-20% by increasing specific power output, increase turbine firing temperature and combined cycle integration to improve efficiency by 2-3 percentage points and reduce emissions	No targets reported	Initiate a prototype combustor module test for large frame engines of low NOx combustion technology (trapped vortex, catalytic, lean premix, or modified diffusion flame) using simulated coal based synthesie gas to demonstrate progress towards a 2 ppm NOx emissions goal.	No targets reported

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
	turbines for coal derived synthesis gas. (MET GOAL)	associated with high hydrogen fuels. (GPRA 4.55.2.5 – MET GOAL)			
Carbon Sequestration					
Complete the injection of 2,500 tons of CO_2 into a depleted oil reservoir to monitor the transport of CO_2 and verify predictive geologic models on reservoir integrity. (NOT MET)	Completed initial set of field tests of advanced monitoring and verification methods for carbon inventories on natural and engineered terrestrial systems and establish a database for mid-continent planning of geological storage projects. (MET GOAL) Initiated evaluations of three novel concepts, comprising integrated sequestration with enhanced coal bed methane recovery, mineral carbonation, and CO_2 flooding during enhanced oil recovery and established initial recommendations for long-term monitoring of CO_2 geological storage to assure acceptability as a safe, long-term storage option. (MET GOAL) Completed initial planning, field testing, or analyses of sequestration concepts involving saline aquifer storage, ocean storage, and scientific feasibility of CO_2 storage as hydrate on the ocean floor, and completed initial comparative evaluation of energy technology scenarios to identify promising concepts for CO_2 sequestration. (MET GOAL)	Designed and tested multiple concepts for efficient, low-cost, advanced CO2 separation and capture including on oxy-fuel combustion, membranes, and hydrates for CO2 separation. Conducted field activities that evaluate sequestration opportunities in depleted oil reservoirs and saline aquifers. Collaboratively explored with the National Academy of Sciences novel and revolutionary means of storing greenhouse gases. This portfolio of over 22 projects targets reducing the cost of carbon dioxide separation and capture by 75% by 2012 compared to year 2000 systems. (GPRA 4.55.3.1 – MET GOAL) Developed instrumentation and initiate field tests of advanced monitoring and verification methods for carbon inventories for geologic and terrestrial sequestration. Completed a database for mid-continent geological storage projects and initiate a framework for U.S. wide project planning. Through regional partnerships, begin U.S.-wide infrastructure development of MMV protocols for carbon accounting to ensure permanence of long-term storage of CO_2. (GPRA 4.55.3.2 – MET GOAL)	Completed at least two pilot scale tests on emerging advanced capture technologies related to oxyfuel, sorbents, membranes or hydrates. (GPRA 4.55.3.1)	Select and award two or more Phase II Regional Carbon Sequestration Partnerships that will begin to evaluate regional infrastructure and technologies to permanently sequester greenhouse gas emissions through small scale validations tests.	Validate technology improvements on carbon capture technology that can be extrapolated and translate to 90% capture at a cost of electricity increase of 20% when compared to an equivalent state-of-the-art non-sequestered plant.

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
Fuels					
Tests to determine ceramic membrane performance in laboratory-scale apparatus are complete. The ITM H_2/Syngas project has now tested five membranes, each of which has been operated for over six months at high pressure. Tests confirmed the selection of membrane materials and provided data for performance models. Additional laboratory-scale testing of catalysts and membrane stability continued in support of pilot-scale operations and future commercialization. (MET GOAL)	Completed development and communication of a hydrogen program and implementation plans. (MET GOAL)	Prepared and communicated a Hydrogen from Coal R&D program strategy and develop solicitation research guidance for technology innovation to reduce the cost of producing hydrogen from coal. (GPRA 4.55.5.1 – MET GOAL)	Completed analysis and continued compilation of data derived from hydrogen separations research and document in the Hydrogen from Coal RD&D Plan. These are in a format that can be used as the basis for developing industry standards needed to design and operate commercial-scale separation technology. (GPRA 4.55.5.1)	Develop industry standards for the design and operation of a bench scale advanced hydrogen separation system, identify such standards and requirements in the RD&D plan, and conduct initial tests of a prototype unit to validate design parameters.	Develop industry standards for the design and operation of a scale-up reactor for simultaneous production of additional hydrogen and its separation in accordance with the standards and requirements in the RD&D plan.
Fuel Cells					
Completed demonstration of a commercial-scale, 250 kw molten carbonate fuel cell (MCFC) power plant system. This test will verify the commercial design for the MCFC technology for the combined heat and power (CHP) or distributed generation (DG) market and, if successful, will justify the construction of a MCFC manufacturing facility in the U.S. (MET GOAL)	Communicated fuel cell program objectives and results and conduct peer-reviews through conferences, workshops, and web-site tools. Managed the PSPG R&D portfolio through assessment of results and selection of new projects to fill portfolio gaps. (MET GOAL) Conducted field tests necessary to establish feasibility of high temperature fuel cell hybrids and novel systems, including design, procurement, construction, and testing. (MET GOAL) Conducedt cost reduction R&D programs involving near-term developers, Siemens Westinghouse and Fuel Cell Energy, for the fuel cells,	Relative to FY 2003 baseline of 145mWatt/cm2 power density @800C, demonstrated a 20% improvement in fuel cell stack power density for Solid State Energy Conversion Alliance (SECA) system design. (GPRA 4.55.4.1 – MET GOAL) Relative to FY 2003 baselines of 900 for cathode performance and 174 for interconnect performance in area specific resistance units of mohms-cm2 @750C, completed 20% improvements in cathode performance and in the service life of electrical interconnect s and transfer technology advances to the SECA industry teams to facilitate systems cost reduction and efficiency goals of $400/kW and 40-60 percent. Annual stakeholder workshops	Began prototype validation of technical requirements for low-cost SECA fuel cell systems. Tested prototype capable of achieving SECA cost reductions and efficiency Phase I goals. (GPRA 4.55.4.1) Under the SECA Core Program, validate one new sealing concept; 20% improvement in metallic interconnect performance relative to FY 2004; and 20% sulfur tolerance relative to FY 2004. These validations will aid SECA industry teams in achieving cost reduction and energy efficiency goals. (GPRA 4.55.4.2)	One or more SECA industry teams complete phase I prototype validation demonstrating SECA phase I efficiency and cost goals. Incorporate seal and interconnect concepts into fuel cell stacks and perform initial tests.	Validate technology improvements to the SECA fuel cell stack that reduce projected stack manufacturing costs to at least $225/kW.

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
	including manufacturing and balance of plant (BOP) components. (MET GOAL) The SECA industrial teams shall conduct stack design and testing, including manufacturing approaches, and materials and balance of plant (BOP) systems optimization leading to the demonstration of prototypes. (MET GOAL) Conducted contracted and in-house SECA core technology of crosscutting and proof-of-concept R&D for transfer to one or more industrial teams, including know-how, patents, licenses, reports, papers in peer reviewed journals, etc. (MET GOAL)	and semi-annual peer reviews will communicate progress and define future R&D requirements. (GPRA 4.55.4.2 – MET GOAL)			
Advanced Research					
No targets reported.	Prepared and evaluated novel sensors and new materials for high temperature, oxidative environments to improve control, increase efficiency and performance, and/or achieve lower emissions of CO_2 and other pollutants. (MET GOAL)	No targets reported.	No targets reported.	No targets reported.	No targets reported.
Efficiency Measure					Maintain total administrative overhead costs in relation to total program costs of less than18 percent. Baseline for administrative overhead rate currently being validated.

Means and Strategies

Fossil Energy will use various means and strategies to achieve its program goals. However, various external factors may impact the ability to achieve these goals. The program also performs collaborative activities to help meet its goals.

The Department will implement the following means:

- Fossil Energy will engage the scientific, academic and industrial communities, and other public sector entities, including the states, to identify research needs and opportunities; technology strategies for addressing the highest priority needs; and the appropriate government roles in meeting those needs. The program will be implemented through competitively solicited, cost-shared public-private partnerships.

The Department will implement the following strategies:

- It will employ a systematic approach to monitor the spectrum of R&D needs to better select and plan activities with a clear governmental role. Such an approach will ensure better planning and execution. Periodic external reviews will be conducted to ensure that the program maintains its focus and terminates projects that industry can fund.

The following external factors could affect FE's ability to achieve its strategic goal:

- The benefits of some of FE's R&D, such as carbon sequestration, are dependent on future actions that strongly incentivize reduction of greenhouse gas emissions.

- Program results may also be affected by world prices for competitive feedstocks and energy technologies; new and evolving environmental regulations or any new legislation; industry restructuring/deregulation issues and uncertainties; and technology advances in the private sector.

In carrying out its mission:

- The impact of the program is expanded by: performing R&D activities in partnership with universities, state and local governments, industry, and other stakeholders; using cost-shared projects and diverse technology paths to improve chances of success, and to create a direct technology transfer component; seeking synergy with the capabilities of multiple governmental agencies and industry, including the unique capabilities of National Laboratories; collaborating with other agencies to effectively promulgate revolutionary domestic energy technologies; investing jointly with other groups in promising technologies for target areas; conducting field demonstrations in collaboration with industry, academia, and others; and transferring technologies in cooperation with state and industry organizations.

Validation and Verification

The program and projects contained within this goal will be evaluated by peer review at annual contractor meetings and other forums. In addition, program benefits are estimated using macroeconomic and detailed industry-specific models. Modeling assumptions and methods are reviewed externally and the results are compared to results from other programs to determine the best application of R&D resources.

To validate and verify program performance, FE will conduct various internal and external reviews and audits. FE's programmatic activities are subject to continuing review by the Congress, the General Accounting Office, the Department's Inspector General, the National Research Council, the U.S. Environmental Protection Agency, state environmental and health agencies, and the Department's Office of Engineering and Construction Management. Each year the Office of Engineering and Construction Management conducts external independent reviews of selected projects. In addition, various Operations/Field Offices commission external independent reviews of site baselines or portions of the baselines. Additionally, FE Headquarters senior management and field managers conduct quarterly, in-depth reviews of cost, schedule, and scope to ensure projects are on-track and within budget.

Program Assessment Rating Tool (PART)

The Department implemented a tool to evaluate selected programs. PART was developed by OMB to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. The Coal program has incorporated feedback from OMB into the FY 2007 Budget Request and has taken or will take the necessary steps to continue to improve performance.

In the past, the Coal program had the President's Coal Research Initiative and Other Power Systems areas PART reviewed separately. This year the Coal program has submitted a single Coal Energy Technology PART which combines these two areas. In this year's PART for Coal Energy Technology, the program scored relatively high on Program Purpose & Design, Strategic Planning, and Program Management sections of the PART, with ratings of 80%, 70%, and 75% respectively. In the PART for the FY 2007 Budget, Coal Energy Technology was rated as "Adequate".

In addition to working at the Fossil Energy level to develop a framework for analyzing cost and benefits for R&D investments (see Overview section), the program has provided OMB with briefings and reports on assumptions used to calculate projected benefits.

Clean Coal Power Initiative

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Clean Coal Power Initiative			
Clean Coal Power Initiative	47,944	49,500	4,957
SBIR/STTR (non-add)	---	(1,366)	(131)
Total, Clean Coal Power Initiative	47,944	49,500	4,957

Description

The mission of the Clean Coal Power Initiative (CCPI) is to enable and accelerate deployment of advanced technologies to ensure that the United States has clean, reliable, and affordable electricity. The CCPI is a cost-shared partnership between the government and industry to develop and demonstrate advanced coal-based power generation technologies. CCPI has experienced delays in implementing demonstration projects that achieve the best results for the American taxpayer. As identified in the Program Assessment Rating Tool (PART) review, CCPI project delays have resulted in a backlog of unused balances, currently over $500 million. These delays are due to legal issues with contract filing, the private sector's difficulty securing adequate financing for their cost-share, extended negotiations over contract terms, and other issues. Furthermore, the PART review identified potential project management concerns.

The 2007 Budget restricts the addition of new funds to CCPI, so that the program can take steps to improve the use of funds already provided for projects and potential future funds. The Program is working to:

- Improve project selection criteria to ensure consistency with Office of Fossil Energy goals and the Administration's Research and Development Investment Criteria.
- Ensure that projects progress to commencement of construction in a timely manner.
- Strengthen the Department's ability to withdraw funding from stalled projects.
- Improve project management controls to ensure that desired results are achieved on schedule and on budget.

Benefits

By 2010, the Clean Coal Power Initiative subprogram will initiate demonstration of advanced coal-based power generation technologies that target advancements from among the following categories: 45 percent electrical efficiency, 90 percent mercury removal at a cost of 70 percent of current technology by 2010, and 0.15 lb/MMBtu NO_x at 75 percent of the cost of current technology (selective catalytic reactors), and can be configured to co-produce heat or fuels. These deployment-ready advanced technologies will be capable of producing substantial near-, mid-, and long-range economic and environmental public benefits. The CCPI subprogram will create public/private partnerships to provide technology to ensure continued electricity production from the extensive U.S. fossil fuel resource, including control technologies to permit reasonable-cost compliance with emerging regulations. CCPI

demonstrations drive down the cost and risks of IGCC systems and other coal-based power and emissions control technologies.

Coal is the most abundant U.S. energy resource, with domestic reserves equal to the energy potential of the world's oil reserves. About 90% of all coal produced in the U.S. is used for electricity generation, and over half of our Nation's electricity is produced by coal-fired power plants. Meeting our Nation's rising demands for clean, reliable, and affordable electricity will require the use of coal for the foreseeable future. We must therefore develop and demonstrate technologies that will enable the continued use of coal to meet our growing demand for electricity in an environmentally sound manner.

The Bush Administration is advancing its vision in clean coal research. The Clean Coal Power Initiative (CCPI) is an effort within the Department of Energy's Fossil Energy program that combines industry investments in research and development with federal matching funds for demonstration of advanced technologies on coal-fired power plants. The Administration is requesting $5 million in FY 2007 to fund joint government-industry-funded demonstration projects to reduce risks on new technologies that can enhance the reliability, efficiency, and environmental performance of coal-fired power generators. This FY 2007 budget request will provide funding towards the third round of demonstration projects under the Clean Coal Power Initiative, incorporating the latest advances in clean coal technologies. CCPI demonstrations respond to the National Energy Policy call to address the reliability and affordability of the Nation's electricity supply, particularly from its coal-based generation, and are a key component of the President's commitment to research and development of clean coal technologies to meet this challenge. By enabling advanced technology to overcome technical risks and bringing them to the point of commercial readiness, the CCPI accelerates the development of power and hydrogen production using coal while proving the feasibility of integrating carbon sequestration and power production and facilitates the movement of technologies into the market place that are emerging from the core research and development activities and directly responds to President's Clear Skies Initiative and supports the Climate Change Technology Program to reduce emissions of air pollutants (particularly NO_x and mercury) and carbon dioxide, a greenhouse gas.

Currently there are six ongoing projects selected under the CCPI Round 1 solicitation, and four projects were selected under the second round of CCPI: two advanced IGCC projects, one integrated emissions reduction project, and one neural-network based plant control and optimization project. In FY 2003, the first round of CCPI projects commenced and NEPA was initiated including the conduct of public scoping meetings for three of the projects that will require Environmental Impact Statements. NEPA was completed for four of six Power Plant Improvement Initiative (PPII) projects and those projects are under construction or in operation. In FY 2004, four out of the six CCPI projects selected in the first round commenced and sufficient CCPI funding existed to support a solicitation for a second round of projects. FY 2005 funding enabled the second round of CCPI projects to be awarded. In FY 2005, four projects were selected from the second round solicitation. FY 2006 funding combined with the FY 2007 budget request will go towards accumulation of funds for supporting the solicitation of a third round of projects.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Clean Coal Power Initiative	**47,451**	**49,500**	**4,957**

For FY 2007, continue ongoing Power Plant Improvement Initiative (PPII) and Clean Coal Power Initiative (CCPI) Round 1 and Round 2 projects to support the President's Coal Research Initiative. The funding request for FY 2007 will go towards accumulated funds for supporting the solicitation of a third round of projects.

For FY 2006, within the Clean Coal Power Initiative (CCPI), award the four projects selected under the second CCPI solicitation and initiate design activities. These projects include Peabody Energy's demonstration of the Airborne Process for multi-pollutant control; Pegasus Energy's neural network-based optimization for mercury and multi-pollutant control; Southern Company Services' demonstration of the transport gasifier; and Excelsior Energy's demonstration of the next generation E-Gas gasifier. For projects selected under the first solicitation, initiate operation of Green River Energy's prototype coal dryer and begin fabrication and installation of three additional dryers. Initiate integrated testing of Neuco's optimization control system and operation for We Energies' TOXECON sorbent injection project. Initiate construction for Western Greenbrier's fluidized-bed co-generation and fly-ash utilization project and plant design activities for the University of Kentucky Research Foundation's coal-ash beneficiation processing project. Award and initiate design of the Gilberton/WMPI coal-to-clean fuels project. *Participants include: University of Kentucky Research Foundation, Neuco, Inc., Great River Energy, Western Greenbrier Co-Generation, LLC, Waste Management Processors, Incl., PTY, LLC, We Energies, Peabody Energy and Airborne Clean Energy, Southern Company, Excelsior Energy Inc., and Pegasus Technologies, Inc.*

For FY 2006, within the Power Plant Improvement Initiative (PPII), make determination on proceeding with proposed extensions for Universal Aggregates' ash utilization project and Otter Tails' advanced particulate collector demonstration. Award and initiate design activities for CONSOL Energy's multi-pollutant dry scrubber system and TIAX's advanced hybrid system for NO_x control. *Participants include: Otter Tail Power Corp., Universal Aggregates, LLC, CONSOL Energy, Inc., and TIAX, LLC.*

For FY 2005, within the Clean Coal Power Initiative (CCPI) completed evaluation of proposals submitted for the second CCPI solicitation, selected four projects, and initiated negotiations with the project sponsors. For projects selected under the first solicitation, initiated operation of Neuco's plant-wide optimization system employing neural networks and continued construction activities for Great River Energy's prototype coal dryer and We Energies' TOXECON sorbent injection system project for multi-pollutant control. Awarded and initiated design activities for the University of Kentucky Research Foundation project. Negotiation activities continued for the Gilberton/WMPI coal-to-clean fuels project. *Participants include: University of Kentucky Research Foundation, Neuco, Inc., Great River Energy, Western Greenbrier Co-Generation, LLC, Waste Management Processors Inc., PTY, LLC, We Energies, Peabody Energy and Airborne Clean Energy, Southern Company, Excelsior Energy Inc., and Pegasus Technologies, Inc.*

For FY 2005, within the Power Plant Improvement Initiative (PPII), completed final reporting activities for Tampa Electric's Neural Network-Sootblower Optimization project. Continued operation activities for Universal Aggregates' ash utilization project and Otter Tails' advanced particulate

(dollars in thousands)

FY 2005	FY 2006	FY 2007

collector demonstration. Accepted Sunflower Electric's decision to end the optimized control system project prior to implementing the proposed overfire air system as part of the second phase of the project. Continued negotiation activities for CONSOL Energy's multi-pollutant Circulating Dry Scrubber system and TIAX's advanced hybrid system for NO_x control. *Participants include: Otter Tail Power Corp. with UNDEERC and Southern Environmental, Inc. (SEI), Tampa Electric Co., Universal Aggregates, LLC, Sunflower Electric Power Corp., CONSOL Energy, Inc., and TIAX, LLC.*

Program Support	**493**	**0**	**0**

Fund technical and program management support.

SBIR/STTR (non-add)	**---**	**(1,366)**	**(131)**

In FY 2005, $1,215,000 and $146,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Total, Clean Coal Power Initiative	**47,944**	**49,500**	**4,957**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Clean Coal Power Initiative	
▪ **CCPI**	
The FY 2007 request will go toward a third round CCPI solicitation. Addition of new funds to CCPI is restricted, so that the program can take steps to improve the use of funds already provided for projects (over $500 million) and potential future funds	-44,543
Total Funding Change, Clean Coal Power Initiative	**-44,543**

FutureGen

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
FutureGen			
FutureGen	17,258	17,820	54,000
SBIR/STTR (non-add)	---	(494)	(1,497)
Total, FutureGen	17,258	17,820	54,000[a]

Description

The FutureGen project is aimed at establishing the technical capability and potential economic feasibility of co-producing electricity and hydrogen from coal with near-zero atmospheric emissions. The project enhances the continued and expanded use of our most abundant and lowest cost domestic energy resource, coal. FutureGen will require integration of subsystems and components currently being developed, such as gasification with low cost CO_2 capture and storage technology, and thus involves considerable risk; however, if the program is successful, the public benefits could be enormous. FutureGen will be supported by a clean coal R&D effort focused on all the key technologies needed - such as carbon sequestration, membrane technologies for oxygen and hydrogen separation, advanced turbines, fuel cells, coal to hydrogen conversion, gasifier related technologies, and other technologies.

Benefits

Coal is the most abundant U.S. energy resource, with domestic reserves equal to the energy potential of the world's oil reserves. About 90% of all coal produced in the U.S. is used for electricity generation, and over half of our Nation's electricity is produced by coal-fired power plants. Meeting our Nation's rising demand for clean, reliable, and affordable electricity will require the use of coal for the foreseeable future. We must therefore develop and demonstrate technologies that will enable the continued use of coal to meet our growing demand for electricity in an environmentally sound manner, including near-zero atmospheric emissions coal-based energy systems to address greenhouse gas mitigation. FutureGen is a key step towards that goal.

The FutureGen project responds to the National Energy Policy call to address the reliability and affordability of the Nation's electricity supply, particularly from its coal-based generation, and is a key component of the President's commitment to research and development of clean coal technologies to meet this challenge.

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a The FY 2006 Appropriation defers $257,000,000 of old Clean Coal funds for future use, and rescinds $20,000,000. The Department proposes the $203,000 become available on October 1, 2007 to continue the FutureGen project. In addition, $54,000,000 will be transferred from the Clean Coal account to the Fossil Energy Research and Development account for FutureGen use.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
FutureGen	**17,080**	**17,820**	**54,000**

In FY 2007, NEPA activities will continue, as will permitting. Project definition activities will continue toward approval of the preliminary baseline range for the project. Site characterization work will continue for the basis of site selection from among the best candidate sites. Technology assessment activities will continue, and design will progress from conceptual toward the preliminary stage. The Project Execution Plan will be revised and updated. The Department also proposes an advance appropriation for FY 2008 of $203 million from balances in the Clean Coal Technology account for FutureGen. *Participants include: FutureGen Industrial Alliance, Inc.*

In FY 2006, technology assessment and preliminary facility design was conducted, including efforts such as determination of functional requirements, technology trade-off studies, and development of technology test plans. A site solicitation occurred and site assessments began. Key NEPA activities were conducted, including issuance of a Notice of Intent and initial preparation of an Environmental Information Volume. *Participants included: FutureGen Industrial Alliance, Inc.*

In FY 2005, NEPA planning activities continued. Information gleaned from design/engineering studies was incorporated into design activities, as appropriate. Baseline environmental monitoring data must be gathered to support not only NEPA and Permitting activities, but also Design/Engineering. Candidate technologies were considered and evaluated. Design studies included conceptual design of the plant's power train, air separation unit, turbine and steam cycles and other generic balance of plant auxiliary systems. *Participants included: FutureGen Industrial Alliance, Inc.*

Program Support	**178**	**0**	**0**

Fund technical and program management support.

SBIR/STTR (non-add)	**---**	**(494)**	**(1,497)**

In FY 2005, $439,000 and $53,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Total, FutureGen	**17,258**	**17,820**	**54,000**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
FutureGen	
▪ **FutureGen**	
The increased funding is required to support detailed plant design and procurement activities, in addition to continuation of ongoing permitting, preliminary design, and site characterization efforts. This funding request meets the requirements of the FutureGen report to Congress	+36,180
Total Funding Change, FutureGen	**+36,180**

Fuels and Power Systems

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Fuels and Power Systems			
Innovations for Existing Plants	18,646	25,146	16,015
Advanced Integrated Gasification Combined Cycle	44,639	55,886	53,982
Advanced Turbines	15,043	17,820	12,801
Carbon Sequestration	44,327	66,330	73,971
Fuels	31,341	28,710	22,127
Fuel Cells	75,360	61,380	63,352
Advanced Research	41,865	52,622	28,914
Combustion Systems	5,093	0	0
U.S./China Energy and Environmental Center	986	984	0
SBIR/STTR (non-add)	---	(7,577)	(7,259)
Total, Fuels and Power Systems	277,300	308,878	271,162

Description

The Fuels and Power Systems program provides research to dramatically reduce coal power plant emissions (especially mercury) and significantly improve efficiency to reduce carbon emissions, leading to a viable near-zero atmospheric emissions coal energy system and supporting the FutureGen project. The FutureGen project creates an advanced, full-scale integrated facility that will utilize advanced coal gasification technology to produce electric power and hydrogen while capturing and sequestering carbon dioxide.

Benefits

The Fuels and Power Systems program supports DOE's mission to advance national energy security in an economic and environmentally sound manner by developing a cost-effective, high-efficient technological capability to dramatically reduce air pollution from coal-fueled electricity generation plants and carbon emissions to achieve essentially near-zero atmospheric emissions. In the near term this means removing technological obstacles to economically meeting all existing and anticipated environmental regulations. In the longer term, the aim is to nearly double coal plant efficiencies (from 33% to 60%) at affordable costs of electricity while working towards near-zero atmospheric emissions, allowing coal to remain a key strategic fuel for the Nation. The program mission is carried out in support of several key Presidential initiatives and priorities: the Coal Research Initiative, Clear Skies Initiative, and the FutureGen project. The Climate Change Technology Program is also a priority for the Department.

Background

The National Energy Policy recommends that the Department continue to develop advanced clean coal technology with a goal of deploying high efficiency coal power plants achieving near-zero atmospheric emissions. The President's Clear Skies Initiative embodied in the Clean Air Interstate Rule (CAIR) and the Clean Air Mercury Rule (CAMR) that were promulgated by the U.S. Environmental Protection Agency in March 2005. Promulgation of CAIR and CAMR provided a market incentive for developing many advanced, cost-effective emissions controls and should reduce the need for Federally funded R&D for existing plants. The Climate Change Technology Program is supported over the longer term through technology for advanced power plants that can nearly double the average efficiency of today's fleet of coal power plants, thereby significantly reducing carbon emissions. The growing national economy relies on electricity supply that is secure, affordable, and reliable. This is especially true in the face of electricity generation market restructuring. Further, new technology is needed to develop much cleaner and more efficient plants to replace and augment an aging power generation infrastructure. Electricity demand from both natural gas and coal is projected to increase significantly through the year 2015. (Annual Energy Outlook, 2004).

The program elements for Fuels and Power Systems include technology developed for existing plants, advanced systems, and near-zero atmospheric emission plants (e.g., FutureGen) are as follows:

- Innovations for Existing Plants (IEP) - The IEP program element has a near- to mid- term focus on developing advanced cost-effective mercury and fine particulate control technologies for retrofitting to existing power plants. The IEP program supports the goals and objectives of the President's Clear Skies Initiative that calls for substantial reductions in mercury, and fine particulate emissions from power plants embodied in the CAIR and CAMR. Results of this advanced research are used by those who develop, design, manufacture and operate both existing and advanced systems across the entire spectrum of coal utilization technologies not only to improve efficiencies, but also to improve environmental performance. This program's crosscutting efforts address the cost-effective removal of air pollutants from fossil fueled systems.

- Advanced Integrated Gasification Combined Cycle (IGCC) - The IGCC program supports both the President's Clear Skies Initiative and the Climate Change Technology Program by enhancing the thermal efficiency of converting coal to electricity, providing the potential for over 50% reduction in CO_2 emissions compared to today's technologies, and through its performance goals of achieving near-zero atmospheric emissions of SO_2, NO_x, mercury, and other pollutants. The IGCC program conducts research that fosters the development and deployment of near-zero atmospheric emission, fuel-flexible gasification-based processes for converting carbon-based feedstocks to electricity, steam, and a broad range of chemicals, including ultra-clean transportation fuels like hydrogen. In order to achieve the full potential of IGCC, significant advances must be made to increase efficiency and reduce the capital and operating and maintenance costs and to improve both the reliability and the overall system availability. In FY 2007, the program will continue to develop technologies for gas stream purification to achieve near-zero atmospheric emission goals and to meet synthesis gas quality requirements for use with fuel cells and conversion processes; to enhance process efficiency and availability; to reduce costs for producing oxygen; and to develop advanced gasification technologies. The successful accomplishment of these activities will enhance the commercialization

prospects of advanced IGCC technologies for the production of electricity for use by utilities, independent power producers, and other industrial stakeholders, while supporting FutureGen.

- Advanced Turbines - The Turbines Program is designed to enable the cost effective implementation of the President's Clear Skies Initiative, and FutureGen project, as well as the Climate Change Technology Program. The focus is on creating the technology base for turbines that will permit the design of near-zero atmospheric emission IGCC plants (e.g., FutureGen) and a class of plants with carbon capture and sequestration. FutureGen plants will enhance the continued use of coal our Nation's largest source of fossil fuel. The performance challenges of coal-based sequestration-ready power plants that use and produce hydrogen create new opportunities and technical challenges for turbine based power systems. Key technologies are needed to enable the development of advanced turbines that will operate with near-zero atmospheric emissions, and higher efficiency when fueled with coal derived hydrogen fuels. The Turbine Program is an investment in secure U.S. electric power production which is clean, efficient, affordable and fuel-flexible. These advances in turbine technology will help retain coal's strategic value as a low-cost, abundant, domestic fuel. In FY 2007, work will continue to address technical issues and ultimately provide turbine technology for burning up to 100% hydrogen. That technology will be available for the FutureGen project and it will contribute to achieving the historic 2010 Central Systems IGCC performance goal.

- Carbon Sequestration - The mission of the Sequestration R&D program is to create public benefits by discovering and developing ways to economically separate and permanently store (sequester), and to offset, greenhouse gas emissions from the combustion of fossil fuels.

- Fuels - The Department's Fuels program is a component of the President's Hydrogen Fuel Initiative, as well as providing the Hydrogen production supporting R&D for the FutureGen plant. The Fuels program provides the means for the FE Office to carryout its research mission to reduce technological market barriers for the reliable, efficient and environmentally sound use of fossil fuels for domestic consumption, power generation and conversion to other fuels such as hydrogen. It also is a major contributor to reaching the Fossil Energy Program Goal 04.55.00.00, Near-Zero Atmospheric Emissions Coal-Based Electricity and Hydrogen Production. Specifically, the program focuses on developing technologies that will facilitate the production, transport, and storage of hydrogen derived from coal. Research will target reducing costs and increasing efficiency of the coal-based hydrogen systems, from plant gate to consumer.

- Fuel Cells - The objectives of the Fuel Cells activity are to enable the generation of efficient, cost-effective, carbon-free electricity from domestic coal with near-zero atmospheric emissions in central station applications; and provide the technology base to permit grid independent distributed generation applications. The Fuel Cells program directly supports the President's FutureGen project through development of cost effective, highly efficient, power blocks that facilitate sequestration in coal based systems.

- Advanced Research - The mission of the Advanced Research subprogram is to serve as a bridge between basic and applied research to foster the development and deployment of innovative systems for improving efficiency and environmental performance, while reducing costs, of Advanced Coal and Power Systems.

- Combustion Systems - This program was redirected in prior years to support advanced combustion hybrid concepts for near-zero atmospheric emission compatible plants (e.g.,FutureGen). In FY 2006, specific technologies from this category are included in the IGCC activity to enhance the integration of hybrid combustion/gasification concepts, including support for the test activity at the Wilsonville Power Systems Development Facility (PSDF).

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Innovations for Existing Plants	**18,646**	**25,146**	**16,015**
▪ **Super Clean Systems**	**1,465**	**990**	**0**

In FY 2007, no funding is requested. The Super Clean Systems activities will use prior year funds to focus on completion of projects awarded in FY 2005 that are directed at achieving low NO_x emissions through advanced low-NO_x combustion technology such as advanced burner design and advanced layered technology application (ALTA) *Participants include: REI, ALSTOM, Fossil Energy Research, and Babcock & Wilcox, RDS, TBD.*

In FY 2006, the Super Clean Systems activities focused on several new projects initiated in FY 2005 to carry out bench and pilot-scale development of advanced combustion and post-combustion NO_x control technology to achieve ultra-low emissions. This research addressed operational issues associated with Selective Catalytic Reduction systems to achieve these stringent emission reductions as well as provide options for smaller, older coal-fired boilers in meeting future NO_x regulations under the Clear Skies Initiative and proposed interstate transport regulations. Research was also performed to control and optimize the speciation of mercury in the combustion zone. *Participants included: REI, ALSTOM, Fossil Energy Research, and Babcock & Wilcox.*

In FY 2005, Super Clean Systems research focused on reducing nitrogen oxide (NO_x) emissions from coal-based power plants in direct support of the Clear Skies Initiative. Work continued on development of ultra low-NO_x combustor for integrated gasification combined cycle systems resulting from FY 2002 Broad Based solicitation. Research also continued under FY 2004 targeted solicitation to develop advanced combustion NO_x control technology, novel catalysts and non-ammonia reagents for SCR systems, and advanced "smart systems" to achieve a mid-term (2010) emission target of <0.10 lbs/mmBtu and a long-term (2020) target of <0.01 lbs/mmBtu. *Participants included: Argonne National Lab, Precision Combustion, TBD.*

▪ **Fine Particulate Control/Air Toxics**	**10,645**	**16,335**	**14,047**

For FY 2007, research will focus on completion of the Phase II field testing projects that were awarded in FY 2004 to evaluate the performance and cost of technology capable of achieving 50-70% mercury capture. In addition, several new field testing projects selected in FY 2006 with the goal of 50-70% capture addressing specific knowledge gaps will continue, as will several other new field testing projects directed at DOE's 2010 goal of having technology ready for commercial demonstration that can achieve 90% or greater mercury capture. Further, new work which was selected in FY 2006 to research and develop novel mercury control concepts including pre-

(dollars in thousands)

FY 2005	FY 2006	FY 2007

combustion removal will be carried out. No funding is provided for pollutant transport programs. *Participants include: ADA-ES, UNDEERC, Sorbtech, URS, ALSTOM, EPRI, GE-EERC, Brookhaven National Lab, Argonne National Lab, Lawrence Berkeley National Lab, ATS, TVA, NETL, RDS, TBD.*

The FY 2006 effort was directed at a comprehensive portfolio of projects to field test advanced mercury control technologies at operating power plants. These technologies, which include sorbent injection, chemical additives, and oxidation catalysts, are capable of achieving 50-70% mercury removal and will focus on units burning low-rank coals. In addition, a third phase of field testing was initiated, contingent upon the success of ongoing bench and pilot development, involving technologies capable of +90% mercury removal. *Participants included: ADA-ES, UNDEERC, Sorbtech, URS, ALSTOM, EPRI, GE-EERC, Brookhaven National Lab, Argonne National Lab, Lawrence Berkeley National Lab, ATS, TBD.*

In FY 2005, the effort focused on continuation of Phase II field testing of advanced mercury control technologies selected under FY 2003 targeted solicitation capable of achieving 50-70% mercury removal in direct support of Clear Skies Initiative, including a second round of awards made in late FY 2004. Research was directed at lower-rank coals and balance-of-plant issues. Completes pilot-scale testing of novel mercury/multi-pollutant control concepts capable of >90% mercury capture. *Participants included: Brookhaven National Lab, Argonne National Lab, Lawrence Berkley National Lab, ATS, SRI, University of Utah, TVA, TBD.*

- **National Labs-Competitive** **3,905** **3,861** **1,968**

In FY 2007, a major focus of the research conducted at NETL will be on the characterization of coal combustion and gasification byproducts, particularly those collected from DOE's field testing program. In addition, mercury sorbents and oxidizing agents to enhance the capture of mercury will be tested at the laboratory scale. Work will also continue in developing a computational fluid dynamics (CFD) model of mercury emission and control. These research activities are in direct support of the FutureGen project and Clear Skies Initiative. *Participants include: NETL.*

In FY 2006, mercury sorbents and oxidizing agents to enhance the capture of mercury were tested at the laboratory scale. Work continued in developing a CFD model of mercury emission and control. In addition, the environmental characterization of coal utilization byproducts from the field testing of mercury control technologies was continued. These research activities are in support of the Clear Skies Initiative. No funding is provided for pollutant transport programs. *Participants included: NETL.*

In FY 2005, continued development of novel mercury control concepts and mercury emission characterization using 500 lb/hour combustion unit. Continued CFD modeling of mercury emission and control, issue analysis, by-product characterization, and water-related research in support of the Clear Skies Initiative. *Participants included: NETL.*

- **By-Products and Water Management** **2,440** **2,475** **0**

In FY 2007, no funding is requested. An assessment, at a reduced level of effort with prior year

(dollars in thousands)

FY 2005	FY 2006	FY 2007

funding, of the fate of mercury and other metals in coal combustion and advanced combustion/gasification byproducts including evaluation of fly ash and scrubber solids from the Phases II and Phase III Hg field testing program. This work will be carried out through a contract awarded in FY 2005. Research will continue, at a reduced level with prior year funding, on the development of technologies and concepts related to power plant water use selected under the FY 2006 targeted solicitation directed at the use of impaired waters, advanced cooling technology, and water recovery and reuse technology. Joint industry/government R&D activities will continue, with limited funding from prior years, to maximize recycle use of coal utilization byproducts for various market applications, and facilitate technology transfer. *Participants include: UNDEERC, EPRI, Argonne National Lab, WVU, RDS, TBD.*

In FY 2006, continued assessment of the fate of mercury and other metals, and coal combustion and advanced combustion/gasification byproducts including evaluation of fly ash and scrubber solids from the Phase II Hg Field Testing program, in support of the Clear Skies Initiative. Completed advanced concepts and technologies related to power plant use and impacts on quality selected under the FY 2003 targeted solicitation to manage power plant water use, as well as initiated new water management research under a FY 2005 targeted solicitation focused on advanced power plant cooling technology, use of impaired waters, and water recovery and reuse technology. Conducted joint industry/government R&D activities to maximize recycle use of coal utilization byproducts for various market applications, and facilitate technology transfer. *Participants included: USGypsum, UNDEERC, EPRI, Argonne National Lab, TBD.*

In FY 2005, assessed potential environmental impacts of coal combustion and advanced combustion/gasification byproducts and solid residues, focusing on mercury and other trace metals, in support of the Clear Skies Initiative. Continued characterization of coal byproducts from Phase II mercury control technology field testing initiated under FY 2004 targeted solicitation. Conducted joint industry/government R&D activities to maximize recycle use of coal utilization byproducts for various market applications, and facilitate technology transfer. Completed development of byproduct treatment and separation technology selected under FY 2003 Broad Based solicitation. Continued advanced concepts and technologies selected under the FY 2003 targeted solicitation to manage power plant water use. *Participants included: Argonne National Lab, WVU, PPL, UNDEERC, University of Kentucky.*

- **Program Support**..... **191** **0** **0**

  Fund technical and program management support.

- **Congressionally Directed Activities – Innovations for Existing Plants**..... **0** **1,485** **0**

  - **Powerspan Electro Catalytic Oxidation Project**..... **0** **990** **0**

    Powerspan Electro Catalytic Oxidation Project for multipollutant (SO_2, NO_x, and Hg) control will be conducted.

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
• **Coal-Waste Slurry Reburn Project**.....	**0**	**495**	**0**

Coal-Waste Slurry Reburn Project for NO_x control will be conducted.

▪ **SBIR/STTR (non-add)**.....	**—**	**(603)**	**(441)**

In FY 2005, $388,000 and $47,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Advanced Integrated Gasification Combined Cycle ..	**44,639**	**55,886**	**53,982**
▪ **Gasification Systems Technology**.....	**26,130**	**34,155**	**32,369**

(a) Gasification**:** In FY 2007, emphasis will be on improving the reliability and performance of the gasifier in an IGCC plant and the development of novel process concepts. Installation of a new riser section on the transport gasifier and the Continuous Coarse Ash Depressurization system at the Power Systems Development Unit (PSDF) will be completed. A long-term gasification test on a low-rank coal will be conducted to demonstrate the performance of the newly installed equipment and other modification, such as that to the coal feed system, to support IGCC technology development. UNDEERC will investigate improvements to the cyclone dipleg design and loop seal for the transport gasifier to improve cyclone efficiency and carbon conversion and establish solids concentration profiles along the riser for various coals to support the design of the gasifier. Empirical relationships for transport properties in the transport gasifier will be developed from tracer testing and sampling probes on a cold flow model. Cold flow testing of advanced feed injectors will be conducted and fabrication of the compact gasifier pilot plant will be initiated to demonstrate improved carbon conversion, thermal efficiency, cost, and reliability. Construction of a pilot plant for integrated testing of the various loops within the chemical looping gasification technology will continue. Testing of the acoustic high temperature measurement device at a commercial gasification plant will be completed. Coated metal components and welded joints similar to those found in tube sheets and coarse filters will be tested in a commercial gasifier as coupons. Final report on chromium refractory and thermocouple research for slagging gasifiers, including performance in commercial coal gasifiers, will be completed.

(b) Gas Cleaning/Conditioning**:** In FY 2007, focus will be on achieving near-zero atmospheric emissions from coal-based gasification plants. Development of novel sorbents for mercury, ammonia, and chloride removal from synthesis gas will continue and testing of promising materials on coal-derived synthesis gas will be initiated. Continue development of improved catalysts for the Selective Catalytic Oxidation of Hydrogen Sulfide process to improve selectivity of carbonyl sulfide (COS) removal and suppress side reactions. Development of multi-contaminant control technologies for sulfur, chloride, ammonia, and trace metals removal will continue. Laboratory scale process units will be designed and construction initiated to demonstrate proof-of-principle of the novel concepts. *Participants include: SCS, NETL, UNDEERC,Alstom. GTI, TDA, RTI, Rocketdyne , Arizona Public Service, ARC, VPI.*

(dollars in thousands)

FY 2005	FY 2006	FY 2007

(a) Gasification: In FY 2006, the Power Systems Development Unit (PSDF) focused on assessing the performance of a new char recycle system, a continuous coarse ash disposal system, the Stamet dry coal feeder, and the newly installed synthesis gas recycle system, all focused on improving the reliability and availability of the gasification system with the capability of producing hydrogen. NETL's Transport/Circulating Fluidized Bed facility was used to support the development of the transport chemical looping gasifiers by evaluating the impact of particle size and size distribution on fluidization characteristics, attrition, and elutriation. Testing of advanced gasification concepts was continued. Continued work on developing the chemical looping concept and will focus on optimizing the operating conditions for the various reactor vessels. Testing of advanced feed injectors and the channel wall cooling system will be completed, and the design of the compact gasifier began. Novel gasifier/process concepts for enhancing hydrogen and methane yields continued to be explored at the bench scale. Testing of the optical pyrometer for high temperature measurement device at Tampa Electric's IGCC plant was completed. Testing of the optical fiber high temperature measurement device was completed at the Wabash River IGCC plant. Bench-scale testing of an engineering prototype acoustic high temperature measurement device was conducted in preparation for full-scale testing at a commercial gasification plant. Completed post mortem analysis of a novel thermocouple assembly removed from service in a commercial coal gasifier and develop 2nd generation device based upon findings. Completed fabrication of commercial size 2nd generation high chromia refractory and installed in a commercial coal gasifier. Completed evaluation of metal coatings and coupon tests at the Wabash River IGCC plant.

(b) Gas Cleaning/Conditioning**:** In FY 2006, R&D focused on achieving near-zero atmospheric emissions from gasification-based systems. Performance tests were conducted on the Transport Reactor Development Unit (TRDU) to evaluate the improvements in particulate removal efficiency using an electrostatic barrier filter and newly developed sorbents for removal of mercury and other trace metals. Sorbent materials for chloride removal were identified and prepared in an industrial scale unit in collaboration with a catalyst manufacturer and were subjected to bench-scale testing to determine performance for achieving near-zero contaminant levels. In conjunction with an industrial partner, a new sulfur sorbent was tested in a bench-scale unit to evaluate its ability to achieve <500 ppb sulfur. A promising mercury sorbent was subjected to absorption/regeneration cycling in simulated synthesis gas to determine its ability to achieve >90% removal at moderate process temperatures. Continued development of the second generation catalyst for the Selective Catalytic Oxidation of Hydrogen Sulfide (SCOHS) technology to achieve <500 ppb sulfur. The detailed design of a skid-mounted unit for testing of the SCOHS technology was completed. The CFD model for sorbent regeneration in a transport desulfurizer was completed, integrated with the absorption model, and the combined model validated using data from slipstream testing at Eastman Chemical. Testing of the hot cyclone-filter hybrid concept for particulate control on a slipstream from the Wabash River IGCC plant was completed. Continued development of multi-contaminant control technologies to reduce capital cost through reduction of process units. *Participants included: SCS, NETL, UNDEERC, Boeing, ALSTOM, ARC.*

(dollars in thousands)

FY 2005	FY 2006	FY 2007

(a) Gasification**:** In FY 2005, the primary focus of the Power Systems Development Unit (PSDF) was on preparation of the facility for testing advanced near-zero atmospheric emission compatible (Vision 21) modules while continuing to characterize the operation of the oxygen-blown transport gasifier on a range of coal feedstocks including lignite. Validation of the CFD model for the transport gasifier will continue using performance data from the PSDF, the Transport Reactor Development Unit (TRDU), and the cold model at NETL.

(b) Gas Cleaning/Conditioning: In FY 2005, R&D focused on achieving near-zero atmospheric emissions from gasification-based systems. Operation of the Gas Process Development Unit for obtaining scale-up data for the design of transport desulfurizer using the RT13 sorbent at moderate temperatures was completed. Validation of the transport desulfurizer CFD model will be completed using performance data from the GPDU and integrated testing with a 2.5 ton/day pilot-scale coal gasifier. Continued R&D to develop advanced concepts for removing mercury, ammonia, and chlorides atmospheric emissions to near-zero levels suitable for use in fuel cell and synthesis gas conversion applications. Construction of a skid-mounted unit of the Selective Catalytic Oxidation of Hydrogen Sulfide (SCOHS) process was initiated. A go/no decision on field testing of the Single-step Sulfur Reduction Process (SSRP) was made based on prior experimental and economic performance. *Participants included: SCS, NETL, UNDEERC, Fluent, RTI.*

- **Systems Analysis/Product Integration** **3,809** **4,307** **4,608**

In FY 2007, work will continue on assessing the economics of advanced process concepts in support of near-zero atmospheric emissions plants (e.g., FutureGen). Studies will focus on advanced multi-contaminant synthesis gas cleaning technologies, novel process concepts/technologies for hydrogen/power and SNG/power to quantify performance and cost benefits and define R&D targets. Development of a three dimensional dynamic simulation model of an IGCC plant with and without carbon dioxide capture will be initiated with the goal of having the model available for control room simulation and operation of the FutureGen plant and other IGCC facilities. Gasification workshops will continue to be conducted in conjunction with the gasification industry and focus on both the regulatory and financial community to assist in the deployment of the technology. The world-wide gasification database will continue to be updated. *Participants include: NETL, RDS, TAMS, Mitretek, GTC.*

In FY 2006, work continued on assessing the economics of advanced process concepts such as chemical looping and advanced gasification concepts, multi-contaminant control technologies, etc. The economics of the Transport Reactor Integrated Gasification (TRIG) process with CO_2 capture was developed. Studies were conducted to establish performance targets for novel process concepts in the R&D program such as alternative systems that can potentially capture carbon dioxide along with raw gas impurities without the need for gas clean up system to reduce cost. Engineering support was provided as needed for the development and evaluation of the FutureGen project. *Participants included: RDS, TAMS, Mitretek, Parsons, SCS,GTC.*

(dollars in thousands)

FY 2005	FY 2006	FY 2007

In FY 2005, work continued on assessing the economics of advanced near-zero atmospheric emissions process concepts and establishing performance targets for novel process concepts in the R&D program. Work at the PSDF focused on developing integration strategies for advanced process concepts and developing experimental programs, cost, and schedules for testing the various technologies. The final engineering designs for the Early Entrance Coproduction Plant project for the production of electricity, fuels, and hydrogen were prepared. The standardized design of a 25 MWe bituminous coal IGCC plant for industrial applications and a 250 MWe lignite IGCC for utility applications were completed. Engineering support was provided as needed for the development and evaluation of the FutureGen project. The update of the worldwide gasification database with the latest plant project announcements was completed, and the sixth gasification environmental workshop was held in Knoxville, TN. *Participants included: NETL, RDS, Mitretek, SCS, Childress, GTC.*

- **Vision 21** **14,242** **17,424** **17,005**

In FY 2007, work will focus primarily on scaling up technologies for incorporation into nero-zero atmospheric emissions plants (e.g., FutureGen) as either a full-scale repeatable module or as subsized module for the test beds. Definition of the 25-150 tons per day (TPD) ion transport membrane (ITM) air separation unit and the required manufacturing infrastructure to support the wafer and module production for this scale of operation will be completed and all major equipment will be ordered. Performance testing of the transport desulfurizer and Direct Sulfur Reduction Process (DSRP) technologies will continue based on successful operation at Eastman Chemical. These efforts will be focused on scaling up the technology for incorporation into FutureGen as a full-scale module. Bench-scale development of the Unmixed Fuel Process will be completed and feasibility of further scale-up of the technology will be evaluated. Modification to the PSDF will be made to prepare for testing of advanced hydrogen/carbon dioxide separation technologies in support of FutureGen. *Participants include: APCI, RTI, NETL, SCS, GE.*

In FY 2006, the planar design advanced air separation membranes was demonstrated at the 3-5 tons per day using full-size modules and achieving 95% purity. Enhanced reliability of the full-size modules was enhanced through advanced process control techniques. The detailed design of the 25 TPD pre-commercial unit was completed. The PSDF focused on preparing the facility to test advanced hydrogen production and separation technologies. Discussions were held with appropriate technology developers to establish process requirements and costs for evaluating their technologies with coal-derived synthesis gas. Technologies considered for testing include advanced water gas shift, K25 membrane, the CO_2 hydrate process, and a polymer membrane for bulk CO_2 and H_2S removal. New metal alloy materials and cermet membrane materials were developed for H_2/CO_2 separation and subjected to lab-scale permeation tests. The design of an engineering scale process development unit to test the tubular H_2/CO_2 membranes at commercially relevant operating conditions was initiated. The K25 H_2 membrane began scale-up in preparation for testing at a gasification site. Continued construction of the 2.5 megawatt equivalent CO_2 hydrate slipstream test for testing on coal-derived synthesis gas. Bench-scale testing of novel ionic liquids for the separation of CO_2 from fuel gas was conducted to evaluate solubility and mass transfer of CO_2 into the liquids. Field testing of first generation ammonia,

(dollars in thousands)

FY 2005	FY 2006	FY 2007

arsenic, and mercury removal sorbents were completed at a gasification site on coal-derived synthesis gas at moderate temperatures to demonstrate ability to achieve near-zero atmospheric emissions levels. Additionally, a H_2/CO_2 membrane that selectively removes CO_2 and H_2S was also demonstrated on coal-derived synthesis gas. A process unit to demonstrate the novel sorbent-based polishing technology was designed for integrated testing with a coal gasifier to demonstrate performance for achieving near-zero levels of contaminant atmospheric emissions. Additionally, innovative concepts to reduce the potential plant investment costs, such as development of raw syngas shift and separation were assessed. *Participants included: APCI, GE, Nexant, RTI, NETL ORNL, ANL, LANL, Siemens, Eltron, SCS.*

In FY 2005, efforts focused on the development of novel technologies that lead to ultra-high efficiencies, the production of hydrogen for ultra-clean fuels, and the elimination of all environmental issues that present barriers to the continued use of coal, including reductions of SO_2, NO_x, CO_2 particulates, and trace elements such as mercury, arsenic, cadmium, and selenium. Laboratory testing of improved materials for membrane-based air separation technologies and life testing of commercial membrane elements were completed. The construction of the 1-5 ton/day air separation membrane unit was completed, and testing of full-scale membrane modules began. Development of novel process concepts for the production of hydrogen and the capture of CO_2 for sequestration was continued. Work on developing improved membranes for hydrogen/ CO_2 separation was continued with focus on developing and optimizing the membrane fabrication process and addressing performance characteristics under actual process conditions. The K25 membrane began further development and scale-up for testing at PDSF and Eastman Chemical on coal-derived synthesis gas. A polymer-based membrane unit for bulk CO_2 and H_2S removal was designed and constructed for testing at Eastman Chemical. An engineering analysis of the CO_2 hydrate process was completed, and experimental work focused on achieving equilibrium in the separation reactor. Testing of a advanced sulfur sorbent in a transport reactor as a slipstream from the coal gasifier at Eastman Chemical commenced to prove long-term performance and stability of the sorbent. The design and construction of skid-mounted units for mercury, ammonia, and chloride control began for testing at Eastman Chemical. Continuous unit testing of the Unmixed Fuel Processor began to demonstrate integrated performance of the gasifier. *Participants included: APCI, Praxair, ANL, Concepts NREC, Ceramatec, GE, PSU, Penn, Nexant, RTI, Medal, Protech, IGT, Siemens-Westinghouse, NETL, Eltron, Coorstech, Noram, Sud Chemie, SIR, KBR.*

- **Program Support**..... **458** **0** **0**

  Fund technical and program management support.

- **SBIR/STTR (non-add)**..... **—** **(1,445)** **(1,490)**

  In FY 2005, $1,041,000 and $125,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Advanced Turbines	**15,043**	**17,820**	**12,801**
▪ **Hydrogen Turbines**	**14,889**	**15,345**	**12,801**

In FY 2007, the Hydrogen Turbines Program will be implementing projects that will enable highly efficient, clean and cost effective turbine-based power systems that use coal derived fuels and capture and sequester CO_2. Project work initiated in 2005-06 through the Hydrogen Turbine solicitation will contribute to significantly increasing combined cycle efficiency, reducing NO_x emissions, and dramatically reducing CO_2 emissions from hydrogen fueled, coal-based power systems, such as FutureGen.

In 2007 work by Siemens Westinghouse will be nearing conclusion and result in catalytic combustion technology capable of emitting only 2 ppm NO_X for deployment in existing and developmental hydrogen fueled turbines. Work will continue under NETL on research to assess combustor designs and the fundamentals associated with hydrogen combustion. GE and Siemens Westinghouse will be working to develop a new generation of gas turbine machinery that will be capable of firing hydrogen produced from coal, while meeting a 2 ppm NO_x limit, to be available for demonstration as part of the FutureGen project. Clean Energy Systems will conduct activities directed toward the development of an oxy-fired rankine cycle turbine capable of firing coal-derived syngas, and other work will cover aspects of combustion and materials development required for the demonstration of IGCC systems with near-zero atmospheric emissions. Coordinated work will continue with the national laboratories to address high heat flux and material issues associated with the combustion of high hydrogen fuels. Work will continue and new work will be initiated with the government led university-industry consortium with a fundamental focus on combustion, aerodynamics, heat transfer, systems/cycles and material issues in machines designed for high hydrogen fuels for systems with near-zero atmospheric CO_2 emissions. *Participants include: GE, University of California Irvine, Precision Combustion, Inc., Clean Energy Systems, Parker Hannifin, Siemens Westinghouse, Gas Technology Institute, Clemson University Turbine Systems Research Consortium, NETL, ORNL, Ames Lab.*

In FY 2006, the Hydrogen Turbines Program continued R&D initiated in FY 2005 to provide turbine designs capable of burning 100% hydrogen in the 2012 time frame. R&D performed by awardees under the FY 2005 Hydrogen Turbine solicitation, continued with the aim to optimize machine performance for near-zero atmospheric emissions plants (e.g., FutureGen) that results in higher efficiencies and lower emissions of NO_x. NO_x reduction through catalytic combustion and fuel premixing continued and is approaching single combustor-can tests applicable to large frame machines. In addition, new work continued on advanced turbine designs and subsystems for near-zero atmospheric emission, sequestration-ready power systems suitable for application to near-zero atmospheric emissions plants (e.g., FutureGen). Work continued and new work was initiated through the University Turbine Systems Research Consortium concerning aerodynamics, materials, heat transfer and combustion of coal derived syngas and hydrogen fuels. NETL continued the simulation and validation of combustion phenomena associated high hydrogen content fuels. *Participants included: GE, Siemens Westinghouse, Precision Combustion, Inc., Clean Energy Systems, Parker Hannifin, Gas Technology Institute, Southwest Research Institute,*

(dollars in thousands)

FY 2005	FY 2006	FY 2007

University of California Irvine, Clemson University Turbine Systems Research Consortium, NETL, ORNL, Ames Lab, TBD.

In FY 2005, the Office of Fossil Energy transitioned the Turbine Program, which was focused on modifying the designs of existing advanced turbines for applications to coal derived synthesis gas, to a Hydrogen Turbine Program. The Hydrogen Turbine Program is designed to support the successful deployment of FutureGen type power systems. These opportunities were identified and explored through the FY 2005 Hydrogen Turbine Solicitation.

The FY 2005 program built upon work initiated in FY 2004 to address technical issues and ultimately provide turbine designs capable of burning up to 100% hydrogen in the 2012 time frame. The relevant technical issues are driven by the need to increase machine efficiency while at the same time reducing NO_x emissions. The lower heat content, higher flame speed and high post combustion moisture content of hydrogen present significant technical challenges to development of highly efficient and clean burning combustion turbines for application to near-zero atmospheric emissions plants (e.g., FutureGen). New work was initiated to further resolve technical issues associated with the use of hydrogen fuels from near-zero atmospheric emissions plants (e.g., FutureGen). Technology development requirements for highly efficient, near-zero atmospheric emission and sequestration ready coal-based power plants presents a challenging set of technical issues. The program is positioned to focus resources on these issues which require a better understanding of materials, aerodynamics, heat transfer and combustion fundamentals. Ultimately, as these issues are resolved, full-scale components and systems can be tested in near-zero atmospheric emissions plants (e.g., FutureGen).

FY 2005 work focused on turbine performance improvement by resolving technical issues that can then be applied to F- or G-class machines for high (>65%) hydrogen combustion. Part of this performance enhancement considered the full integration with the balance of plant subsystems such as the air separation unit and steam cycle. Work to improve efficiency addresses better thermal barrier coatings, better methods for blade cooling, fuel premixing, optimizing the mass throughput, and aerodynamics, and extending or realizing the full torque limitations of existing machines. Work continued with GE, Siemens Westinghouse, Precision Combustion, Inc., and others to resolve NO_x emissions and efficiency improvements for turbines operated in FutureGen type plants. Work continued and new work was initiated through the University Turbine Systems Research Consortium concerning aerodynamics, materials, heat transfer and combustion of coal derived syngas and hydrogen fuels. NETL continued the simulation and validation of combustion phenomena associated with high hydrogen content fuels. Funding for the operation of the fuel cell/turbine hybrid simulation facility (HYPER Project) continued under the Turbines Program. *Participants included: GE, NFCRC, Siemens Westinghouse, Clemson University Turbine Systems Research Consortium, NETL, ORNL, Ames Lab, TBD.*

- **Program Support**..... **154** **0** **0**

  Fund technical and program management support.

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
▪ **Congressionally Directed Activities – Advanced Turbines**	**0**	**2,475**	**0**
• **Ramgen Engine Development**	**0**	**2,475**	**0**

The Ramgen Engine Development Project was completed in FY 2006.

▪ **SBIR/STTR (non-add)**	**—**	**(408)**	**(353)**

In FY 2005, $304,000 and $36,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Carbon Sequestration	**44,327**	**66,330**	**73,971**
▪ **Greenhouse Gas Control**	**37,040**	**50,490**	**66,836**

In FY 2007, the Phase II Regional Carbon Sequestration Partnerships (CSRP) will continue field validation experiments involving CO_2 injection and monitoring, mitigation, and verification (MMV) operations in saline reservoirs, depleted oil and gas fields, and coalbed methane seams. These tests are designed to assess the safety of operations, determine the fate of CO_2 stored in these geologic formations, refine storage capacity estimates, and determine future regional opportunities for large scale deployment of sequestration technologies, should they be needed. These field verification tests require a substantial funding commitment to ensure successful completion of Phase II activities among the CSRP. Increased funding will also ensure that the CSRP provides complete coverage throughout the United States.

Being able to capture CO_2 at the lowest possible cost is critical to minimizing total sequestration costs in the future. Research is continuing to lower the capture costs of CO_2 and help to expedite commercialization at large scale sources. This research will be continuing with projects that are selected under a solicitation released in FY 2005 for technologies available for the existing fleet. In addition, research will continue to move forward on two oxycombustion projects (Babcock and Wilcox (B&W) and BOC Group) that were selected in FY 2006. Oxycombustion is a promising carbon capture technology that uses oxygen rather than air for combustion, thereby resulting in a highly pure carbon dioxide exhaust stream that can be captured at relatively low cost and sequestered.

Additional research will continue in addressing systems to lower the costs of capture, an example of a bench-scale project is at the University of Texas at Austin that will be completing experiments to address issues such as solvent loss, solvent reclaiming, and corrosion associated with the potassium carbonate/piperazine solvent. Additional projects will be undertaken in the area of CO_2 capture including novel concepts, system analysis, bench-scale, and pilot-scale projects in an effort to reduce the cost associated with capturing the CO_2 for sequestration. These projects will result from competitive solicitations and will help the core R&D Program toward meeting its goals.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

Sequestration field tests will be continuing to understand the trapping mechanisms for CO_2 storage and to develop best practice procedures for the Regional Partnerships and FutureGen. The Weyburn Project will be entering its second phase to investigate carbon dioxide storage, protocols, and modeling and analysis in conjunction with economic enhanced oil recovery operations in the Weyburn oilfield, with the potential to expand into an adjacent oilfield. The Frio project is being scaled up following the initial successful injection of a small quantity of CO_2 into a saline formation in October of 2004. Using the infrastructure now available at the site, the project will scale up and inject a larger quantity of carbon dioxide into several zones in the saline Frio Formation, and conduct monitoring and verification for a longer period of time. An unmineable coal seam will continue to be investigated with a planned 26,000 tons of CO_2 to verify sequestration potential in a West Virginia coal seam.

Emphasis on field scale monitoring, mitigation, & verification (MMV), and modeling will continue to provide tools and protocols to verify the long term permanence of CO_2 storage. Geophysical tools such as Vertical Seismic Profiling (VSP), crosshole seismic, and crosshole electromagnetics will be integrated with other tools such as well logs, geochemical analysis of reservoir fluids, use of tracers, and reservoir modeling to monitor and predict distribution of the plume, and verify carbon dioxide containment.

The National Carbon Sequestration Database and Geographical Information System (NATCARB) will continue enhancement and functionality of the Relational Database Management System covering the United States. Enhancements to NATCARB will be conducted by Kansas State of the amount of energy, both direct and embodied (indirect), currently used in the production of this Nation's commodity crops and herbaceous energy crops, and determine from these energy expenditures the quantity of CO_2 expended and attributable to these production sectors.

All FY 2007 activities will provide critical support for FutureGen, Carbon Sequestration Leadership Forum (CSLF) and the President's strategy to slow the growth of greenhouse gas emissions.

Participants include: Montana State University, UNDEERC, Univ. of Kansas, Battelle, AEP, Babcock and Wilcox, Alstom Power, CMU, Foster Wheeler, BOC Group, Texas BEG, Virginia Tech, Univ. of Minnesota, UOP, Notre Dame, Harvard, Arizona State, Univ. of Georgia, Velocys, Praxair, Dakota Gasification, ARI, SRI, California Technical Institute, RTI, Stephen F. Austin, Univ. of Massachusetts, Univ. of Michigan, Univ. of Delaware, Univ. of North Carolina-Charlotte, Nature Conservancy, BP, Kansas State, Univ. of KY, Univ. of TX, MIT, Princeton University, Consol, MBARI, IEA, Univ. of Illinois, SSEB, Uni. Of NM, California Energy Commission, NETL, ARC, LANL, SNL, LLNL, LBNL, PNNL, ORNL, INEEL, TBD.

In FY 2006, numerous technologies in the area of CO_2 capture were either continued or began pilot scale testing phases to validate substantial potential for cost reduction and performance improvement. Example technologies include the Research Triangle Institute dry sorbent,

(dollars in thousands)

FY 2005	FY 2006	FY 2007

University of Texas piperazine solvent, Alstom Power oxygen based combustion process, Foster Wheeler oxygen based combustion process, and the LANL, INEEL/Pall CO_2/H_2 separation membrane. Sequestration field tests began the injection phases of small quantities of CO_2 or scaling up existing injection efforts to investigate larger sections of geologic formation. Weyburn project Began Phase II efforts to continue development of monitoring, mitigation & verification (MMV) technologies. Texas Bureau of Economic Geology (BEG) expanded injection into Frio saline formation to appropriate near-by locations. American Electric Power & Battelle considered the possibility of a small scale capture and sequestration experiment at the Mountaineer power plant in the FY 2006 timeframe. Monterey Bay Aquarium Research Institute (MBARI) performed a several-day field test to further understanding of ocean sequestration feasibility. In the area of breakthrough CO_2 capture concepts, projects selected with the National Academy of Sciences were approaching their final year. Researchers completed laboratory tests of novel membranes and sorbents to determine their applicability for pilot scale development. In the novel area of converting CO_2 to solid carbonates, researchers studied fundamental reaction mechanisms and rates, and experimentally testing the novel idea of storing CO_2 together with SO_2 in standstones containing feldspar and iron oxide. Terrestrial sequestration projects completed reforestation experiments on hundreds of acres of previously unproductive reclaimed mine lands. Recommended mined land reclamation practices were developed as well as summary of costs required to optimize carbon sequestration through the reforestation of these lands. Testing was conducted on different land use types and protocol development for two advanced soil carbon sampling technologies capable of measuring carbon at less than 10% of the cost of conventional methods. Guidelines were provided on the optimum forest management practices for the major commercial tree species in the United States taking into account a market established for different carbon prices. Finally, approximately 7 Phase II Regional Carbon Sequestration Partnerships were established to evaluate through small scale validation tests their ability to sequester carbon efficiently, safely, and permanently. The partnerships validated all infrastructure concepts and begin regulatory compliance, permitting, liability approaches for selected projects as well as implement public outreach and education mechanisms to engage the public and other stakeholders. All FY 2006 activities provided critical support for FutureGen, Carbon Sequestration Leadership Forum (CSLF) and the President's Climate Change Technology Program. *Participants included: Montana State University, UNDEERC, Univ. of Kansas, Battelle, AEP, Alstom Power, CMU, Foster Wheeler, Texas BEG, Virginia Tech, Univ. of Minnesota, UOP, Notre Dame, Harvard, Arizona State, Univ. of Georgia, Velocys, Praxair, Dakota Gasification, ARI, Nature Conservancy, Univ. of KY, Univ. of TX, MIT, Princeton University, Consol, MBARI, IEA, Univ. of Illinois, SSEB, Uni. Of NM, California Energy Commission, NETL, LANL, SNL, LLNL, LBNL, PNNL, ORNL, TBD.*

In FY 2005, continued core R&D program toward meeting the goals in the following areas: Developing efficient, low-cost, advanced CO_2 separation and capture concepts; identifying issues associated with carbon sequestration in differing geologic formations, and reducing the cost, and environmental uncertainties (including storage stability, permanence, rates and characteristics of migration) of large-scale carbon sequestration through innovative Public-Private R&D partnerships. Close collaboration with the carbon management science programs and activities in

the Office of Science will be maintained for the purposes of applying promising basic science principles to novel concepts, thereby providing an integrated approach to advancing the science and technology of carbon sequestration. Completed pilot tests on advanced capture technologies related to membrane and hydrate configurations. Completed field tests for non-CO_2 greenhouse gas mitigation related to fugitive methane emissions from coalmines. Completed field tests for geologic sequestration combined with enhanced coal bed methane recovery. Completed study of carbon dioxide/limestone sequestration in the ocean. Finally, Regional partnerships (1) identified regional opportunities and benefits; (2) established a baseline and characterized a region by matching source and sink opportunities; (3) established preliminary monitoring and verification protocols; (4) identified appropriate regulatory framework for sequestration options; and (5) communicated with stakeholders through education and outreach programs. Launch technology validation phase of the regional carbon sequestration partnerships. *Participants included: NETL, LANL, Battelle, Praxair, Dakota Gasification, ARI, Nature Conservancy, Univ. of KY, Univ. of TX, VA Tech, MIT, Princeton University, Consol, IEA, University of Massachusetts, TBD.*

- **Focus Area for Carbon Sequestration Science**..... **6,834** **5,940** **7,135**

In FY 2007, the Focus Area for Carbon Sequestration will, depending on findings from the prior year, conduct tests in the Modular Carbon Capture Facility (MCCF) of promising sorbents and use results to identify and define a commercial application at a power plant. NETL will report the performance of advanced aminated sorbents and evaluate their benefits for actual applications. The Focus Area will conduct detailed process design of a CO_2 capture system in a full size power plant. The most promising membrane or solvent technology for IGCC applications will be identified to propose for larger scale testing in a gasification environment. CFD and APECS modeling tools will continue to be used to evaluate the economic viability and support the development of carbon capture technologies. The Focus Area will develop a CFD-based reduced order model (ROM) of an oxygen carrier regeneration unit. The Focus Area will continue to develop methods to accurately detect and locate abandoned wells in a variety of reservoir types, and conduct research on tools and methods to ensure the permanence of geologically sequestered carbon through the use of surface monitoring techniques based on chemical tracers, CO_2 and possibly both CH4 and Radon soil flux rates, and geophysical data. These tools will be combined with reservoir models that simulate underground migration of CO_2 to allow estimation of leak rates as low as 0.01% per annum. Field testing of MMV and modeling methodologies will be conducted through active collaborations with one or more regional partnership pilot or demonstration projects in coal seams and/or brine reservoirs, and other continuing field sequestration projects, and will ensure acceptance by permitting agencies. The Focus Area will work to achieve acceptance by users of site selection and screening criteria for CO_2-ECBM, and will publish data on CO_2/coal interactions measured at reservoir conditions, including flow studies and CT scanner measurements, that improve understanding of field sequestration results. The Focus Area will complete a "transparent" model of CO_2-ECBM sequestration that incorporates accurate scientific knowledge of coal swelling behavior and allows the evaluation of various injection/recovery configurations. *Participants include: NETL.*

(dollars in thousands)

FY 2005	FY 2006	FY 2007

In FY 2006, the Focus Area for Carbon Sequestration Science conducted further System Analysis studies on candidate sorbents based on kinetic and thermodynamic studies completed in FY 2005. During FY 2006, the Focus Area developed a structured aminated sorbent, and determined how absorption/regeneration occurs on this advanced CO_2 sorbent. The Focus Area completed additional system studies of candidate sorbents based on kinetic and thermodynamic studies completed in FY 2005. As warranted, the Focus Area designed a process scale test of NETL-developed sorbents in the Modular Carbon Capture Facility (MCCF) and procured needed material. NETL also investigated the chemistry of aqueous ammonia service life in the presence of flue gas contaminants. For IGCC applications, NETL evaluated potential of ionic liquids for direct physical solvent use, or as a membrane. In addition, Computational Fluid Dynamics and APECS modeling were used to support the carbon capture technology area. Understanding the technological and economic viability of carbon capture technologies is a critical step in their development. Both CFD and APECS tools enable the equipment and process designers to more accurately evaluate the performance of these systems. The Focus Area tested new methodologies to detect and locate abandoned wells that might significantly affect leakage of CO_2 from field sequestration sites. The Focus Area continued to develop, test and demonstrate a suite of surface and near surface MMV technologies at sequestration field sites and developed first hand knowledge of the strengths and weaknesses of each technique. Testing of MMV technologies continued at the Frio site, the Kansas EOR site, the Strata Productions site in New Mexico, and/or other field sites to be identified. This resulted in a well tested suite of tools that can be used to detect CO_2 leaks and quantify leak rates should any leakage occur. The Focus Area attempted to show that some of the MMV tools can detect and quantify CO_2 leakage in amounts less than 0.01% per year from a geologic sequestration reservoir. The Focus Area developed an improved understanding of the physical, chemical, thermodynamic and mineralogical phenomenon that occur (including coal swelling/shrinkage and mineral dissolution) when CO_2 is injected into a coal seam by incorporating key data into the coal formation sequestration computer simulator. This simulator will assist in developing the theoretical basis for understanding field results from both the Burlington Resources and Consol projects. The Focus Area continued to study the interactions between CO_2 brine and rock samples from the Frio site and the AEP/Battelle site. Collaboration was emphasized with Carbon Sequestration Regional Sequestration Partnerships. *Participants included: NETL.*

In FY 2005, the most advanced CO_2 capture sorbent known, $LiSiO_4$, were tested in the flexible Modular CO_2 Capture Facility (MCCF) in the fuel gas mode. Several other sorbents were also evaluated in the MCCF with particular emphasis on support to FutureGen or other large scale demonstrations. Measurement, monitoring & verification activities continued to develop, evaluate, demonstrate and test new low cost surface and near surface methods for monitoring and verification of the integrity of geologically sequestered CO_2 at domestic sequestration sites, and possibly some foreign sites. NETL continued to develop the theoretical basis for understanding field results from both the Burlington Resources and the CONSOL CO_2-enhanced coalbed methane recovery projects. New insights and confirmation of previously developed hypotheses that are central to the continued development of coal seam sequestration were developed. Key laboratory experiments were conducted that confirm or deny previously developed insights.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

NETL's geological sequestration core flow laboratory (GSCFL) obtained drilling core samples from the AEP/Battelle Mountaineer project in New Haven, WV, and began evaluating the rock's permeability and porosity. The effects of CO_2 injection upon the host rock mineralogy and petrography were investigated. *Participants included: NETL.*

- **Center for Zero Emissions Research and Technology** **0** **5,940** **0**

  The Zero Emission Research and Technology Center is a research collaborative focused on understanding the basic science of underground (geologic) carbon dioxide storage to mitigate greenhouse gases from fossil fuel use and to develop technologies that can ensure the safety and reliability of that storage.

  In FY 2007, no funding is requested.

  In FY 2006, conducted research focused on understanding the basic science of underground (geologic) carbon dioxide storage to mitigate greenhouse gases from fossil fuel use. *Participants included: Montana State U., West Virginia U., LANL, LBNL, PNNL, NETL.*

  In FY 2005, activity conducted under Advanced Research.

- **Program Support** **453** **0** **0**

  Fund technical and program management support.

- **Congressionally Directed Activities – Carbon Sequestration** **0** **3,960** **0**

  - **Jupiter Oxy Fuel Technology** **0** **2,079** **0**

    Completed research on the Oxy Fuel Combustion Technology process in FY 2006. This process combusts coal and other fossil fuels with oxygen to produce CO_2 that is highly concentrated in the flue gas, facilitating capture.

  - **Utah Center for Ultra-Clean Coal Utilization**. **0** **1,881** **0**

    Completed research at the Utah Center for Ultra-Clean Coal Utilization. The Center pursues development of highly efficient coal conversion technologies. Key research areas target the elimination of pollutants, greenhouse gases, and safeguarding human health and environment. The Center conducts research into technologies for the retrofit of existing coal-fired power plants.

- **SBIR/STTR (non-add)** ..... **—** **(1,616)** **(2,045)**

  In FY 2005, $923,000 and $111,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Fuels	**31,341**	**28,710**	**22,127**
▪ **Transportation Fuels and Chemicals**	**6,150**	**0**	**0**

This program conducts process research to develop advanced technologies for producing hydrogen from fossil energy resources, primarily coal, as adjunct technology to coal gasification-based systems that co-produce electricity.

- **Syngas Membrane Technology** **5,174** **0** **0**

  In FY 2007 and FY 2006, no funds are requested for this activity.

  In FY 2005, conducted work on novel syngas ceramic membrane development targets for the production of environmentally superior liquid fuels and hydrogen. *Participant: APCI*

- **Ultra Clean Fuels** **976** **0** **0**

  In FY 2007 and FY 2006, no funds are requested for this activity.

  In FY 2005, initiated research to develop an optimum process for making high hydrogen content liquids from coal. The liquids will then be evaluated for their suitability to provide hydrogen at distributed locations near the point of use. *Participant: ICRC/Syntroleum.*

▪ **Hydrogen from Coal Research** **16,518** **21,635** **22,127**

In FY 2007, continue research for the development of novel technology to: 1) separate hydrogen from mixed gas streams to remove remaining impurities prior to utilization; 2) produce substitute natural gas from coal for distributed hydrogen production; 3) store and deliver hydrogen/liquid hydrogen carriers; 4) utilize high-speed computation science to provide the technical foundation to facilitate the development of advanced system components associated with the production, delivery, storage and utilization of hydrogen from coal; and, 5) perform systems engineering studies to determine optimum strategies for scale-up of advanced separation membrane. Also, in FY 2007, activities will be initiated to move to the next level of maturity by study of potential configurations for scaling-up of hydrogen membrane reactors and advanced CO_2/H_2 separation systems. These activities are critical toward completing the FE goal to develop modules for installation into the FutureGen plant, as well as the Hydrogen Fuel Initiative. *Participants include: Gas Technology Institute, Wright-Patterson AFB, Eltron Res., Inc., ORNL, ANL, RTI, West Virginia University, Arizona Public Service, Advanced Materials Corp., REB, Univ. of Michigan, NETL, Headwater Group, GE, Univ. of Kentucky, Aspen Products Group, United Technologies Group, Univ. of Wyoming, Univ. of Lehigh, UNDEERC, TBD.*

In FY 2006, performed research to develop technologies to: 1) separate hydrogen from mixed gas streams (continuation); 2) produce high hydrogen content coal-derived liquids for subsequent reforming at distributed generation facilities (continuation); 3) store hydrogen (continuation); 4) utilize hydrogen in non-fuel cell powered applications (continuation); 5) utilize computation science to provide the technical foundation upon which to facilitate the development of advanced system components associated with the production, delivery, storage and utilization of hydrogen from coal; and 6) evaluate pathways for producing hydrogen from low rank coals; and initiate research to: 1) produce domestic substitute natural gas (SNG) as an alternate, low cost approach

(dollars in thousands)

FY 2005	FY 2006	FY 2007

for producing hydrogen near the end-use; 2) produce high-value carbon products to lower the overall cost of centrally produced hydrogen from coal; and (3) systems engineering studies to: a) develop more efficient and less costly concepts for liquid fuels reforming; and to b) determine optimum strategies for scale-up of advanced separation membrane modules.

In FY 2005, performed research to develop technologies to: 1) separate hydrogen from mixed gas streams (continuation); 2) produce high hydrogen content coal-derived liquids for subsequent reforming at distributed generation facilities (continuation); 3) store hydrogen (continuation); 4) utilize hydrogen in non-fuel cell powered applications (continuation); 5) utilize computation science to provide the technical foundation upon which to facilitate the development of advanced system components associated with the production, delivery, storage and utilization of hydrogen from coal; and 6) evaluate pathways for producing hydrogen from low rank coals.

Participants include: SouthWest Research Institute, U. Of Calif.-Davis, Gas Technology Institute, Media & Process Technology, Ohio State Univ., Wright-Patterson AFB, Eltron Res., Inc., Oak Ridge National Lab, Los Alamos National Lab, Argonne National Lab, National Laboratory Competitive, UNDEERC, TBD.

- **Solid Fuels and Feedstocks**..... **5,694** **0** **0**

The program emphasizes three areas of research: 1) technologies to produce high value carbon products from coal; 2) advanced separations technologies to produce commercial grade coal from coal waste; and 3) process science and engineering related to integrating coal-derived fuels production with refinery operations.

- **Premium Carbon Products**..... **976** **0** **0**

In FY 2007 and FY 2006, no funding is requested.

In FY 2005, conducted work on development of novel processes to produce high value graphite, activated carbon, carbon fibers for high strength materials, carbon foams for military applications and carbon electrodes for batteries and fuel cells. *Participants include: A Penn State University-managed consortium that includes West Virginia University, Univ. of Kentucky and several industrial companies.*

- **Advanced Separation**..... **2,928** **0** **0**

In FY 2007 and FY 2006, no funding is requested.

In FY 2005, conducted work on developing processes for reclamation of coal fines to monetize coal from waste coal sites and mitigate potential environmental issues associated with these sites; and to develop solid-solid and solid-liquid coal separation processes that have crosscutting applicability in the mineral industry. *Participants include: Virginia Polytechnic University – managed consortium that includes West Virginia Univ. Univ. of Montana, Univ. of Kentucky, Univ. of Nevada-Reno, New Mexico Tech and Univ. of Utah.*

- **Coal-Derived Jet Fuels** **1,790** **0** **0**

In FY 2007 and FY 2006, no funding is requested.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

In FY 2005, conducted work on the FY 2004 research and development to determine the technical requirements and cost implications of integrating coal-derived jet fuel production into refinery operations. *Participant: Penn State*

- **Advanced Fuels Research**..... **2,657** **0** **0**

  Provide the scientific foundation for developing advanced hydrogen production technologies and other coal fuel-related processes that can be integrated with coal gasification-based hydrogen co-production facilities.

  In FY 2007 and FY 2006, no funding is requested.

  In FY 2005, conducted work on supporting research that will facilitate the development of high-efficiency, affordable processes for converting coal to high value fuels, including hydrogen and hydrogen precursors; and to develop a coal extraction process that provides precursor chemicals suitable for production of premium coal-derived materials. *Participants include: Univ. of Kentucky et at, WVU.*

- **Program Support**..... **322** **0** **0**

  Fund technical and program management support.

- **Congressionally Directed Activities – Fuels**..... **0** **7,075** **0**

  - **Center for Advanced Separation Technologies**..... **0** **990** **0**

    Completed research at the Center for Advanced Separation Technologies (CAST) to explore solid-solid and solid-liquid separations important to the coal and minerals industries.

  - **Continuous Solvent Extraction Processes for Coal Derived Carbon Projects at WVU**..... **0** **693** **0**

    Completed study of coal based extract as a source of material for producing high-value carbon products at West Virginia University.

  - **WVU Coal Liquefaction Study in China**..... **0** **495** **0**

    Completed review and environmental assessment for the Direct Liquefaction commercial demonstration being built in China using American developed technology.

  - **WVU Lightweight Composite Materials for Heavy Duty Vehicles Project**..... **0** **442** **0**

    Completed research on development of innovative composites, including metal matrix technology and design concepts for lightweight vehicles which would translate to increased fleet fuel efficiency.

  - **ITM/Syngas Project**..... **0** **1,980** **0**

    Completed Air Products and Chemicals research on development of membranes for converting natural gas and air to synthesis gas and hydrogen.

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
• **National Center for Hydrogen Technology**	**0**	**2,475**	**0**

Completed work at UNDEERC on multifaceted research to develop centrally produced and decentralized hydrogen from low-rank coal, storage and end use application.

▪ **SBIR/STTR (non-add)**	**—**	**(797)**	**(613)**

In FY 2005, $720,000 and $86,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Fuel Cells	**75,360**	**61,380**	**63,352**
▪ **Fuel Cells Advanced Research**	**11,769**	**7,920**	**0**

In FY 2007, no planned activities in this category.

In FY 2006, conducted advanced electrochemical work initiated in prior years including research on viability of advanced SOFC based energy storage and hydrogen co-production concepts. *Participants included: PNNL, Montana State Univ., Univ. of Florida, NETL, Ion America, CalTech.*

In FY 2005, completed work on high temperature electrochemical research conducted at HiTEC at PNNL, Montana State University and the University of Florida. *Participants included: PNNL, Montana State University, University of Florida, NETL, TBD.*

▪ **Fuel Cell Systems Development**	**2,850**	**0**	**0**

In FY 2007 and FY 2006, no planned activities in this category.

In FY 2005, FCE completed its work on the Montana Hybrid project. *Participants include: Fuel Cell Energy, NETL.*

▪ **Vision 21 Hybrids**	**4,843**	**0**	**0**

In FY 2007 and FY 2006, no planned activities in this category.

In FY 2005, the work on tubular solid oxide fuels at Siemens Westinghouse Power Corp. was completed its transition to SECA.

▪ **Innovative Systems Concepts/SECA**	**52,278**	**43,065**	**63,352**

In FY 2007, continue work on three SECA Industrial Teams targeting 3-10 kW prototype demonstrations with a cost of $400/kW. Continue work on three SECA Coal Based Fuel Cell projects focused on scaling solid-oxide fuel cells for near-zero atmospheric emissions central generation. Complete last Phase I SECA prototype test, validating successful industrial teams achievements of SECA Phase I technical requirements for low-cost fuel cell systems; continue SECA core technology R&D to resolve remaining crosscutting technical issues, such as seals and interconnects and to enhance individual subsystem components and overall system performance to position teams to achieve Phase II goals and the final SECA system 2010 goal of $400/kW; continue MW-scale SECA fuel cell and fuel cell hybrids work in support of coal-syngas based,

(dollars in thousands)

FY 2005	FY 2006	FY 2007

near-zero atmospheric emissions fuel cell systems. Continue R&D addressing barrier issues with respect to the performance and manufacturability of larger-size fuel cells suitable for use in multi-MW applications. *Participants include: Industrial Teams, PNNL, ANL, NETL, and other core technology participants.*

In FY 2006, continued SECA Industrial Team Phase II cost reduction and Coal Based Fuel Cell Projects in support of near-zero atmospheric emissions plants (e.g., FutureGen). Continued remaining Phase I prototype tests including independent third party validation testing to ensure successful industrial team achievement of SECA technical requirements for low-cost fuel cell systems; continued SECA core technology R&D to resolve remaining crosscutting technical issues, such as seals and interconnects and to enhance individual subsystem components and overall system performance to position teams to achieve Phase II goals and the final SECA system 2010 goal of $400/kW. Continued MW-scale SECA fuel cell and fuel cell hybrids work in support of coal-syngas based, near-zero atmospheric emissions fuel cell systems. Continued R&D addressing barrier issues with respect to the performance and manufacturability of larger-size fuel cells suitable for use in multi-MW applications. *Participants included: GE, Siemens Westinghouse, Delphi, FCE, Acumentrics, Cummins, PNNL, ANL, NETL, and other core technology participants.*

In FY 2005, began prototype validation of Phase I technical requirements for low-cost SECA fuel cell systems; enhanced individual components and systems performance; conducted SECA core technology R&D to resolve crosscutting technical issues; developed innovative reformers, sensors, and controls; initiate designs of coal-derived gas-based SECA systems as permitted. The Fuel Cell Coal Based Systems Program began. The goal of the program is to create a commercial >100 MW-class, 55% efficiency, CO_2-ready, fuel cell/gas turbine hybrids in coal based power plants by 2020. The first solicitation, selections and awards will be made in FY 2005. *Participants included: GE, Siemens Westinghouse, Delphi, FCE/MRI, Acumentrics, Cummins-SOFC, PNNL, ANL, NETL, TBD, and other core technology participants.*

- **Novel Generation** **2,846** **0** **0**

In FY 2007 and FY 2006, no funding is requested. In accordance with the R&D Investment Criteria, Ramgen will no longer be funded through direct sourcing. Ramgen is eligible for funding through a competitive, merit-based process under the Turbines program.

In FY 2005, completed sponsored work on the RamPressor. *Participants included: Ramgen.*

- **Program Support** **774** **0** **0**

Fund technical and program management support.

- **Congressionally Directed Activities – Fuel Cells** ... **0** **10,395** **0**
  - **MW-Scale Oxide Fuel Cell Gas Turbine Hybrid System** **0** **2,475** **0**

Completed MW-Scale Oxide Fuel Cell Gas Turbine Hybrid System Project.

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
• **MW-Scale Solid Oxide Fuel Cell Stationary Power Generation**	**0**	**2,970**	**0**
Completed MW-Scale Solid Oxide Fuel Cell Stationary Power Generation Project.			
• **Solid Oxide Fuel Cell Tech. Stat Power Applications Project**	**0**	**990**	**0**
Completed the Solid Oxide Fuel Cell Technology Stat Power Applications Project.			
• **Solid Oxide Fuel Cells**	**0**	**3,960**	**0**
Completed the Solid Oxide Fuel Cells work in Pennsylvania.			
▪ **SBIR/STTR (non-add)**	**—**	**(1,592)**	**(1,748)**
In FY 2005, $1,808,000 and $218,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.			
Advanced Research	**41,865**	**52,622**	**28,914**
▪ **Coal Utilization Science**	**17,120**	**7,920**	**9,439**
• **Coal Utilization Science (Core)**	**12,684**	**7,591**	**9,114**

In FY 2007, conduct research aimed at innovations and advanced concepts that support development of highly efficient and clean power plants focusing on the reduction or elimination of adverse environmental impacts of coal use.

Continue to develop a new class of sensors that are capable of monitoring key parameters under harsh operating conditions of ultra-clean fossil energy systems including FutureGen. Revolutionary concepts for Enabling Technologies: continue to develop projects initiated in FY 2006 targeting critical areas of power plants with near-zero atmospheric emissions and FutureGen. Continue mechanistic 3D modeling and stochastic modeling and model integration development for advanced power systems. Continue to investigate basic combustion and gasification chemistry to discern rates and mechanisms that affect emissions behavior of coal under advanced and conventional combustion/gasification conditions to minimize criteria pollutants in support of the Clear Skies Initiative. Continue to investigate the fundamental parameters involved in mineral sequestration, i.e., kinetics and thermodynamics. *Participants include: SNL, CMU, AML, Nuonics, ARC, General Electric, New Mexico Tech., REI, Texas A&M Univ., Univ. of Utah, Ames, Fluent, NETL, TBD.*

In FY 2006, conducted research that supports development of highly efficient and clean power plants, focusing on the reduction or elimination of adverse environmental impacts of coal use.

Sensors and Controls: Continued to develop a new class of sensors selected through a FY 2003/2004 BBFA solicitation that are capable of monitoring under the harsh operating conditions of ultra-clean fossil energy systems including FutureGen. Proceeded to prototype

(dollars in thousands)

FY 2005	FY 2006	FY 2007

development of sensor projects based on feasibility test evaluations. Enabling Technologies: Initiated projects selected under FY 2005 solicitation targeting critical areas of power plants with near-zero atmospheric emissions and FutureGen. Continued mechanistic 3D modeling and stochastic modeling and model integration development for advanced power systems. Continued to investigate basic combustion and gasification chemistry to discern rates and mechanisms that control emissions behavior of coal under advanced and conventional combustion/gasification conditions to minimize NO_x, SO_x, air toxics, and other pollutants in support of clear skies initiative. Developed conceptual geochemical model of magnesium silicate carbonation for CO_2 sequestration and demonstrate CO_2 brine carbonation with core geological reservoir host rocks. No funds are requested for the Arctic Energy Office. *Participants included: NETL, SNL, CMU, ARC, Ohio State U., U of Fla, MSU, Nuonics, Prime Photonics, REI, SRI, Miss. State U., SRD, TBD*

In FY 2005, conducted research that supports the development of highly efficient and clean power plants, focusing on the reduction or elimination of adverse environmental impacts of coal use. Sensors and controls: Completed prototype development and testing of sensors critical to enhancing and controlling plant efficiencies and emissions. Continued to develop new class of sensors based on projects selected through FY 2002, FY 2003, and FY 2004 solicitations that are suitable for monitoring in harsh conditions that will enable the operation of ultra-clean fossil energy systems. Enabling Technologies: Completed development of computational workbench for near-zero atmospheric emission compatible systems. Initiated mechanistic 3D modeling of near-zero atmospheric emission compatible plant. Continued to investigate basic combustion and gasification chemistry to discern rates and mechanisms that control emissions behavior of coal under advanced and conventional combustion/gasification conditions to efficiently minimize NO_x, SO_x, air toxics, and other pollutants in support of the clear skies initiative. Completed integration of mechanical, chemical, and chemico-mechanical pretreatment into CO_2 mineral carbonation process. Continued support for the Arctic Energy Office. *Participants included: NETL, SNL, CMU, U. of Pittsburgh, ARC, Ohio State U., REI, U. of FL, MSU, U. of Alaska.*

- **Mercury Control** **300** **329** **325**

In FY 2007, complete projects relating to fundamental mechanisms that affect mercury control and initiate technology transfer activities for mercury continuous emission monitors. *Participants include: SNL, Purdue University, GTI, University of Arizona; URS.*

In FY 2006, continued projects selected under FY 2004 solicitation for fundamental mechanisms that effect mercury control. Continued to develop real time mercury emissions monitor with capability for speciation. *Participants included: SNL, Purdue U., GTI, U. of Arizona, URS.*

In FY 2005, implemented projects selected under FY 2004 solicitation. Continued to develop real time mercury emissions monitor with capability for speciation. *Participants included: Purdue U., GTI, U. of Arizona, URS, SNL.*

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
• **Zero Emissions Research and Technology**	**3,960**	**0**	**0**

In FY 2007, no activity.

In FY 2006,activity conducted under Sequestration. Support for the Strategic Center for Zero Emissions Coal Research continued with funds made available in FY 2005.

In FY 2005, continued to conduct research for advanced coal programs and FutureGen at the Strategic Center for Zero Emissions Coal Research. Funds provided in FY 2005 are sufficient to support this effort through FY 2006. *Participants included: Montana State U., WVU, PNNL, LANL, NETL, LBNL.*

• **Program Support**	**176**	**0**	**0**

Fund technical and program management support.

▪ **Materials**	**10,555**	**7,920**	**7,533**
• **High Temperature Materials Research**	**4,966**	**3,541**	**3,586**

In FY 2007, develop high-strength, oxidation- and corrosion-resistant metallic and intermetallic alloys for use as hot components in advanced fossil energy conversion and combustion systems to help meet the efficiency and clean power generation goals of near-zero atmospheric emissions plants (e.g., FutureGen). These alloys are needed to improve thermal efficiency through increased operating temperatures and decreased cooling requirements, as well as to provide materials for applications ranging from process monitoring (e.g. thermowells) to structural components or protective coatings in aggressive environments such as those encountered in coal gasification systems (e.g. molten salt, slag, ash, sulfidation etc.). The development effort is based on increasing performance through fundamental understanding, manipulation, and control of the phases of the metallic and intermetallic structures. *Participants include: ANL, INEEL, ORNL, Ames, NETL.*

In FY 2006, developed strong, tough and oxidation resistant materials capable of service temperatures approaching 1600°F. Apart from the environmental aspects of the effluent from coal combustion, major concern from the systems standpoint is the aggressiveness of the combustion environment toward structural components. This experimental program was aimed at developing a scientific understanding of corrosion mechanisms as a function of alloy composition and deposition chemistry, and at quantitatively determining the scaling and internal penetration of sulfur and oxide species into the alloys. *Participants included: ANL, INEEL, ORNL, Ames.*

In FY 2005, developed a new generation of corrosion resistant high temperature alloys and refractories that will be used as hot components in advanced fossil energy combustion and conversion systems. Performed laboratory research accompanied by testing of the alloys in actual power plant conditions. Novel nano-science approaches were developed for separating hydrogen from product streams that are generated during coal gasification, methane partial oxidation, and water-gas shift reactions. A substantial part of the nano-science for separation is research on materials and their microstructure, for example, the development of materials

(dollars in thousands)

FY 2005	FY 2006	FY 2007

used as molecular sieves to separate hydrogen from the test of the gas. Demonstrate stability of proton-conducting ceramics in atmosphere of coal-derived gas and operated membrane reactor to produce low cost hydrogen from coal. *Participants included: ANL, INEEL, ORNL, Ames, LBNL, NETL, TBD.*

- **Materials for Ultra Supercritical and Gas Separation Systems** **5,481** **4,379** **3,947**

In FY 2007, develop materials technology for ultra supercritical (USC) steam turbines to match USC boiler steam conditions. This advanced materials development effort is critical to support commercialization of USC power plants. Weldability of rotors, resistance to oxidation, exfoliation of the oxides, and solid-particle erosion are key constraints to achieving USC turbine temperature/pressure steam conditions. USC plants become even more attractive when combined with oxyfuel boiler combustion technology to facilitate sequestering CO_2. All of these areas will be addressed.

In the area of gas separations, the objective is to develop a metal supported membrane having both high permeance and selectivity for hydrogen. Early prototype membranes will go through various characterization steps to estimate the average pore size and evaluate them for leak flow. Several techniques have been developed to minimize the leaks and these processes will be applied to the tubes to evaluate the most effective treatment. *Participants include: ORNL, PNNL, Energy Industries of Ohio, ARC, Ames, LANL.*

In FY 2006, developed alloys (e.g., for boiler tubing materials) for ultra supercritical (USC) systems with operating temperatures raised to 1460^{o}F and ensure the weldability of these high temperature materials. The lack of materials with the necessary fabricability, fracture toughness, and adequate resistance to creep, oxidation, corrosion, and thermal fatigue at these higher steam temperatures and pressures currently limit the operation of pulverized coal-fired plants at the higher efficiency advanced USC steam conditions. Pursued breakthrough concepts to develop materials (to include membranes) for achieving very low cost hydrogen and oxygen separation from mixed gas streams and for stabilizing greenhouse gases for next generation energy plants such as FutureGen. *Participants included: ORNL, PNNL, Energy Industries of Ohio, ARC, LANL, Siemens-Westinghouse.*

In FY 2005, identified improved alloys, fabrication processes and coating methods that will permit boiler operation of steam temperatures up to 1400^{o}F and steam pressures up to 5400 psi. Work with alloy developers, fabricators, equipment vendors and power generation plant operators to obtain cost targets for the commercial deployment of alloys and processes developed. Defined issues impacting designs that can permit power generation at steam temperatures greater than or equal to 1460^{o}F. Identified materials needed to develop steam turbines capable of operating at ultra supercritical temperature and pressure conditions and developed a plan to evaluate and qualify materials for the critical components of such turbines. Increased permeance of new membrane materials for achieving very low cost hydrogen and oxygen separation from mixed gas streams achieving repeatability with defect-free membranes, and employed techniques that can be used to manufacture on a large scale.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

Studied impact of new materials and processes for stabilizing greenhouse gases for next generation energy plants (such as oxygen-fired combustion). *Participants included: LANL, ORNL, ARC, UCSD, PNNL, Energy Industries of Ohio, Siemens-Westinghouse.*

- **Program Support** **108** **0** **0**

  Fund technical and program management support.

- **Coal Technology Export**..... **986** **990** **984**

  In FY 2007, continue to facilitate the development and deployment of advanced U.S. clean coal and other fossil energy technologies in global markets. Many of these were developed with DOE funding. These global markets are large, rapidly-growing and highly competitive. Work funded in this area involves a wide range of bilateral and multilateral activities to advance U.S. interests with various countries and international organizations. This work promotes U.S. clean coal technologies, near-zero atmospheric emissions technologies and carbon capture and storage technologies. DOE works closely with U.S. industry to accomplish this. Especially notable are activities to promote the use of U.S. clean coal and carbon capture and storage technologies in China, the world's largest and fastest-growing energy market. Another major activity is participation in the World Energy Council Committee on Cleaner Fossil Fuel Systems (CFFS). The CFFS brings together a wide range of stakeholders from around the world for collaborative activities to promote research, development, demonstration and deployment of cleaner fossil fuels systems.

  In FY 2006, intensified the facilitation of the development and deployment of Near-Zero Atmospheric Emissions Technologies for fossil fuels internationally working with IEA Headquarters. Increased emphasis on pursuing opportunities identified by the World Energy Council Committee on Cleaner Fossil Fuel Systems and the Southern States Energy Board for the international sale and deployment of U.S. clean coal technologies and advanced power systems. Strengthened established partnerships and pursue the establishment of additional effective partnerships to advance U.S. interest in environmental protection by promoting deployment of cleaner energy systems through training, conferences, site visits and information and technical exchanges on clean power systems, best practices, privatization with targeted utilities and governments, and advising countries on identification and elimination of barriers for deployment of cleaner coal and power systems. Promoted the deployment of carbon capture and storage technologies worldwide. Initiated the implementation of Clean Energy/Industrial Ecology Projects in developing countries as a means of Mitigating CO_2 emissions growth as these countries expand electrification.

  In FY 2005, intensified the facilitation of the development and deployment of Near-Zero Atmospheric Emissions Technologies for fossil fuels internationally working with IEA Headquarters. Continued compounding the pursuit of opportunities identified by the World Energy Council Committee on Cleaner Fossil Fuel Systems and the Southern States Energy Board for the international sale and deployment of U.S. clean coal technologies and advanced power systems. Strengthened established partnerships and pursue the establishment of additional effective partnerships to advance U.S. interest in environmental protection by promoting

(dollars in thousands)

FY 2005	FY 2006	FY 2007

deployment of cleaner energy systems through training, conferences, site visits and information and technical exchanges on clean power systems, best practices, privatization with targeted utilities and governments, and advising countries on identification and elimination of barriers for deployment of cleaner coal and power systems. Promoted the deployment of carbon capture and storage technologies worldwide, and provided support for the Carbon Sequestration Leadership Forum. Initiated the implementation of Clean Energy/Industrial Ecology Projects in developing countries as a means of Mitigating CO2 emissions growth as these countries expand electrification.

- **Bioprocessing of Coal** **1,480** **1,485** **1,148**
  - **Bioprocessing of Coal** **1,465** **1,485** **1,148**

    In FY 2007, continue bioremediation of coal to reduce mercury emissions from power plants. Evaluate processes for generating hydrogen from coal waste and fossil fuels. Continue development of biosensors for detection of pollutants using light emitting proteins. Investigate novel bioprocessing research with application to waste stream remediation in advanced power systems. Discontinue investigations of global and natural CO_2 sequestration. *Participants include: ORNL, INEEL, Penn State, NETL, TBD.*

    In FY 2006, completed testing at large scale (power plant) toxin process to safely control zebra mussels as a means of improving the efficiency and reliability of existing power plants. Completed development of technical protocol for screening marine microalgae for maximum biofixation and its conversion into alternative fuels. Evaluated processes for generating hydrogen from fossil fuels. Continued to investigate global and natural CO_2 sequestration. Continued bioremediation of coal to reduce mercury emissions from power plants. Investigated novel bioprocessing research focusing on investigations of influence of microorganisms on the fate of mercury from coal ash. Initiated development of biosensors for detections of pollutants using light emitting proteins. *Participants included: ORNL, INEEL, NY Museum, NETL.*

    In FY 2005, continued testing at large scale (power plant) toxin process to safely control zebra mussels as a means of improving the efficiency and reliability of existing power plants. Continued development of technical protocol for screening marine microalgae for maximum biofixation and its conversion into alternative fuels. Completed development of bench scale testing of biohydrogen from carbon containing waste products to determine food sources that will support microbial growth and hydrogen production. Continued to investigate global, and natural CO_2 sequestration. Demonstrated whitings catalyzed CO_2 fixation at pilot scale. Investigate production value of added chemicals via nonaqueous biocatalysis. Continued bioremediation of coal to reduce mercury emissions when burned in power plants. *Participants included: ORNL, INEEL, PNNL, NY State U., NETL.*

  - **Program Support** **15** **0** **0**

    Fund technical and program management support.

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
▪ **Environmental Activities**.....	**1,972**	**1,980**	**1,722**

In FY 2007, on a lesser scale continue analysis of issues associated with air and water quality, solid waste disposal, and toxic substances, and global climate change. Discontinue analysis of oil and gas regulatory issues. Continue emission trends and forecast studies. *Participants include: ANL, ICF, Resource Dynamics, TMS, PNNL.*

In FY 2006 and FY 2005, continued analysis of issues associated with air and water quality, solid waste disposal, and toxic substances, and global climate change. Continued emission trends and forecast studies. *Participants included: ANL, ICF, Resource Dynamics, TMS, PNNL.*

▪ **Technical and Economic Analyses**	**986**	**990**	**787**

In FY 2007, continue a limited number of studies supporting multi-year planning FE strategy and program formulation; conduct studies on issues that crosscut FE programs including strategic benefits of and new markets for fossil fuel technology. Continue to conduct critical studies to identify major challenges, "leapfrog" technologies, and advanced concepts that are applicable to fossil energy systems, and have the potential to improve their efficiency, cost, and/or environmental performance. *Participants include: ANL, ICF, EIA, Resource Dynamics, TMS.*

In FY 2006 and FY 2005, continued studies supporting multi-year planning FE strategy and program formulation; conduct studies on issues that crosscut FE programs including strategic benefits of and new markets for fossil fuel technology. Conducted critical studies to identify major challenges, "leapfrog" technologies, and advanced concepts that are applicable to fossil energy systems, and have the potential to improve their efficiency, cost, and/or environmental performance. *Participants include: ANL, ICF, EIA, Resource Dynamics, TMS.*

▪ **International Program Support**	**986**	**990**	**984**

In FY 2007, continue U.S. commitment to the International Energy Agency (IEA) fossil fuel activity. This activity is a significant and highly-visible international initiative to advance fossil energy technologies. It substantially leverages the internal fossil energy activities of DOE. Two major IEA commitments are in this area. The first is to the IEA Clean Coal Centre. The Centre is the pre-eminent international research institution on Clean Coal Technologies. It produces numerous reports each year on international coal technology developments that are highly-relied-upon by the U.S. government and by U.S. industry. DOE, with input from U.S. stakeholders such as the Electric Power Research Institute (EPRI), the National Mining Association (NMA), Southern States Energy Board (SSEB) and the Edison Electric Institute (EEI), has the major role in the direction of the Centre and uses this role to ensure that the Centre meets U.S. needs. The second IEA commitment is to the IEA Working Party on Fossil Fuels (WPFF), which the United States provides key leadership. The WPFF, at the urging of the United States, is carrying out an ongoing initiative to promote Near-Zero Atmospheric Emissions Technologies for Fossil Fuels. It also provides direction to several ongoing IEA task forces working in the fossil energy area.

In FY 2006, continued Fossil Energy's commitment to the International Energy Agency (IEA) program support. Continued to provide leadership, direction, cooperation and coordination of office activities with other Federal agencies, state and local governments, energy trade

associations, and the energy industry. Continued preservation and enhancement of active relationships with national and international organizations such as the World Energy Council (WEC), United States Energy Association (USEA), Southern States Energy Board (SSEB), and universities and other non-governmental organizations. Enhanced the expansion of cleaner energy technology power systems activities in southern and western regional African countries, eastern Europe, the Pacific Rim, Russia and Newly Independent States, South Asia/Near East, western Europe, and the Western Hemisphere. Promoted the deployment of carbon capture and storage technologies worldwide. Influenced opportunities for cleaner power systems and clean fuels from coal in selected countries. Initiated the implementation of Clean Energy/Industrial Ecology Projects in developing countries as a means of mitigating CO_2 emissions growth as these countries expand electrification.

In FY 2005, continued Fossil Energy's commitment to the International Energy Agency (IEA) program support. Continued to provide leadership, direction, cooperation and coordination of office activities with other Federal agencies, state and local governments, energy trade associations, and the energy industry. Continued preservation and enhancement of active relationships with national and international organizations such as the World Energy Council (WEC), United States Energy Association (USEA), Southern States Energy Board (SSEB), and universities and other non-governmental organizations. Enhanced the expansion of cleaner energy technology power systems activities in southern and western regional African countries, eastern Europe, the Pacific Rim, Russia and Newly Independent States, South Asia/Near East, western Europe, and the Western Hemisphere. Promoted the deployment of carbon capture and storage technologies worldwide. Influenced opportunities for cleaner power systems and clean fuels from coal in selected countries. Initiated the implementation of Clean Energy/Industrial Ecology Projects in developing countries as a means of mitigating CO_2 emissions growth as these countries expand electrification.

- **Focus Area for Computational Energy Science** **3,945** **3,960** **2,578**
  - **Focus Area for Computational Energy Science** **3,906** **3,960** **2,578**

    In FY 2007, NETL will continue the development of virtual simulations capability to model the performance of advanced power plant systems using mathematical computational simulations and computer-based models. This capability will greatly accelerate development time and substantially reduce the costs required to design viable near-zero atmospheric emissions coal energy options. Continue development of next generation multi-phase flow with interphase exchanges (MFIX). Continue analysis of fuel cell-gas turbine hybrid systems to provide detailed information on the complex interaction between fuel cells and gas turbines that have been coupled together to achieve ultra high efficiency in electrical generation. Continue to extend these steady-state capabilities to develop simulations of dynamic or time-varying models. The ability to study these advanced power systems as they vary in time will help in optimizing operations such as startup, shutdown and systems upsets. At a reduced level of effort, continue the Supercomputing Science Consortium support activities for advanced simulations by providing high performance computing, internet access, technical support and visualization development. *Participants include: NETL, CMU, West Virginia*

University, State of West Virginia, Penn. Supercomputing Center and University of Pittsburgh.

In FY 2006, NETL continued the development of virtual simulations capability to model the performance of advanced power plant systems using mathematical computational simulations and computer-based models. This capability will greatly accelerate development time and significantly reduce the costs required to design viable near-zero atmospheric emissions coal energy options. NETL continued to apply, analyze and evaluate simulators of high efficiency and near-zero atmospheric emission processes at both the individual component level and at the integrated overall system level to assist in their design and establish performance parameters. Continued the application of steady-state process simulations that use coal gasification, gas turbines, and fuel cell subsystems. Using these capabilities, initiated analyses of fuel cell-gas turbine hybrid systems to provide detailed information on the complex interaction between fuel cells and gas turbines that have been coupled together to achieve ultra high efficiency in electrical generation. Continued to extend these steady-state capabilities to develop simulations of dynamic or time-varying models. The ability to study these advanced power generation systems as they vary in time will help in optimizing operations such as startup, shutdown, and system upsets. At a reduced level of effort, continued the Superconducting Science Consortium support activities for advanced simulations by providing high performance computing, internet access, technical support and visualization development. *Participants included: NETL, CMU, West Virginia U, State of WV, PSC, and U of Pittsburgh.*

In FY 2005, NETL continued development of virtual simulations capability using mathematical computational simulations and modeling to accelerate development time and reduce costs of technology systems that have high efficiencies with near-zero atmospheric emissions. Began to apply the virtual integrated simulators of high efficiency and near-zero atmospheric emission processes to study proposed systems and evaluate their design and performance. Analyzed and evaluated these advanced processes, using the advanced simulation capability, at both the individual component level and overall system level. Completed the initial application of process simulation of high efficiency and near-zero atmospheric emission process incorporating MFIX-based component model describing an advanced gasification process to provide detailed information describing the gasification process. Completed the initial application of process simulation of high efficiency and near-zero atmospheric emission process based on fuel cell/gas turbine hybrid system which incorporates a detailed fuel cell component model that will provide detailed information describing fuel cell stack performance. Continued the Supercomputing Science Consortium support activities in advanced simulations by providing high performance computing, internet access, technical support and visualization development in direct support of virtual integrated simulators. Completed a virtual integrated simulation of a high efficiency and near-zero atmospheric emission process, such as a hybrid or advanced gasifier, to demonstrate the ability to simulate a dynamic coupled system. *Participants included: NETL, CMU, U. of WVU, State of WV, PSCC, U. of Pittsburgh.*

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
• **Program Support**	**39**	**0**	**0**
Fund technical and program management support.			
▪ **University Coal Research**	**2,876**	**2,970**	**2,755**
• **University Coal Research**	**2,846**	**2,970**	**2,755**

In FY 2007, the University Coal Research (UCR) Program plans to continue to support grants at U.S. colleges and universities by emphasizing longer-term research for achieving Fossil Energy's strategic objectives. This year's solicitation will focus on three research areas that accelerate technology development and address potential breakthrough technologies for the next century. These will be advanced materials; instrumentation, sensors and controls; and computational energy science.

Collaborative proposals will be solicited from groups of three to five participants, either all universities, or universities jointly with an industrial partner. Selected projects will be eligible for funding of $500,000 to $1 million for a three year period. Five to ten grants are anticipated to be awarded, depending on the number of meritorious proposals submitted. Additionally, at least one student from each participating university will be required to receive grant support.

In FY 2006, the University Coal Research (UCR) Program continued to support grants at U.S. colleges and universities by emphasizing longer-term research for achieving Fossil Energy's strategic objectives. Critical key research areas that accelerate technology development and seek to identify breakthrough technologies for the next century will be supported. Key research areas supported include: advanced power systems including FutureGen, the hydrogen from coal initiative, global climate change, control of coal based mercury emissions, development of advanced materials, sensors and controls, fuel cells, and the utilization of coal-by-products.

As in past years, support continued in all three areas of the UCR Program: the Core, Innovative Concepts Phase-I and, Innovative Concepts Phase-II areas. Under the Core area, the program will continue to encourage collaboration through joint proposals involving university/industry teams. Core Program grants from about $80,000 to $400,000 each will be awarded. The number of grants was determined by the number of meritorious proposals submitted.

Exploration of novel approaches and innovative concepts developed in other scientific and technological areas that assist in developing breakthrough technologies for coal utilization was continued in the Innovative Concepts Phase-I and Phase-II areas. Approximately six, $50,000, one year, Innovative Concepts Phase I grants could be awarded. Further, plans are to continue the Innovative Concepts Phase II Program where one or more Phase I projects can be selected for a $200,000 Phase-II grant award.

In FY 2005, the University Coal Research (UCR) Program continued to support grants at U.S. colleges and universities by emphasizing longer-term research for achieving Fossil Energy's

(dollars in thousands)

FY 2005	FY 2006	FY 2007

strategic objectives. Critical key research areas that accelerate technology development and seeking to identify breakthrough technologies for the next century were supported. The key research areas supported include: near-zero atmospheric emission plants, hydrogen initiative, global climate change, coal-based mercury emissions, materials, sensors and controls, and coal by-product utilization for the measurement, characterization, and the development of cost-effective control technologies.

- **Program Support** **30** **0** **0**

  Fund technical and program management support.

▪ **HBCUs, Education and Training**..... **959** **990** **984**

- **HBCUs, Education and Training** **949** **990** **984**

  In FY 2007, FY 2006, and FY 2005, funding will be used to conduct Fossil Energy research activities with HBCU and other minority institutions and support an HBCU annual technology transfer symposium. *Participants to be determined.*

- **Program Support** **10** **0** **0**

  Fund technical and program management support.

▪ **Congressionally Directed Activities – Advanced Research**..... **0** **22,427** **0**

- **Jupiter Oxy Fuel Technology**..... **0** **5,643** **0**

  Developed oxy-fuel technology that uses 100% oxygen with a combustion process for fossil fuels to reduce emissions of NO_x.

- **New York City Parks Randall's Island**..... **0** **990** **0**

  Installed fuel cell in New York City park at Randall's Island.

- **Power Plant Flue Gas Cleaning/Pollution Elimination Project**..... **0** **2,178** **0**

  Installed flue gas cleanup/pollution control equipment for power plant.

- **GEDAC Packaged Gas Engine-Driven Heat Pump** **0** **2,178** **0**

  Developed GEDAC natural gas engine-driven heat pump and prepared several units for long-term tests.

- **Planar Solid Oxide Fuel Cell Project** **0** **1,485** **0**

  Developed Planar Solid Oxide Fuel Cells for high efficiency, low cost power plants.

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
• **UNDEERC**	**0**	**990**	**0**
Assessed and implemented options for environmentally sounder uses of low rank coal, such as gasification and clean coal technologies.			
• **WVU Lightweight Composite Materials for Heavy Duty Vehicles Project**	**0**	**53**	**0**
Evaluated metal and polymer matrix composites for use in lightweight materials for use in heavy duty vehicles.			
• **Coal to Liquids Program – Phase II**	**0**	**1,980**	**0**
Characterized liquid hydrogen carriers produced by Syntrolium at Montana facility.			
• **Arctic Energy Office**	**0**	**4,950**	**0**
Issued competitive solicitation for fossil energy related Arctic projects.			
• **National Biofuel Energy Laboratory**	**0**	**1,980**	**0**
The National Biofuel Energy Laboratory is a fuel research component of the Wayne State University NextEnergy Center in Michigan. Research was conducted on new specifications for biodiesel that is intended to encourage the auto industry to promote a clean alternative to imported petroleum.			
▪ **SBIR/STTR (non-add)**	**—**	**(1,115)**	**(570)**
In FY 2005, $745,000 and $89,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.			
Combustion Systems	**5,093**	**0**	**0**
▪ **Advanced Hybrid Combustion**	**5,041**	**0**	**0**
In FY 2007 and FY 2006, there are no activities planned.			
In FY 2005, efforts will be re-focused on the development of novel technologies in oxygen combustion; catalytic unmixed combustion of coal; high pressure coal combustion kinetics and continuous pressure feeds for solid feedstocks needed to meet the requirements of advanced near-zero atmospheric emissions power generation systems. *Participants include: ALSTOM, GEGR, Stamet, Fluent, Inc., Western Kentucky University, General Electric.*			
▪ **Program Support**	**52**	**0**	**0**
Fund technical and program management support.			
▪ **SBIR/STTR (non-add)**	**—**	**—**	**—**
In FY 2005, $120,000 and $14,000 were transferred to the SBIR and STTR programs respectively.			

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
U.S./China Energy and Environmental Technology Center	**986**	**984**	**0**

No funding is requested for FY 2007.

In FY 2006 and FY 2005, the Energy and Environmental Technology Center (EETC) had a baseline set of activities that included maintenance of its facilities, support of industrial partners meetings and activities related to the U.S./China Fossil Energy Protocol, and emissions reductions in China. One meeting included plant tours for Chinese attendees, where they observed U.S. clean coal technologies in commercial operations. In FY 2005, the EETC assisted a study that will result in NO_x reductions from China's largest thermal power plant. Toward this end, the EETC provided information to plant management on the performance of NO_x control technologies, including those that were developed and demonstrated under the Clean Coal Technology Program. Additionally, the EETC assisted its Chinese partners in the development of a coal quality management plan for the City of Beijing. Beijing will use the results of this plan in the implementation of its planned air quality improvement program which is being undertaken prior to the 2008 Olympic Games. This project is part of an overall EETC program to adapt U.S. techniques for the reduction of emissions from industrial and municipal heating plants in China. These plants emit hundreds of millions of tons of CO_2 annually as well as enormous amounts of pollutants.

Total, Fuels and Power Systems	**277,300**	**308,878**	**271,162**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Innovations for Existing Plants	
Promulgation of the Clean Air Interstate Rule and the Clean Air Mercury Rule in 2005 provided a market incentive for developing many advanced, cost-effective emissions controls and should reduce the need for Federally funded R&D for existing plants, as determined by the Research and Development Investment Criteria.	
▪ **Super Clean Systems**	
The decrease terminates research directed at NO_x control technology	-990
▪ **Fine Particulate Control/Air Toxics**	
The decrease is primarily associated with the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-1,694,000). In-house work currently funded within this budget line will be funded in the program direction line beginning in FY 2007. The decrease in funding focuses the effort on critical mercury reduction research at the field-testing level and de-emphasizes the particulate control research	-2,288

	FY 2007 vs. FY 2006 ($000)
▪ **National Labs-Competitive**	
The decrease in funding will continue research on coal combustion and gasification by-products, and mercury control at a reduced level	-1,893
▪ **By-Products and Water Management**	
Prior year funding will be used to carry out research on the characterization of Hg in CUBs, at a reduced level. Research initiated in FY 2006 directed at power plant water management will be terminated	-2,475
▪ **Congressionally Directed Activities – Innovations for Existing Plants**	
The Powerspan Electro Catalytic Oxidation and the Coal-Waste Slurry Reburn Projects will be completed	-1,485
Total, Innovations for Existing Plants	**-9,131**
Advanced Integrated Gasification Combined Cycle	
▪ **Gasification Systems Technology**	
The decrease is primarily associated with the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-1,590,000). In-house work currently funded within this budget line will be funded in the program direction line beginning in FY 2007. The decrease is also attributable to a slight reduction in efforts related to the development of advanced gasifiers, gas cleaning technologies, and novel process concept/technologies for the co-production of electricity and hydrogen or synthetic natural gas.	-1,786
▪ **Systems Analysis/Product Integration**	
The increase funds technical outreach to support IGCC commercialization efforts and to support the strategic direction of the program	+301
▪ **Vision 21**	
Decrease is due to reduced level of effort for the development of advanced hydrogen/carbon dioxide technologies	-419
Total, Integrated Gasification Combined Cycle	**-1,904**
Advanced Turbines	
▪ **Hydrogen Turbines**	
The decrease is primarily associated with the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-1,956,000). In-house work currently funded within this budget line will be funded in the program direction line beginning in FY 2007. The decease in funding will result in resources being focused on hydrogen turbines for FutureGen. Additionally, work will be significantly reduced in the University Turbine Systems Research Program and	

	FY 2007 vs. FY 2006 ($000)
oxy fuel turbine research for near-zero atmospheric emission coal based systems area.	-2,544
▪ **Congressionally Directed Activities – Advanced Turbines**	
The Ramgen Engine Development Project will be completed	-2,475
Total, Advanced Turbines	**-5,019**

Carbon Sequestration

▪ **Greenhouse Gas Control**	
The increase will provide funding for the Phase II activities for the Carbon Sequestration Regional Partnerships (CSRP) in order to stay on schedule. The CSRP will conduct field verification stages for testing sequestration technologies and infrastructure concepts throughout unique regions of the United States. These field verification tests require a substantial funding commitment to ensure successful completion of Phase II activities among the CSRP. Increased funding will also ensure that the CSRP provides complete coverage throughout the United States. The increase is offset by the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-4,228,000). In-house work currently funded with this budget line will be funded in the program direction line beginning in FY 2007	+16,346
▪ **Focus Area for Carbon Sequestration Science**	
The increase will provide additional field testing for Monitoring, Mitigation and Validation (MMV) and modeling methodologies that will be conducted through active collaboration with one or more regional partnerships	+1,195
▪ **Center for Zero Emissions Research and Technology**	
The decrease will slow research on geologic storage of CO_2	-5,940
▪ **Congressionally Directed Activities – Carbon Sequestration**	
Completed work on the Jupiter Oxy Fuel Technology project and at the Utah Center for Ultra-Clean Coal Utilization	-3,960
Total, Carbon Sequestration	**+7,641**

Fuels

▪ **Hydrogen from Coal Research**	
Continue Hydrogen from Coal Research to develop improved, novel technology for the production, delivery, storage and utilization of hydrogen - including the initiation of research to scale-up technologies which will simultaneously produce and separate coal-derived hydrogen from the other gas constituents in one membrane reactor, and studies in conjunction with EERE to determine optimum paths for distributing hydrogen from central coal-based plants. The	

	FY 2007 vs. FY 2006 ($000)
increase is offset by the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-1,484,000). In-house work currently funded with this budget line will be funded in the program direction line beginning in FY 2007	+492
▪ **Congressionally Directed Activities – Fuels**	
Completed work at the Center for Advanced Separation Technologies, on the Continuous Solvent Extraction Process project at WVU, the Coal Liquefaction Study in China a conjunction with WVU, the Lightweight Composite Materials for Heavy Duty Vehicles Project at WVU, the ITM/Syngas Project, and at the UNDEERC National Center for Hydrogen Technology	-7,075
Total, Fuels	**-6,583**
Fuel Cells	
▪ **Advanced Research**	
Decrease in funding to reflects completion of the HiTec activities	-7,920
▪ **Innovative Systems Concepts/SECA**	
Increase in funding to support SECA Coal Based Fuel Cell initiative and SECA Phase II program activities. The increase is offset by the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-595,000). In-house work currently funded with this budget line will be funded in the program direction line beginning in FY 2007	+20,287
▪ **Congressionally Directed Activities – Fuel Cells**	
Completed work on the MW-Scale Oxide Fuel Cell Gas Turbine Hybrid System project, the MW-Scale Solid oxide Fuel Cell Stat. Power Generation project, the Solid Oxide Fuel Cell Tech. Stat Power Applications project, and the Solid Oxide Fuel Cells work in Pennsylvania	-10,395
Total, Fuel Cells	**+1,972**
Advanced Research	
▪ **Coal Utilization Science**	
The increase in funding is to maintain sensor and enabling technology projects and continue combustion/gasification activities. The increase is offset by the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-1,165,000). In-house work currently funded with this budget line will be funded in the program direction line beginning in FY 2007	+1,519

	FY 2007 vs. FY 2006 ($000)
▪ **Materials**	
The decrease is primarily associated with the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-337,000). In-house work currently funded within this budget line will be funded in the program direction line beginning in FY 2007	-387
▪ **Coal Technology Export**	
Funding is essentially level with FY 2006	-6
▪ **Bioprocessing of Coal**	
The decrease reflects offsets in the budget to support emphasis on higher priority critical research in the Coal Utilization Science advanced research activity. A portion of this reduction is associated with the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-131,000). In-house work currently funded within this budget line will be funded in the program direction line beginning in FY 2007	-337
▪ **Environmental Activities**	
The decrease reflects offsets in the budget to support emphasis on higher priority critical research in the Coal Utilization Science advanced research activity	-258
▪ **Technical and Economic Analyses**	
The decrease reflects offsets in the budget to support emphasis on higher priority critical research in the Coal Utilization Science advanced research activity	-203
▪ **International Program Support**	
Funding is essentially level with FY 2006	-6
▪ **Focus Area for Computational Energy Science**	
The decrease is primarily associated with the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-1,357,000). In-house work currently funded within this budget line will be funded in the program direction line beginning in FY 2007	-1,382
▪ **University Coal Research**	
The decrease is due to offsets in the budget to support emphasis in higher priority critical research in the Coal Utilization Science advanced research activity.	-215
▪ **HBCUs, Education and Training**	
Funding is essentially level with FY 2006	-6

	FY 2007 vs. FY 2006 ($000)
▪ **Congressionally Directed Activities – Advanced Research**	
Completed work on the Jupiter Oxy Fuel Technology project, the New York City Parks Randall's Island project, Power Plant Flue Gas Cleaning/Pollution Elimination project, the GEDAC Packaged Gas Engine-Driven Heat Pump project, the Planar Solid Oxide Fuel Cell project, low rank coal research at UNDEERC, the West Virginia University Lightweight Composite Materials for Heavy Duty Vehicles project, Phase II of Coal to Liquids program, fossil related Arctic research at the Arctic Energy Office, and research at the National Biofuel Energy Laboratory	-22,427
Total, Advanced Research	**-23,708**
U.S./China Energy and Environmental Center	
It is anticipated that activities will continue into FY 2007 with existing funds	**-984**
Total Funding Change, Fuels and Power Systems	**-37,716**

Program Direction Adjustment (non-add)

A portion of the reductions are associated with the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account ($-14,537,000). In-house work currently funded within this budget line will be funded in the program direction line beginning in FY 2007	*(-14,537)*

Natural Gas Technologies

Funding Profile by Subprogram [a]

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[b]	FY 2006 Current Appropriation	FY 2007 Request
Natural Gas Technologies					
Natural Gas Technologies.....	43,632	33,000	-330	32,670	0
Total, Natural Gas Technologies	43,632	33,000	-330	32,670	0

Mission

The mission of the Natural Gas Technologies Program has been to develop policies and environmentally friendly technologies that would have stimulated a diverse supply of natural gas, both in North America and around the world, so that the market can function to the benefit of all Americans. Budget discipline necessitated close scrutiny of all Fossil Energy programs, using strict guidelines to determine their effectiveness and compare them to other program offering more clearly demonstrated and substantial benefits. As a result, the 2007 Budget will terminate the program in FY 2007.

The Program Assessment Rating Tool (PART) was developed by OMB to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. A PART assessment of the Natural Gas R&D program was conducted for the FY 2004 Budget and a reassessment was conducted for the FY 2005 Budget. The program was rated "Ineffective" in the PART analysis based primarily on not demonstrating clear results of the research effort.

Benefits

Improving the ability to supply and deliver needed natural gas to the consumer had economic, national security, and environmental benefits for the country. Economic benefits included (1) savings to consumers, through price reductions that would have accompanied supply expansion, as well as (2) increased profitability to industry through more efficient operations. Environmental benefits would have been realized through more efficient E&P activities and the expanded use of gas to displace less-clean burning fuels in a variety of end-use applications. Increased national security would have been realized through strengthening of the Nation's energy supply and further diversification of energy supply sources.

Preliminary benefit modeling was conducted by the Department as part of an integrated program benefits analysis of all the Department's major R&D programs to develop Department-wide program benefits estimates, as part of the effort to conform to the President's Management Agenda. The Department is

[a] SBIR/STTR funding in the amount of $1,207,000 was transferred to the Science Appropriation in FY 2005. Estimates for SBIR/STTR budgeted in FY 2006 are $869,000.

[b] Includes a rescission of $330,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006.

working to improve consistency across programs in the methodology and assumptions used in estimating program costs and benefits.

Background

DOE's efforts were to expand and diversify the available gas resource base through environmentally-friendly technologies and improved policy options for conventional and unconventional gas supply, methane hydrates, expanded LNG capacity and infrastructure assurance. Although the resource is large, a growing proportion is locked away in complex and deep reservoirs that are not economic to find and produce.

The Natural Gas Technologies program specifically targeted R&D opportunities in existing wells and fields that are operating at the margins of economic viability and unconventional gas resources, most of which exists beyond the margins of current economic feasibility. The program also focused on fundamental, long-term R&D for frontier resources such as Methane Hydrates and ultra-deep gas.

Strategic and Program Goals

The Department's Strategic Plan identified four strategic goals (one each for defense, energy, science, and environmental aspects of the mission) plus seven general goals that tie to the strategic goals. The Natural Gas Technologies program supports the following goal in FY 2006:

Energy Strategic Goal

General Goal 4: Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The Natural Gas Technologies program has one program goal, which contributed to General Goal 4 in the "goal cascade".

Program Goal 04.56.00.00: Natural Gas Technologies, Abundant Affordable Gas: The Natural Gas Technologies' goal is to provide technology and policy options capable of ensuring abundant, reliable, and environmentally sound gas supplies.

Contribution to Program Goal 04.56.00.00 Natural Gas Technologies, Abundant Affordable Gas

The Program Goal was to support General Goal 4. The Program's remaining benefit will be that reflected in the FY 2006 Joule submission to "complete four of the prototype near-term products or field tests from the following critical technology areas: advanced drilling, stripper-well enhancement, and gas storage. Federal staff, paid from the program direction account, will continue to work toward an orderly termination of the program in FY 2007.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
General Goal 4, Energy Security			
Program Goal 04.56.00.00, Natural Gas Technologies, Abundant Affordable Gas			
Exploration and Production	23,013	17,820	0
Gas Hydrates	9,136	8,910	0
Infrastructure	8,127	0	0
Effective Environmental Protection	3,356	1,485	0
Congressionally Directed Activities	0	4,455	0
Total, General Goal 4 (Natural Gas Technologies)	43,632	32,670	0

Annual Performance Results and Targets

FY2002 Results	FY 2003 Results	FY 2004 Results	FY2005 Results	FY2006 Targets	FY 2007 Targets
Program Goal 04.56.00.00 Natural Gas Technologies, Abundant Affordable Gas					
Exploration and Production					
Demonstrate safe economic slimhole drilling technology in actual use under Arctic conditions. This technology can significantly reduce cost and environmental impacts. (MET GOAL) Develop and demonstrate two technologies to detect and quantify areas of high fracture density in currently uneconomic low permeability gas reservoirs. This program has the near-term commercial potential to double average per-well productivity. (MET GOAL)	Complete basin model for the Wind River basin and well site selection in Greater Green River Basin to evaluate integrated remote sensing, seismic surveys and basin structural analysis to differentiate gas-bearing from uneconomic fractured reservoirs, complete a conceptual model of regional water distribution to help operators avoid poor production areas, and build and have field ready an initial prototype of a 400-geophone receiver array to improve seismic resolution necessary to locate economically productive gas zones. (MET GOAL) Conduct 2 field tests of improved drilling technology that will improve the productivity of gas reservoirs and reduce drilling costs and 2 field tests of technologies to improve natural fracture detection to increase the percentage of economically producing wells of all wells drilled. (MET GOAL)	Conduct laboratory studies and feasibility analyses necessary to justify the next stage of R&D for a drilling vibration monitoring and control system, a novel mud hammer, high-temperature high-pressure cements, gas resources in the Uinta and Anadarko basins, and high- temperature electronics. This is accomplished by completing prototype development and validation testing of data fusion algorithms, a power amplifier, and simulating software for fractured reservoirs prior to field trials.(MET GOAL) (4.56.1) Complete field tests and analysis of stripper well technologies, a jet assisted drilling system, advanced fracture stimulation designs, natural fracture predictions, and downhole power and communications systems to determine the overall technical and cost efficiency of the technology and the next step(s) to be taken, i.e., commercialization, additional modifications and testing, or termination. (MET GOAL) (4.56.2)	Complete four of the prototype near-term products or field tests from the following critical technology areas: advanced drilling, and stripper-well enhancement, and gas storage.. When these technologies are fully transferred to industry, they will substantially reduce costs or increase efficiency in gas exploration and, production and storage. Benefits will be based on modeling estimates. The prototype projects can be found on the program's website. (MET GOAL) (4.56.1)	Complete four of the prototype near-term products or field tests from the following critical technology areas: advanced drilling, advanced diagnostics/imaging, stripper-well enhancement, and gas storage. Conduct exploratory and characterization studies that confirm and/or advance development of methane hydrate exploration technologies or help assess the viability of future production scenarios. (4.56.1)	No activities.
Gas Hydrates					
Quantify a hydrate deposit by correlating core samples with geophysical and well log data. (MET GOAL)	Exchange information and coordinate effort between government agencies. Award subprojects under Joint Industry Projects for Gulf of	Hold interagency meetings to exchange hydrate information and coordinate hydrate efforts between government agencies; issue newsletters; and hold			

FY2002 Results	FY 2003 Results	FY 2004 Results	FY2005 Results	FY2006 Targets	FY 2007 Targets
	Mexico seafloor stability and monitoring programs. Issue newsletters, publish available technical reports on the methane hydrate website, and hold 2 workshops to communicate program results to researchers. Conduct annual Federal Advisory Committee meeting. (MET GOAL)	workshops to communicate program results to stakeholders. (MET GOAL) (4.56.3)			
	Complete hydrate modeling for Alaska drilling program. Report strength and thermal property tests at national labs, this is fundamental data needed to model production and seafloor stability of hydrates. Develop prototype Raman Spectroscopy to use lasers to define hydrate molecular structure. (MET GOAL)	Complete laboratory analysis of core samples from the Malik research well and the Hot Ice No. 1 well, thermal property and thermal conductivity measurements, and complete installation of a 12-liter hydrate cell to obtain the necessary data for modeling and characterizing hydrate deposits. (MET GOAL) (4.56.4)	Conduct an ocean expedition to retrieve gas hydrate samples for laboratory analysis. This will increase the understanding of sub-sea resources, which is a prerequisite for development of safe production technologies. (MET GOAL) (4.56.2)	Methane Hydrate goal included above.	
	Complete initial report of improved hydrate coring device on Ocean Drilling Program, Leg 204. Study of oceanic samples is essential to understanding the distribution and properties of hydrates in nature. Drill 1 test well to determine aerial extent of hydrate occurrence in Alaska. Complete evaluation of hydrate occurrence in Gulf of Mexico to understand the interaction of hydrate and seafloor stability. (MET GOAL)	Complete field tests of hydrate logging and coring operations in the Gulf of Mexico, and drilling and coring Hot Ice No. 1, and analyze results and publish reports on ODP leg 204 and Malik well to advance our understanding of seafloor stability and production potential. (MET GOAL) (4.56.5)			
Infrastructure					
	Complete laboratory testing and begin field demonstration of an improved remedial technology for storage wells. (MET GOAL)				

FY2002 Results	FY 2003 Results	FY 2004 Results	FY2005 Results	FY2006 Targets	FY 2007 Targets
Effective Environmental Protection					
	Analyze results of bench-scale reverse osmosis in produced water treatment equipment. Develop kinetics for model compounds to be used in enzymatic and biomimetic catalysts for upgrading heavy crude oils. Construct greenhouse prototype for phytoremediation for methane (natural gas) from coal beds (CBM) water. Collect data on fine particulate matter emission factors. These studies will provide the scientific basis for lower-cost commercial-scale environmental technologies. (MET GOAL)	Ensure that refining and gas production and use are safe for the environment and the public by conducting field tests and data analysis for remediation, produced water treatment, and synthetic mud technologies. Also preparing baseline characterization of impacts of Wyoming and Montana coalbed methane (gas from coal seams) production on groundwater systems and utilizing laser-coupled technology to identify natural gas distribution system leaks. (MET GOAL) (4.56.6)			

Means and Strategies

No activity is proposed for FY 2007.

Validation and Verification

The program was a major supporter of DOE's performance measures tracking system (Joule) and pioneered many of the system's tracking and reporting tools. GPRA reporting requirements were handled through the Joule system, and the program also used the same Joule software to track performance on a number of additional measures covering the full breath of the program's activities (FE Joule. In FY 2004 and FY 2005, the program achieved a "Green" rating.

To validate and verify program performance, FE conducts various internal and external reviews and audits. FE's programmatic activities are subject to continuing review by the Congress, the General Accounting Office, and the Department's Inspector General. Additionally, FE Headquarters senior management and Field managers conduct quarterly, in-depth reviews of cost, schedule, and scope to ensure projects are on-track and within budget. The methane hydrates activities have a Federal Advisory Committee to oversee the efforts.

Collaboration Activities: The impact of the Domestic Gas Supply program was expanded by: performing R&D activities in partnership with universities, State and local governments, industry, and other stakeholders; using cost-share projects and diverse technology paths to improve chances of success, and to create a direct technology transfer component; seeking synergy of the capabilities of multiple governmental agencies and industry, including the unique capabilities of National Laboratories; collaborating with other agencies to effectively promulgate domestic production technologies; investing jointly with other groups in promising technologies for target resource areas; conducting, with input from National Laboratories, field demonstrations in collaboration with industry, academia, and others; and transferring technologies in cooperation with State and industry organizations.

External Factors Affecting Performance: Access to public land is the single most important factor impacting the supply of domestic natural gas. Additional factors include world oil prices, corporate mergers and acquisitions, availability and cost of capital, and new and evolving environmental legislation and regulation may affect gas program results.

Planned Program Evaluation: The Office of Natural Gas and Petroleum Technology annually performed an internal review of the R&D portfolio as an integral part of annual budget preparation. Projects were evaluated periodically at contractor review conferences and as part of road-mapping workshops to determine R&D gaps. National Energy Technology Laboratory (NETL) individually monitored projects with status and major milestone reporting documented in a NETL project database.

Program Assessment Rating Tool (PART)

PART was developed by OMB to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. A PART assessment of the Natural Gas Technologies program was conducted for the FY 2004 Budget and a reassessment was conducted for the FY 2005 Budget. The program was rated "Ineffective" in the Program Assessment Rating Tool analysis based primarily on not demonstrating clear results of the research effort.

The Department has developed preliminary baseline benefit estimates for its applied R&D programs, but needs to improve consistency across programs in the methodology and assumptions used in estimating program costs and benefits.

Natural Gas Technologies

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Natural Gas Technologies			
Exploration and Production	23,013	17,820	0
Gas Hydrates	9,136	8,910	0
Infrastructure	8,127	0	0
Effective Environmental Protection	3,356	1,485	0
Congressionally Directed Activities	0	4,455	0
SBIR/STTR (non-add)	---	(869)	(0)
Total, Natural Gas Technologies	43,632	32,670	0

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Exploration and Production	**23,013**	**17,820**	**0**

The program focused on technology to find and produce gas from non-conventional and deep gas reservoirs with minimal environmental impact. Also included were resource assessments in new basins, advanced diagnostics and imaging, and drilling completion and stimulations.

▪ **Advanced Drilling, Completion and Stimulation**	**7,109**	**8,910**	**0**

No activity in FY 2007.

In FY 2006, implemented Congressionally directed activities to develop advanced drilling completion and stimulation technology, including Deep Trek. *Participants included: NETL, APS Technologies, Honeywell, Schlumberger, GTI, TBD.*

In FY 2005, Deep Trek projects for high temperature electronics, super cement, and advanced MWD prototype development were completed. Research in enhanced telemetry and active drilling vibration dampeners was completed. Benchmarking of drilling fluids and bits for extreme HT-HP environments was completed. *Participants included: NETL, APS Technologies, MASI Technologies, Honeywell, Schlumberger, E-Spectrum, Novatek, Mauer, Cementing Solutions, Terra Tek, GTI.*

▪ **Advanced Diagnostics and Imaging Systems**	**3,675**	**3,960**	**0**

No activity in FY 2007.

In FY 2006, implemented Congressionally directed activities to expand the recoverability of natural gas from low-permeability formations. *Participants included: 3DGeo, RSI, Technology Intl., U. Alabama, U. Texas (BEG), National Labs, TBD.*

In FY 2005, conducted work on projects selected in the Advanced Diagnostics and Imaging area, which investigate improved methods of imaging deep gas targets to improve industries success rate of finding new gas. A geologic play book for the Trenton-play in the Appalachian basin was completed and work on resource assessments of deep plays in Alabama was conducted. *Participants include: 3DGeo, Paulsson Geophysical, WVU Research Corp, RSI, Technology Intl., U. Alabama, U. Texas (BEG).*

- **Multi National Laboratory/ Industry Partnership**..... **1,424** **0** **0**

No activity in FY 2007 and FY 2006.

In FY 2005, conducted work on projects focused on advanced drilling, and MWD and LWD tools.

- **Stripper Well Revitalization**..... **1,070** **1,980** **0**

No activity in FY 2007.

In FY 2006, implemented Congressionally directed activities in support of stripper wells and technology transfer. *Participants included: Penn St. University, PTTC.*

In FY 2005, conducted work on the National Stripper Well Consortium involving industry and the research community to investigate multiple technologies to improve stripper well production to prevent abandonment. In addition, supported industry-led efforts in technology transfer through workshops and publications focused on the small- to mid-sized independents. *Participants: Penn St. University.*

- **Technology Transfer** **480** **0** **0**

No activity in FY 2007. FY 2006 activity included in Stripper Well Revitalization above.

In FY 2005, conducted work on industry-led efforts in technology transfer. *Participants included: PTTC.*

- **Storage Technology** **0** **990** **0**

No activity in FY 2007.

In FY 2006, implemented Congressionally directed activities to improve the reliability and efficiency of gas storage systems. *Participants included: Penn St. University.*

FY 2005 activities included in Infrastructure below.

- **Deep Trek** **1,439** **0** **0**

No activity in FY 2007. FY 2006 activity included in Advanced Drilling Completion and Stimulation above.

In FY 2005, conducted research on developing critical high temperature electronic components and an advanced high temperature MWD system needed by industry to drill and complete deep gas wells. *Participants included: Honeywell, Schlumberger*.

- **Liquefied Natural Gas** **3,791** **1,980** **0**

No activity in FY 2007.

In FY 2006, implemented Congressionally directed activities in liquefied natural gas technologies. *Participants included: NETL, TBD.*

In FY 2005, conducted analyses of the economic impact of LNG supplies in the U.S. market and specific safety and security issues related to the delivery of LNG to terminals in the U.S. A federal task force was established to streamline the LNG terminal approval process. *Participants include: Conversion Gas Imports, GTI/University of Arkansas, New York State Electric and Gas, DOT/OPS, Coast Guard, MMS, FERC.*

- **Arctic Research** **3,788** **0** **0**

No activity in FY 2007. In FY 2006, work was funded as a Congressional Directed Priority. See below.

In FY 2005, conduct work supporting the Arctic Energy Office.

- **Program Support** **237** **0** **0**

Fund technical and program management support.

Gas Hydrates **9,136** **8,910** **0**

Gas Hydrates, located in Alaska and the Gulf of Mexico and other offshore locations of the U.S., contain huge resources of natural gas (if only 1% were economically producible, we could triple our resource base). In addition to their potential as a resource, hydrates appear to have implications for the global climate. Significant research is needed to provide the knowledge and technology to understand the fundamental characteristics of hydrates by 2010, and commercially produce gas from hydrates starting in 2015-2020, when more conventional resources decline. Because this research is high risk and long-term, and could potentially lower the value of current reserves, there is little incentive for industry to take the lead in hydrate development.

- **Gas Hydrates** **9,042** **8,910** **0**

No activity in FY 2007.

In FY 2006, implemented Congressionally directed activities to develop the knowledge and technology to allow methane to be produced from hydrates while protecting the environment. *Participants included: Chevron, BP, NETL, National Labs, TBD.*

In FY 2005, the program conducted work on its assessment of gas hydrates to analyze seafloor stability and safety issues and the potential resource in the Gulf of Mexico through an ongoing joint industry project to collect deep stratigraphic cores from hydrate formations as well as continue the development of instrumented arrays for future deployment in the GoM. Characterization well sites were prioritized in Alaska to assess the hydrate resource. Scientists at NETL and other national labs

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007

conducted hydrate characterization studies. *Participants include: Chevron Texaco, U. Mississippi, BP, U. Alaska, USGS, MMS, NOAA, NSF, NETL, National Labs.*

- **Program Support** **94** **0** **0**

  Fund technical and program management support.

Infrastructure **8,127** **0** **0**

This program developed technology to ensure the operational reliability and integrity of transmission and utility distribution pipeline systems. The research was focused on five categories: inspection technologies, remote sensing, materials development, operational technologies, and storage. Benefits of the program were expected to be reduced greenhouse methane emissions, increased pipeline capacity, improved pipeline assessment techniques, more efficient pipeline operations, and increased safety and security.

- **Storage Technology** **1,138** **0** **0**

  No activity in FY 2007. FY 2006 activity is included in Exploration and Production above.

  In FY 2005, DOE conducted work on an industry-led consortium in gas storage and conduct work on developing an advanced method for developing cavernous storage in carbonate formations. *Participants: Penn State University and Clemson University.*

- **Delivery Reliability** **6,905** **0** **0**

  No activity in FY 2007 and FY 2006.

  In FY 2005, conducted research on ensuring the reliability and integrity of the gas transmission and distribution network, developing smart automated inside pipeline inspection sensor systems, obstacle detection systems for horizontal boring applications for laying distribution pipelines, developing systems capable of detecting external force damage, developing technology to improve the efficiency for reciprocating and turbo compressors, and developing advance technology capable of determining pipeline wall integrity. *Participants included SwRI, Tuboscope, NYGAS, GTI, Battelle, CSU, ARC, ANL, INEEL, LLNL, SNL, ORNL, PNNL, NETL.*

- **Program Support** **84** **0** **0**

  Fund technical and program management support.

Effective Environmental Protection **3,356** **1,485** **0**

This program sought to reduce the environmental impacts of gas operations and reduce the cost of environmental compliance through a combination of technology development, risk assessment, and regulatory streamlining. The program emphasized research that would improve access to onshore public lands.

- **Environmental Science** **3,321** **1,485** **0**

  No activity in FY 2007.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007

In FY 2006, implemented Congressionally directed activities to develop treatment technologies that will allow water from conventional gas wells or coal bed methane wells to be put to beneficial use or to be safely discharges to the surface. *Participants included: NETL, National Labs, TBD.*

In FY 2005, conducted work on targeted initiatives to define and solve specific problems in key focus areas, specifically: 1) environmental barriers to coal bed methane production, and 2) air quality issues affecting natural gas production. Developed objective, credible data for regulatory decisions as part of a program-wide environmental strategy for maintaining sustainable supplies of natural gas. *Participants include: NETL, National Labs.*

▪ **Program Support**	**35**	**0**	**0**

Fund technical and program management support.

Congressionally Directed Activities	**0**	**4,455**	**0**
▪ **Arctic Energy Office**	**0**	**1,980**	**0**

Conducted Arctic energy R&D through the Arctic Energy Office at the University of Alaska Fairbanks (UAF).

▪ **University of Mississippi Hydrates Research**	**0**	**990**	**0**

Conducted methane hydrates research at the University of Mississippi, Center for Marine Resources and Environmental Technology.

▪ **University of Wyoming Multi-Disciplinary Coal-bed Natural Gas Research Center**	**0**	**1,485**	**0**

Conducted multidisciplinary coal-bed methane research at the University of Wyoming.

SBIR/STTR (non-add)	**---**	**(869)**	**---**

In FY 2005, $1,078,000 and $129,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 amount reflects the estimated level of funding.

Total, Natural Gas Technologies	**43,632**	**32,670**	**0**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Natural Gas Technologies	
• Budget discipline necessitated close scrutiny of all Fossil Energy programs, using strict guidelines to determine their effectiveness and compare them to other programs offering more clearly demonstrated and substantial benefits. As a result, the 2007 Budget will terminate the program in FY 2007	-32,670
Total Funding Change, Natural Gas Technologies	**-32,670**

Oil Technology

Funding Profile by Subprogram [a]

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[b]	FY 2006 Current Appropriation	FY 2007 Request
Oil Technology					
Oil Technology	32,985	32,000	-320	31,680	0
Total, Oil Technology.....	32,985	32,000	-320	31,680	0

Mission

The mission of the Oil Technology Program has been to implement a policy and technology research and development program to resolve the environmental, supply, and reliability constraints of producing oil resources. Budget discipline necessitated close scrutiny of all Fossil Energy programs, using strict guidelines to determine their effectiveness and compare them to other programs offering more clearly demonstrated and substantial benefits. As a result, the 2007 Budget will terminate the program in FY 2007.

The Program Assessment Rating Tool (PART) was developed by OMB to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. A PART assessment of the Oil R&D program was conducted for the FY 2004 Budget and a reassessment was conducted for the FY 2005 Budget. The program was rated "Ineffective" in the PART analysis based on not demonstrating clear results of the research effort.

Benefits

Each year Fossil Energy estimates the benefits of program activities to support Government Performance and Results Act (GPRA) reporting. Methods are complex and vary by program. The Oil and Gas Programs have traditionally used two separate economic and engineering modeling systems to calculate selected economic and energy security benefits. In 2004, as part of the effort to better conform to the President's Management Agenda, Fossil Energy undertook an integrated program benefits analysis of oil, natural gas, coal and power systems research within Fossil Energy to develop Fossil Energy-wide program benefits estimates. This analysis was to examine all Fossil Energy research programs on a common basis with respect to modeling assumptions and should have enabled aggregate and comparative assessments of the benefits of Fossil Energy research programs.

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a SBIR/STTR funding in the amount of $936,000 was transferred to the Science Appropriation in FY 2005. Estimates for SBIR/STTR budgeted in FY 2006 are $875,000.

b Includes a rescission of $320,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006.

Preliminary benefit modeling was conducted by the Department as part of an integrated program benefits analysis of all the Department's major R&D programs to develop Department-wide program benefits estimates, as part of the effort to conform to the President's Management Agenda. The Department is working to improve consistency across programs in the methodology and assumptions used in estimating program costs and benefits.

Background

The Oil Technology program budget delineated program goals, such as Enhanced Oil Recovery/CO_2 Injection, Domestic Resource Conservation, and Environmental Science, as funding categories. When appropriate, collaborations with other Federal agencies, industry, academia, and states were used to meet program goals.

The Oil Technology Program included research to support technology development and policy decision-making and to allow greater access to energy resources with minimal environmental impact.

Strategic and Program Goals

The Department's Strategic Plan identified four strategic goals (one each for defense, energy, science, and environmental aspects of the mission) plus seven general goals that tie to the strategic goals. The Oil Program supports the following goal in FY 2006:

Energy Strategic Goal

General Goal 4: Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The Oil Technology program has one program goal, which contributed to General Goal 4 in the "goal cascade."

Program Goal 04.57.00.00: Oil Technology, Abundant Oil: Enhance U.S. energy security by managing and funding oil exploration and production (E&P) research and policy which results in development of domestic oil resources in an environmentally sound and safe manner.

Contribution to Program Goal 04.57.00.00: Oil Technology, Abundant Oil

The Program Goal was to support General Goal 4. The Program's remaining benefit will be that reflected in the FY 2006 Joule submission to "Develop technologies through 4 projects which will contribute to increasing domestic oil supplies in an environmentally friendly manner." Federal staff, paid from the program direction account, will continue to work toward an orderly termination of the program in FY 2007.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
General Goal 4, Energy Security			
Program Goal 04.57.00.00, Oil Technology, Abundant Oil			
Exploration and Production	18,219	13,365	0
Reservoir Life Extension/Management	5,753	5,940	0
Effective Environmental Protection	9,013	9,504	0
Congressionally Directed Activities	0	1,881	
Interstate Oil and Gas Compact Commission	0	990	0
Total, General Goal 4 (Petroleum – Oil Technology)	32,985	31,680	0

Annual Performance Results and Targets

Program Goal 04.57.00.00 Oil Technology, Abundant Oil

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
Demonstrate a small-diameter, lightweight composite drill pipe for ultra-short radius drilling. (MET GOAL)	Increase access to the domestic oil resources remaining in the reservoir due to lack of advanced technology. Focus on high risk research (award 6 projects and issue 1 solicitation - Micro-hole technologies) for future applications on state and federal lands and waters, and on addressing nearer-term barriers. Select and award 4 projects with independents, and on a regional basis award 4 projects-PUMP. Award 2 projects in Advanced Technologies and select band award projects under the Broad Funding Announcement. (MET GOAL) Advance the state-of-the-art in oil recovery processes by conducting bench tests (in surfactant behavior, and in paraffin deposition) and develop conceptual models and techniques related to chemical flooding, reservoir and flow simulation, reservoir characterization for enhanced oil recovery technologies to increase the amount of oil that can be recovered from discovered reservoirs (MET GOAL) Reduce the number of dry holes drilled in frontier areas, and increase near-term energy security through field testing (3 projects) improved oil recovery techniques, seismic (1 project), data acquisition (2 projects), and interpretation (1 project) in existing light and heavy oil reservoirs at sites ranging from Alaska to Utah. Initiate full-	Enhance access to remaining domestic oil resources using advanced technology by focusing on high-risk research (award 3 projects—Micro-hole technology); issuing competitive solicitation and awarding three projects. Initiate Russian cooperative Research Program; and conduct model integration peer review and industry strategic program review. (MET GOAL) (4.57.1) Advance the state-of-the-art in oil recovery processes by conducting bench tests in surfactant behavior (2 projects); modeling on-conventional reservoirs, studying gel control of water production, developing seismic algorithms to better identify hydrocarbon targets; testing 2 prototypes (3-phase separator and micro-hole completion), modeling sweep efficiency for enhanced oil recovery technologies to increase the amount of oil that can be recovered from discovered reservoirs, and completing tundra modeling and pond work, conducting wettability studies as well as initiating fracture development study. (MET GOAL) (4.57.2)	Develop technologies through 4 projects which will contribute to increasing domestic oil supplies in an environmentally friendly manner. MET GOAL. (4.57.1)	Develop technologies through up to 4 programs which will contribute to increasing domestic oil supplies in an environmental-ly friendly manner. (4.57.1)	

Annual Performance Results and Targets

Program Goal 04.57.00.00 Oil Technology, Abundant Oil

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
	scale test of newly developed vibration sonic tool. (NEARLY MET GOAL) Stimulate current production through accelerated transfer of technology to U.S. producers, especially small independent companies that have limited exposure to the technology needed to increase the oil resource base through 66 regional workshops, including one on micro-hole technologies, publish 2 newsletters, and 2 reports. (MET GOAL)				

Means and Strategies

No activity is proposed for FY 2007.

Validation and Verification

The Oil Program has impacted the domestic oil supply by performing R&D activities in partnership with universities, State and local governments, industry, and other stakeholders; using cost-share projects and diverse technology paths to improve chances of success, and to create a direct technology transfer component and seeking synergy of the capabilities of multiple governmental agencies, including the unique capabilities of National Laboratories and industry collaborating with other agencies to effectively promulgate and transfer domestic production technologies to the public.

To validate and verify program performance, FE conducts various internal and external reviews and audits. FE's programmatic activities are subject to continuing review by the Congress, the General Accounting Office, and the Department's Inspector General. Additionally, FE Headquarters senior management and Field managers conduct quarterly, in-depth reviews of cost, schedule, and scope to ensure projects are on-track and within budget.

External Factors Affecting Performance: These factors include world oil prices, corporate mergers and acquisitions, availability and cost of capital, and new and evolving environmental legislation and regulation.

Planned Program Evaluation: The Office of Natural Gas and Petroleum Technology annually performs an internal review of the R&D portfolio as an integral part of annual budget preparation. Projects are evaluated periodically at contractor review conferences and as part of road-mapping workshops to determine R&D gaps. National Energy Technology Laboratory (NETL) technology managers individually monitor projects with status and major milestone reporting documented in a NETL project database.

Program Assessment Rating Tool (PART)

PART was developed by OMB to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. A PART assessment of the Oil Technology program was conducted for the FY 2004 Budget and a reassessment was conducted for the FY 2005 Budget. The program was rated "Ineffective" in the Program Assessment Rating Tool analysis based primarily on not demonstrating clear results of the research project.

The Department has developed preliminary baseline benefit estimates for its applied R&D programs, but needs to improve consistency across programs in the methodology and assumptions used in estimating program costs and benefits.

Oil Technology

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Oil Technology			
Exploration and Production	18,219	13,365	0
Reservoir Life Extension/ Management	5,753	5,940	0
Effective Environmental Protection	9,013	9,504	0
Congressionally Directed Activities	0	1,881	0
Interstate Oil and Gas Compact Commission	0	990	0
SBIR/STTR (non-add)	---	(875)	(0)
Total, Oil Technology	32,985	31,680	0

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Exploration and Production	**18,219**	**13,365**	**0**

The program focused on development of technologies to economically recover the oil remaining in mature fields by expanding the technology options for enhanced oil recovery.

- **EOR/CO_2 Injection** **2,018** **3,960** **0**

  No activity in FY 2007.

  In FY 2006, conducted Congressionally directed work to enhance utilization of industrial carbon dioxide. *Participants included: ARI, Univ. Pittsburgh, Univ. Oklahoma, National Labs and TBD.*

  In FY 2005, conducted work on short and long term efforts to enhance utilization of industrial CO_2. The strategy was to increase the adoption of 'best practices' to opportunities existing in the near-term. Specifically, basin-wide strategies were examined to identify ways to lower cost and accelerate infrastructure development to cost effectively deliver CO_2 from industrial sites to candidate oil fields; this effort included resolving potential permitting and regulatory issues. *Participants include LBNL, LANL, NETL, TBD.*

- **Diversity of Global Oil Supply** **910** **0** **0**

  No activity in FY 2007 and FY 2006.

  In FY 2005, conducted work on diversification of international sources of oil supplies through bilateral activities with nations that are expanding their oil industry, including Norway, Canada, Mexico, and others. Bilateral and multi-lateral work included technology exchanges and joint

(dollars in thousands)

FY 2005	FY 2006	FY 2007

research, development and demonstration under the Administration's North American Initiative and other international agreements. *Participants included: Tuland Univ., NETL, INEEL.*

- **Advanced Drilling, Completion and Stimulation** **2,071** **3,960** **0**

No activity in FY 2007.

In FY 2006, conducted Congressionally directed work for drilling and completion enhancements that support microhole exploration. *Participants included: Geoprober, NETL and TBD.*

In FY 2005, conducted work on upgrades to the Advanced Cuttings Transport Facility that allow high-temperature/high-pressure experimentation on energized fluids (air, mist, gas assisted, foam, etc.) and synthetic drill fluids, cements, and transport of fluids in horizontal and inclined wellbores. *Participants included: Northrop Grumman, University of Tulsa, DEA, APS Technology, Impact Technologies, National Labs, NETL.*

- **Advanced Diagnostics and Imaging Systems** **4,832** **2,970** **0**

No activity in FY 2007.

In FY 2006, conducted Congressionally directed work in reservoir imaging. *Participants included: Univ. Houston, Univ. Texas, Univ. Kansas, and National Labs.*

In FY 2005, conducted work on development of advanced reservoir diagnostics and imaging systems to optimize oil discovery and recovery. Developed quantitative engineering parameters that control rock-fluid interactions which impact oil production. Completed work on fundamental geoscience efforts focusing on geoscience/engineering reservoir characterization on naturally fractured reservoirs. *Participants included: Cal Tech, Northrop Grumman, Univ of Houston, Univ of Kansas, CSM, Stanford Univ, Univ of TX @ Austin, Mich Tech, Univ of Illinois, MT BOM, NMIMT, Western Michigan Univ, Adv Resources, Wm Marsh Rice Univ, NETL.*

- **Multi-National Laboratory/Industry Partnership and National Laboratory Supporting Research** **1,450** **0** **0**

No activity in FY 2007 and FY 2006.

In FY 2005, conducted work on the transfer of technologies that advance understanding of the characteristics and producibility from oil reservoirs. *Participants included: National Labs.*

- **Reservoir Efficiency Processes** **3,821** **2,475** **0**

No activity in FY 2007.

In FY 2006, conducted Congressionally directed work for improved gas flooding recovery methods. *Participants include: Univ. Texas, Correlations Comp., CA Inst. Of Tech., and National Labs.*

In FY 2005, conducted work on development of improved gas flooding recovery methods and advanced the state-of-the-art in reservoir simulation. *Participants included: NETL, Northrop Grumman, NMIMT, Univ of TX, Cal Tech, Univ of OK, Univ of Kansas, Univ of TX @ Austin, Stanford Univ, Correlations Company, Adv Resources Intl, Univ of Utah, Univ of Pitts, Univ of Houston, Univ of Oklahoma*.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
▪ **Arctic Research**.....	**1,954**	**0**	**0**

No activity in FY 2007 and FY 2006.

In FY 2005, conducted research on the oxygen transport membrane at the University of Alaska, Fairbanks. Completed research in oil-related projects through the Office of Arctic Energy including tundra travel model for the North Slope of Alaska, characterization and alteration of wettability states of Alaskan reservoirs, and physical, biological and chemical implications of mid-winter pumping of tundra ponds. *Participants included: Univ. of Alaska-Fairbanks, Alaska Dept. Natural Resources, National Labs.*

▪ **Russia Technology Program**.....	**976**	**0**	**0**

No activity in FY 2007 and FY 2006.

In FY 2005, conducted work on the Russian Cooperative Research Program including one or more of the following technology focus areas: USGS-Russian Offshore Arctic Resource Assessment; World Bank Global Gas Flaring Initiative; Arctic Construction and Operations Technology Transfer Initiative; "Full Value Chain" Oil Spill Restoration; Prevention, and Response Program; and/or, U.S.-Russia Commercial Energy Summit Education Initiative. *Participants included: More Oil, NM Institute of Mining and Technology, USGS.*

▪ **Program Support**.....	**187**	**0**	**0**

Fund technical and program management support.

Reservoir Life Extension/Management	**5,753**	**5,940**	**0**
▪ **Domestic Resource Conservation**	**5,694**	**5,940**	**0**

No activity in FY 2007.

In FY 2006, conducted Congressionally directed work to improve recovery from mature fields including microhole technologies. *Participants included: Confluent, Tempress, Bake Hughes, NETL, INEEL.*

In FY 2005, conducted work on the following elements: 1) Key technology prototype development, such as micro-hole technologies, for enabling improved access and minimizing environmental impact; 2) Technology transfer with special emphasis on independents; and 3) Policy analysis and planning to prioritize program efforts and provide policy evaluations to maximize impact on domestic oil recovery over a wide range of technological and economic conditions. *Participants included: PTTC, Northrop Grumman, CDO, Univ of Kansas, Penn State, NETL.*

▪ **Program Support**.....	**59**	**0**	**0**

Fund technical and program management support.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Effective Environmental Protection	**9,013**	**9,504**	**0**

The Effective Environmental Protection program has focused on technologies and practices that reduce the environmental impact of oil exploration, production, and processing while minimizing the cost of effective environmental protection and compliance. In addition, the program has developed technology to allow additional oil development on Federal lands and examined the specific impact of produced water and the more general problem of water management.

▪ **Environmental Science**	**8,920**	**9,504**	**0**

No activity in FY 2007.

In FY 2006, conducted Congressionally directed work for Federal lands access, Low-Impact Natural Gas and Oil (LINGO) and produced water management and beneficial use. *Participants included: TX-EES, GWOC, Colorado School of Mines, NETL, National Labs, TBD.*

In FY 2005, conduct work on targeted activities to define and solve specific problems in key areas, specifically: 1) management of produced water and technology development that makes produced water a resource for beneficial uses; and 2) ensuring maximum sustainable access to oil resources on Federal lands. *Participants included: KS State Univ, Northrop Grumman, TX -EES, Univ of N Carolina, Univ of TX at Austin, IOGCC, GWPC, CSM, CDO, NETL, LBNL, LLNL.*

▪ **Program Support**	**93**	**0**	**0**

Fund technical and program management support.

Congressionally Directed Activities	**0**	**1,881**	**0**
▪ **Risk Based Data Management System**	**0**	**396**	**0**

Conducted risk-based data management.

▪ **Utah Center for Heavy Oil Research**	**0**	**1,485**	**0**

Conducted heavy oil research at the Utah Center.

Interstate Oil and Gas Compact Commission	**0**	**990**	**0**

Conducted environmental assessments through the Interstate Oil and Gas Compact Commission.

SBIR/STTR (non-add)	**---**	**(875)**	**0**

In FY 2005, $836,000 and $100,000 was transferred to the SBIR and STTR programs respectively. The FY 2006 amount reflects the estimated level of funding.

Total, Oil Technology	**32,985**	**31,680**	**0**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Oil Technology	
• Budget discipline necessitated close scrutiny of all Fossil Energy programs, using strict guidelines to determine their effectiveness and compare them to other programs offering more clearly demonstrated and substantial benefits. As a result, the 2007 Budget will terminate the program in FY 2007	-31,680
Total Funding Change, Oil Technology	**-31,680**

Program Direction

Funding Profile by Category

(dollars in thousands/whole FTEs)

	FY 2005	FY 2006	FY 2007
Indirect Program Direction – Research and Development			
Headquarters			
Salaries and Benefits	17,700	17,077	17,154
Travel	797	792	822
Support Services	8,274	8,827	10,421
Total, Headquarters	26,771	26,696	28,397
Full Time Equivalents	127	127	122
National Energy Technology Laboratory (NETL)			
Salaries and Benefits	43,767	46,445	47,597
Travel	1,593	1,601	1,617
Support Services	32,571	31,130	22,698
Total, NETL	77,931	79,176	71,912
Full Time Equivalents	377	377	369
Total, Indirect Program Direction			
Salaries and Benefits	61,467	63,522	64,751
Travel	2,390	2,393	2,439
Support Services	40,845	39,957	33,119
Total, Indirect Program Direction	104,702	105,872	100,309
Full Time Equivalents	504	504	491
NETL Program Specific			
Salaries and Benefits	0	0	14,068
Travel	0	0	469
Total, NETL Program Specific	0	0	14,537
Full Time Equivalents	0	0	138
Alaska Natural Gas Transportation Project			
Office of the Federal Coordinator			
Salaries and Benefits	250	0	750
Travel	50	0	100
Support Services	200	0	1,400
Total, Office of the Federal Coordinator	500[a]	0	2,250
Full Time Equivalents	2	0	6

a Represents funding that was reprogrammed to program direction from prior year balances.

(dollars in thousands/whole FTEs)

	FY 2005	FY 2006	FY 2007
Loan Guarantee for Alaska Natural Gas			
Salaries and Benefits	150	0	800
Travel	50	0	100
Support Services	200	0	1,400
Total, Loan Guarantee for Alaska Natural Gas	400[a]	0	2,300
Full Time Equivalents	1	0	5
Total, Alaska Natural Gas Transportation Project			
Salaries and Benefits	400	0	1,550
Travel	100	0	200
Support Services	400	0	2,800
Total, Alaska Natural Gas Transportation Project	900[a]	0	4,550
Full Time Equivalents	3	0	11
Import/Export Authorization			
Salaries and Benefits	0	0	1,280
Travel	0	0	20
Support Services	0	0	500
Total, Imports / Exports	0	0	1,800
Full Time Equivalents[a]	0	0	14
Advanced Metallurgical Research			
Salaries and Benefits	0	0	7,010
Travel	0	0	90
Support Services	0	0	900
Total, Advanced Metallurgical Research			8,000
Full Time Equivalents	0	0	77
Total Program Direction			
Salaries and Benefits	61,867	63,522	88,659
Travel	2,490	2,393	3,218
Support Services	41,245	39,957	37,319
Total, Program Direction	105,602	105,872	129,196
Total, Full Time Equivalents	722[b]	731[c]	731

a Represents funding that was reprogrammed to program direction from prior year balances.
b The 722 FTEs includes 215 FTEs that were direct funded in the programmatic accounts in FY 2005 versus program direction. These FTEs and related expenses were all consolidated in program direction in FY 2007.
c The 731 FTEs includes 227 FTEs that were direct funded in the programmatic accounts in FY 2006 versus program direction. These FTEs and related expenses were all consolidated in program direction in FY 2007.

Mission

The Program Direction and Management Support function provides the Federal staff with resources that assist the Office of Fossil Energy in carrying out its goals. These resources are allocated and the costs are generated based on the goals, strategic directions, priorities, and plans that have been pre-established.
As stated in the Departmental Strategic Plan, DOE's Strategic and General Goals will be accomplished not only through the efforts of the major program offices in the Department but with additional efforts from offices which support the programs in carrying out the mission. Fossil Energy performs critical functions which directly support the mission of the Department. These functions focus on technological investigations and research concerning the use of fossil energy substances.

Overview

Beginning in FY 2007, all of the funds supporting Federal employees were directed to be consolidated in program direction, per the FY 2006 Energy and Water Development Appropriations Act (P.L. 109-103). The consolidation of all these funds within the program direction line will portray the total costs of activities conducted by Federal employees within Fossil Energy. In previous years, funding for direct research activities conducted by Federal employees (now funded as NETL Program Specific) was provided under each program; and the Advanced Metallurgical Research account and Import/Export Authorization account were separate non-program direction accounts.

- Headquarters/NETL Indirect Program Direction - In order to carry out the Program Direction and Management Support function, the Headquarters staff is responsible for providing overall guidance/direction of the program offices. This guidance/direction includes implementing DOE policy, communicating guidance consistent with the policies to the FE field offices, establishing program objectives, developing program plans, evaluating alternative program strategies, reviewing procurement plans, monitoring work progress, and approving revisions in work plans. In addition to the Headquarters staff, the NETL performs the day-to-day project management functions of assigned programmatic areas. This includes monitoring Fossil Energy contracts and the National Laboratory activities. NETL is also responsible for developing project budgets, implementing procurement plans, and other programs and site support activities necessary to achieve their program objectives.

- NETL Program Specific - This funding supports Federal staff directly associated with conducting the research activities of a specific program. This staff includes Technicians, Engineers and Scientists in support of the NETL Office of Science and Engineering Research (In-House Research and Development) and the Albany Research Center. Activities of the staff include in-house research in support of the following program areas: Innovations for Existing Plants, Integrated Gasification Combined Cycle, Turbines, Carbon Sequestration, Fuels, Fuel Cells, and Advanced Research.

- Alaska Natural Gas Transportation Project – The Office of the Federal Coordinator for Alaska Natural Gas Transportation Projects is responsible for coordinating the roles of Federal agencies associated with an Alaska Natural Gas Pipeline Act (ANGPA) or Alaska Natural Gas Transportation Act (ANGTA) of 1976 project; ensuring compliance of a project with either

ANGTA or ANGPA; carrying out the responsibilities of the Federal Inspector under an ANGTA filing; acting as a liaison to all interested parties. The Loan Guarantee Program administers authorities provided in the ANGPA. The Alaska Gas Transportation Project was authorized to reduce the dependency on foreign sources of energy.

- Office of Import/Export Authorization (OIEA) – OIEA manages the regulatory review of natural gas imports and exports. In addition the program exercises regulatory oversight of the conversion of existing oil and gas-fired powerplants, processes exemptions from the statutory provisions of the Powerplant and Industrial Fuel Use Act of 1978 (FUA), as amended, and processes certifications of alternate fuel capability pursuant to the provisions of the amended FUA.

- Advanced Metallurgical Research - The Advanced Metallurgical Research will continue research contributions to Fossil Energy's Coal Research Initiative programs by focusing on research to increase component service life through the development of affordable materials and processes. Service improvements will be evaluated by development of new materials, protection of current materials, and real-time corrosion sensors. Refractory repair techniques will be investigated at gasifier operating temperatures and pressures. Carbon dioxide containment through enhancement of natural geologic formation seals will be emphasized. The Albany Research Center's support to the Solid State Energy Conversion Alliance (SECA) through material development, fabrication, and performance evaluation will continue for solid oxide fuel cell applications.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Indirect Program Direction - Research and Development	**104,702**	**105,872**	**100,309**
Headquarters Indirect	**26,771**	**26,696**	**28,397**
Salaries and Benefits	**17,700**	**17,077**	**17,154**

Provide funds for 122 FTEs in FY 2007, 127 FTEs in FY 2006, and 127 FTEs in FY 2005 at Headquarters. Also included in each fiscal year are 17 FTEs that were transferred from the Clean Coal Technology (CCT) account. Headquarters FTEs are responsible for implementing and communicating DOE policy to the field offices, which includes NETL. The FTEs also set program objectives, develop program plans and evaluate alternative strategies. In addition, they are also responsible for developing budgets, approving procurement plans, and overseeing the efficiency and the effectiveness of the progress of the activities related to the resources and costs. Federal staff, paid from the program direction account, will continue to work toward an orderly termination of the Oil and Gas programs in FY 2007.

Travel	**797**	**792**	**822**

Provide funds for both domestic and international travel in support of the activities that support the mission of the Department.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Support Services	**8,274**	**8,827**	**10,421**
▪ **Technical and Management Support Services**	**3,416**	**3,232**	**4,171**

Provide for contractual services that are generic to the entire FE program.

▪ **Computer Systems and Support**	**1,012**	**1,040**	**1,550**

The Headquarters information technology investment includes costs associated with general information technology infrastructure support including LAN, internet and intranet networking, cyber security, desktop support, televideo, information architecture planning and systems support.

▪ **E-Government Initiatives**	**0**	**495**	**500**

The requested funding will provide for the costs associated with Government-wide E-Government initiatives and Lines of Business.

▪ **Working Capital Fund**	**3,846**	**4,060**	**4,200**

In FY 2007, FY 2006, and FY 2005 provides funding for the Department's working capital fund. This funding will support administrative services such as rent, postage, copying, and supplies.

NETL Indirect	**77,931**	**79,176**	**71,912**
Salaries and Benefits	**43,767**	**46,445**	**47,597**

Provide funds for 369 FTEs in FY 2007, 377 in FY 2006, and 377 in FY 2005 at NETL. Included in each fiscal year are 49 FTEs that were transferred from the Clean Coal Technology (CCT) account. Activities of the staff include project management, product development, contract management, and other service activities related to program and site support. It is anticipated that 50 FTEs in each fiscal year will be paid via reimbursable agreements, therefore, salaries and benefits associated with these FTEs are not included in the budget estimate. Federal staff, paid from the program direction account, will continue to work toward an orderly termination of the Oil and Gas programs in FY 2007.

Travel	**1,593**	**1,601**	**1,617**

Provide funds for travel in support of the above activities in the attainment of program goals, both on the domestic front and abroad.

Support Services	**32,571**	**31,130**	**22,698**

Provide funding for facility operations, maintenance, finance, information automation, administrative, management and technical support. The NETL information technology investment is funded in this budget line. This investment includes costs associated with general information technology infrastructure support including LAN, internet and intranet networking, cyber security, desktop support, televideo, telecom, information architecture planning and systems support. Additionally, this investment covers specific mission related systems support including the TORIS and PROMIS systems. This budget line also includes all costs associated with site support contractors that assist in the operation of the facility.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
NETL Program Specific	**0**	**0**	**14,537**
Salaries and Benefits	**0**	**0**	**14,068**

Provide funds for 138 Federal staff such as Technicians, Engineers and Scientists in support of the NETL Office of Science and Engineering Research (In-House Research and Development) and the Albany Research Center. Activities of the staff include in-house research in support of the following program areas: Innovations for Existing Plants, Integrated Gasification Combined Cycle, Turbines, Carbon Sequestration, Fuels, Fuel Cells, and Advanced Research.

Travel	**0**	**0**	**469**

Provide funds for both domestic and international travel in support of the activities that support the mission of the Department.

Alaska Natural Gas Transportation Project	**900**	**0**	**4,550**
Salaries and Benefits	**400**	**0**	**1,550**

In FY 2007, an additional 6 FTEs are requested to fully staff the Office of the Federal Coordinator for Alaska Natural Gas Transportation Projects to coordinate the expeditious discharge of all Federal agencies' responsibilities for an Alaska Natural Gas Transportation project; and 5 FTEs are requested to staff the Loan Guarantee Program Office to administer Loan Guarantee authorities for the Alaska Natural Gas Transportation Project.

Travel	**100**	**0**	**200**

Provide funds for both domestic and international travel in support of the activities that support the mission of the Department.

Support Services	**400**	**0**	**2,800**

In FY 2007, the request will also enable the Office of Loan Guarantee for Alaska Natural Gas Transportation Projects to carryout all statutory authorities.

Import/Export Authorization	**0**	**0**	**1,800**
Salaries and Benefits	**0**	**0**	**1,280**

Provides for 14 FTEs in the Office of Import/Export Authorization (OIEA). Previously, the OIEA included their request independently of the Research and Development's request.

Travel	**0**	**0**	**20**

Provide funds for both domestic and international travel in support of the activities that support the mission of the Department.

Support Services	**0**	**0**	**500**

Provide funds for contractual services in support of the OIEA.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Advanced Metallurgical Research	**0**	**0**	**8,000**
Salaries and Benefits	**0**	**0**	**7,010**

Provide funds for 77 FTEs in FY 2007 to support to the Solid State Energy Conversion Alliance (SECA) through material development, fabrication, and performance evaluation will continue for solid oxide fuel cell applications.

Travel	**0**	**0**	**90**

Provide funds for both domestic and international travel in support of the activities that support the mission of the Department.

Support Services	**0**	**0**	**900**

Provide technical contractual services that are generic to the entire program above.

Total, Program Direction	**105,602**	**105,872**	**129,196**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Indirect Program Direction - Research and Development	
Headquarters Indirect Program Direction	
Salaries and Benefits	
The change reflects the reduction of 5 FTEs, which is offset by increases in pay and benefits costs; statutory increase, promotions and within-grade increases, performance awards, and health benefit costs.	+77
Travel	
The increase to travel is attributable to projected escalation in travel costs per trip	+30
Support Services	
▪ **Technical and Management Support Services** Increase is due to the renewal of several support service contracts	+939
▪ **Computer Systems and Support** The increase is required to comply with the Department's requirements for cyber security upgrades.	+510
▪ **E-Government Initiatives** This increase is to provide additional funding for Government-wide E-Government Initiatives	+5

	FY 2007 vs. FY 2006 ($000)
▪ **Working Capital Fund**	
This increase in Working Capital Fund will provide for Fossil Energy's costs that are associated with new Department-wide accounting systems (STARS), IT project management certifications costs, and miscellaneous overhead costs	+140
Total, Support Services	+1,594
Total, Headquarters Indirect Program Direction	**+1,701**
NETL Indirect Program Direction	
Salaries and Benefits	
The change reflects the reduction of 8 FTEs, which is offset by increases in pay and benefits costs which includes: statutory increases, promotions and within-grade increases, performance awards, and health benefit costs.	+1,152
Travel	
The increase to travel is attributable to projected escalation in travel costs per trip. ...	+16
Support Services	
The decrease in support services is a result of an overall reduction in funding in FY 2007.	-8,432
Total, NETL Indirect Program Direction	**-7,264**
NETL Program Specific	
Salaries and Benefits	
The increase is a result of the consolidation of all program direction related activities under the program direction account, as directed per P.L. 109-103. Salaries and benefits will be provided for 138 FTEs.	+14,068
Travel	
The increase is a result of the consolidation of all program direction related activities under the program direction account, as directed per P.L. 109-103.	+469
Total, Program Specific.....	**+14,537**
Alaska Natural Gas Transportation Project	
Salaries and Benefits	
The increase supports 11 FTEs to staff the Office of Federal Coordinator for Alaska Natural Gas Transportation Project and the Loan Guarantee Program for the Alaska Natural Gas Transportation Project.	+1,550
Travel	
The increase is a result of 11 FTEs who will be traveling while conducting necessary business for the Alaska Natural Gas Transportation Project	+200

	FY 2007 vs. FY 2006 ($000)
Support Services	
The increase is a result of additional technical and management support due to the establishment of the Office of Federal Coordinator for Alaska Natural Gas Transportation Project and Loan Guarantee Program for the Alaska Natural Gas Transportation Project	+2,800
Total, Alaska Natural Gas Transportation Project	**+4,550**
Import/Export Authorization	
Salaries and Benefits	
The increase is a result of the consolidation of all program direction related activities under the program direction account, as directed per P.L. 109-103. Salaries and benefits will be provided for 14 FTEs	+1,280
Travel	
The increase is a result of the consolidation of all program direction related activities under the program direction account, as directed per P.L. 109-103	+20
Support Services	
The increase is a result of the consolidation of all program direction related activities under the program direction account, as directed per P.L. 109-103	+500
Total, Import/Export Authorization	**+1,800**
Advanced Metallurgical Research	
Salaries and Benefits	
The increase is a result of the consolidation of all program direction related activities under the program direction account, as directed per P.L. 109-103. Salaries and benefits will be provided for 77 FTEs	+7,010
Travel	
The increase is a result of the consolidation of all program direction related activities under the program direction account, as directed per P.L. 109-103	+90
Support Services	
The increase is a result of the consolidation of all program direction related activities under the program direction account, as directed per P.L. 109-103	+900
Total, Advanced Metallurgical Research	**+8,000**
Total Funding Changes, Program Direction	**+23,324**

Plant and Capital Equipment

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[a]	FY 2006 Current Appropriation	FY 2007 Request
Plant and Capital Equipment					
GPP at NETL and ARC	2,958	2,000	-20	1,980	0
NETL Office/Lab Building	3,944	18,000	-180	17,820	0
Total, Plant and Capital Equipment	6,902	20,000	-200	19,800	0

Mission

The mission of the Plant and Capital Equipment program is to maintain the facilities necessary to safely and effectively carryout the mission of the Fossil Energy R&D program.

Benefits

General plant projects include repairs, improvements, alteration and additions that are essential to the safe, environmentally acceptable and efficient operations of NETL sites and ARC.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
GPP at NETL and ARC	**2,958**	**1,980**	**0**

Provides no funding in FY 2007 for General Plant Projects (GPP) at the National Energy Technology Laboratory and the Albany Research Center.

In FY 2006 and FY 2005, provides for General Plant Projects (GPP) at the National Energy Technology Laboratory and the Albany Research Center.

NETL Office/Lab Building	**3,944**	**17,820**	**0**

In FY 2007, no funding requested for facilities and infrastructure renovation at the National Energy Technology Laboratory.

In FY 2006, the funding will provide the funding necessary for completion of the building projects at the National Energy Technology Laboratory sites.

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a Includes a rescission of $200,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

FY 2005 funding provided for building design for facilities at both the Pittsburgh and Morgantown sites; renovation of several buildings; demolition of several buildings and subsequent site preparation; expand parking facilities; and enhanced security measures.

Total, Plant and Capital Equipment	**6,902**	**19,800**	**0**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
GPP at NETL and ARC – No activity is planned in FY 2007	-1,980
NETL Office/Lab Building – The decrease reflects the completion of the building projects at the National Energy Technology Laboratory sites	-17,820
Total, Plant and Capital Equipment	**-19,800**

Fossil Energy Environmental Restoration

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[a]	FY 2006 Current Appropriation	FY 2007 Request
Fossil Energy Environmental Restoration					
CERCLA Remedial Actions	1,807	1,175	-12	1,163	1,155
RCRA Remedial Actions	2,011	1,903	-19	1,884	3,120
Other ES&H Actions.....	5,649	6,522	-65	6,457	5,440
Total, Fossil Energy Environmental Restoration.....	9,467	9,600	-96	9,504	9,715

Mission

The objectives of the Fossil Energy (FE) Environmental Restoration activities are to ensure protection of workers, the public, and the environment in performing the FE mission of the National Energy Technology Laboratory (NETL) at the Morgantown (MGN), West Virginia, Pittsburgh (PGH), Pennsylvania, Tulsa, Oklahoma and Fairbanks, Alaska sites, and the Albany Research Center (ARC) at Albany, Oregon.

Benefits

Environment, Safety and Health (ES&H) activities include those necessary to protect workers and the public from exposure to hazardous conditions and materials (e.g., fires, carcinogens, asbestos, lead, etc.), identify and correct safety and health hazards, improve workplace monitoring and industrial safety programs, achieve compliance ES&H site directives and with Federal, state and local ES&H requirements (e.g., permit maintenance), including Department of Energy (DOE) initiatives, and implement initiatives related to achieving best-in-class performance (e.g., ISO-14001). Activities also include environmental protection, and cleanup activities on-site, and at several former off-site research and development locations (e.g., Wyoming sites). Groundwater and soil monitoring/remediation is also required at ARC to ensure compliance with Federal, state and local requirements.

Performance measures are listed below that support the overarching goal of making consistent and measurable progress in reducing and eliminating injuries, incidents and environmental releases.

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a Includes a rescission of $96,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006.

- Maintain Environment, Safety, and Health (ES&H) risk management programs and Federal, state, and local permit compliance status at NETL and ARC.
- Conduct NETL's remediation activities at Rock Springs and Hoe Creek, WY sites.
- Conduct NETL's and ARC's environmental monitoring and surveillance activities (air, water, wastewater) in support of permit maintenance and/or State-mandated requirements.
- Conduct ES&H training at NETL and ARC according to job hazard analyses.
- Conduct lead asbestos abatement actions at NETL and ARC as required by maintenance, construction, and projects.
- Conduct limited on-site infrastructure fixes at NETL and ARC related to resolving ES&H issues (e.g., ventilation).
- Implement continuity of operations program at NETL and ARC.
- Conduct limited pollution prevention and energy efficiency activities in support of ISO-14001 certification maintenance at NETL and ARC.
- Remove hazardous materials at ARC.
- Maintain emergency response and security program capabilities at NETL and ARC.
- Continue with ES&H-related equipment/facility upgrades and infrastructure repairs, including facility evaluations at ARC.
- Conduct limited soil and groundwater monitoring and remediation activities at ARC.
- Implement limited activities to meet waste minimization and energy efficiency goals.
- Maintain programs for purchasing environmentally preferable products and services.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
CERCLA Remedial Actions	**1,807**	**1,163**	**1,155**
▪ **Rock Springs Sites**	**583**	**495**	**575**

In FY 2007, operate (full scale operation) and maintain the *In-Situ* Aeration Bioremediation Systems at Rock Springs Sites 4, 9, and 12 to remove BTEX compounds from Tipton aquifer ground water, as required by the Wyoming Department of Environmental Quality (WDEQ). Conduct periodic ground water sampling events to determine progress in removing contaminants. Plug and abandon approximately 20 groundwater wells that are no longer required in the monitoring system. Perform 1–year stability study at Site 9 to assess contaminant rebound potential. *Participants include: Army Corps of Engineers*

In FY 2006, operated (full scale operation) and maintained the *In-Situ* Aeration Bioremediation Systems at Rock Springs Sites at Sites 4, 9, and 12 to remove BTEX compounds from Tipton aquifer ground water, as required by the Wyoming Department of Environmental Quality (WDEQ). Conducted periodic ground water sampling events to determine progress in removing contaminants. *Participants included: Army Corps of Engineers.*

In FY 2005, operated and maintained the *In-Situ* Aeration Bioremediation Systems at Rock Spring Sites to remove BTEX compounds from Tipton aquifer ground water, as required by the WDEQ.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

Conducted periodic ground water sampling events to determine progress in removing contaminants from the Tipton aquifer. *Participants included: Army Corps of Engineers.*

- **Hoe Creek Site** **302** **247** **275**

  In FY 2007, plug and abandon monitoring wells at Hoe Creek II site and reclaim site; continue into "shut-down" mode at Hoe Creek III site, which includes conducting limited sparging operations.

  Perform periodic ground water surveillance activities to ensure stabilization of background BTEX concentrations. *Participants include: Army Corps of Engineers*

  FY 2006, phased into "shut-down" mode at the Hoe Creek Site, which includes conducting limited sparging operations at three locations. Performed periodic ground water surveillance activities to ensure stabilization of background BTEX concentrations. *Participants included: Army Corps of Engineers.*

  FY 2005, sealed and abandoned all wells, except long-term monitoring wells to be used in contaminant rebound evaluations, as required by the WDEQ. *Participants included: Army Corps of Engineers.*

- **Hannah Site Revegetation**..... **25** **25** **40**

  In FY 2007, evaluate revegetation success at DOE Hanna Site and initiate closeout activities that include submittal of bond release documentation to WDEQ, providing information to general public, and obtaining land owner final approval of reclamation results

  In FY 2006, conducted closeout activities include submittal of bond release document to WDEQ, providing information to general public, and obtaining land owner final approval of reclamation results.

  FY 2005, closeout active operations with respect to revegetation initiatives.

- **NETL Preliminary Site Investigations** **433** **149** **40**

  In FY 2007, continue to investigate/support one site in which NETL may have current and future environmental liability (e.g., typically associated with property disposition issues due to environmental contamination at off-site contractor locations) as determined through EPA and State environmental agency interactions.

  In FY 2006, continued to investigate/support two sites in which NETL may have current and future environmental liability (e.g., typically associated with hazardous waste disposal operations) as determined through EPA and State environmental agency interactions.

  In FY 2005, initiated the discovery and investigation of one former FE Research and Development (R&D) site. Conducted preliminary assessments (PA) at two sites (four locations) if necessary to determine environmental risk prior to contract closeout.

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
▪ **NETL Site Remediation**	**20**	**0**	**0**

In FY 2007 and FY 2006, no funding is requested for this activity.

In FY 2005, performed on-site building and soil type remediation assessment at NETL (re-assessment).

▪ **Gas Leak Remediation**	**0**	**0**	**0**

No funding is requested in FY 2007 and FY 2006. In FY 2005, prior year funding of $1,000,000 was used to work with the Borough of Versailles, Pennsylvania, to remediate leaks from abandoned natural gas wells.

▪ **CERCLA PRP Response Activities**	**444**	**247**	**225**

In FY 2007, conduct remedial investigations, feasibility studies, and address environmental claims for one or two sites found to be contaminated and requiring cleanup under Federal CERCLA and State cleanup standards.

In FY 2006, conducted remedial investigations, feasibility studies, and address environmental claims for two sites found to be contaminated and requiring cleanup under Federal CERCLA and State cleanup standards.

In FY 2005, conducted remedial investigations and feasibility studies on two sites found to be contaminated and requiring cleanup under Federal CERCLA and State cleanup standards.

RCRA Remedial Actions	**2,011**	**1,884**	**3,120**
▪ **NETL On-Site Remediation**	**1,379**	**1,364**	**1,605**

In FY 2007, implement chemical- and pollutant-related environmental management plans under NETL's ISO-14001 program; continue NETL RCRA-related on-site regulatory, corrective, preventive and improvement activities such as: asbestos and lead abatement and waste minimization and pollution prevention activities; perform activities to ensure compliant wastewater treatment plant operations in order to address past notices of violations, and fund site support contractor RCRA-related risk management and maintenance activities. Begin to retrofit heating and cooling systems with acceptable refrigerants to meet Federal requirements in 2010.

In FY 2006, continued NETL RCRA-related on-site regulatory, corrective, and preventive activities such as: lead and asbestos abatement; waste minimization and pollution prevention activities including managing residual wastes which represent activities beyond baseline programs required to accommodate new/changing DOE requirements and conditions and/or risk reduction and improvement initiatives; performing activities to better achieve and maintain compliant wastewater treatment plant operations (especially at Pittsburgh site) in order to address past notices of violations, and supporting site support contractor RCRA-related risk management and maintenance activities. Also, implemented chemical- and pollutant-related environmental management plans under NETL's ISO-14001 program.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

In FY 2005, continued NETL on-site regulatory and corrective, activities such as: lead and asbestos abatement; waste minimization and pollution prevention activities including managing residual wastes; achieving/maintaining compliant wastewater treatment plant operations, and site support contractor RCRA-related maintenance activities.

- **Albany Research Center RCRA** **632** **520** **1,515**

In FY 2007, in addition to continuing efforts from FY 2006, increase activities associated with beryllium abatement activities. This will include conducting a site-wide survey of beryllium, developing a risk assessment, and generating a prioritized remediation plan leading to verification and certification of legacy beryllium contamination removal. Continue regulatory groundwater monitoring activities in conjunction with the Oregon Dept. of Environmental Quality. Continue investigation and risk assessment activities for the specific trichloroethylene (TCE) issue and identify the most appropriate path forward to alleviate contamination.

In FY 2006, continued ARC RCRA cleanup actions including abating lead and asbestos exposures; resolving chemical storage and labeling; monitoring soil and groundwater; investigation and interim measure actions concerning groundwater, upgrading ventilation and air pollution systems; and improving air emission management, materials handling, and waste disposal activities.

In FY 2005, continued ARC RCRA cleanup actions including abating lead and asbestos exposures; resolving chemical storage and labeling; monitoring soil and groundwater; upgrading ventilation and air pollution systems; and improving air emission management, materials handling, and waste disposal activities.

Other ES&H Actions **5,649** **6,457** **5,440**

- **Other ES&H Actions at NETL** **4,447** **3,738** **3,750**

In FY 2007, implement and improve baseline regulatory compliance, Integrated Safety Management, and ISO 14001 programs (emergency management, occupational medicine and health, industrial hygiene, safety, environmental management, ergonomics, training, and fire protection) at NETL. Implement limited actions in support of correcting ES&H deficiencies associated with infrastructure (e.g., ventilation systems; waste pads; gas cylinder storage areas). Implement limited actions in support of achieving DOE's pollution prevention and energy management goals

In FY 2006, implemented baseline regulatory and Integrated Safety Management/ISO 14001 programs (emergency management, occupational medicine and health, industrial hygiene, safety, environmental management, ergonomics, training, and fire protection) at NETL. Implemented limited actions in support of achieving DOE's pollution prevention and energy management goals. Implemented limited actions in support of correcting ES&H deficiencies associated with infrastructure (e.g., ventilation systems; waste pads; gas cylinder storage areas). Implemented non-CERCLA related corrective actions that may occur at off-site locations.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

In FY 2005, implemented baseline regulatory and Integrated Safety Management/ISO 14001 programs (emergency management, occupational medicine and health, safety, environmental management, ergonomics, training, and fire protection) at NETL. Implemented limited actions in support of achieving DOE's pollution prevention and energy management goals.

- **ES&H Corrective Action at NETL Tulsa Site**..... **25** **15** **15**

In FY 2007 and FY 2006, implement ergonomics corrective actions, provide site-specific ES&H training, conduct emergency drills, and perform infrastructure inspections.

In FY 2005, performed ES&H-related training and an ergonomics review to determine personnel at risk of ergonomic injury. Performed testing of and maintenance on fixed fire protection systems. Conducted emergency management drills.

- **ES&H Corrective Action at ARC**..... **1,082** **2,624** **1,600**

In FY 2007, continue ARC safety and health programs and corrective actions including industrial hygiene monitoring and surveillance efforts, a limited occupational medicine program, emergency preparedness and drills, ergonomics, training, fire protection, and security improvements. Within resources maintain indoor air quality and ventilation systems, walking/working surfaces, personal protective equipment, and conduct facility seismic evaluations. Continue incremental progress toward attaining pollution prevention and energy management goals. Major costs include contracted security services and contracted ES&H support.

In FY 2006, continued ARC safety and health programs and corrective actions including industrial hygiene monitoring and surveillance, occupational medicine, emergency preparedness and drills, ergonomics, training, fire protection, and security improvements. Maintained indoor air quality and ventilation systems, walking/working surfaces, personal protective equipment maintenance, and facility seismic evaluations. Continued incremental progress toward DOE's pollution prevention and energy management goals. Costs also include contracted security, Integrated Safety Management System (ISM) and Environmental Management Systems (EMS) support.

In FY 2005, continued ARC safety and health programs and corrective actions including monitoring and surveillance, emergency preparedness and drills, and security improvements. Maintained indoor air quality and ventilation systems, walking surfaces, personal protective equipment maintenance, facility seismic evaluations, and training. Continued incremental progress toward DOE's pollution prevention and energy management goals. Costs also include contracted security, ISM, and ISO 14001 support.

- **Program Support**..... **95** **80** **75**

Fund technical and program management support.

Total, Fossil Energy Environmental Restoration	**9,467**	**9,504**	**9,715**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
CERCLA Remedial Actions	
▪ The decrease continues to reflect the successful incremental implementation of remediation strategies at NETL's sites in Wyoming.....	-8
RCRA Remedial Actions	
▪ The increase in FY 2007 is required for the following activities: (1) monitoring, surveillance and remedial actions associated with TCE contamination of soil and groundwater at the ARC site; (2) monitoring and remediation actions due to historic issues (e.g., beryllium and organic chemicals) at ARC and NETL, and (3) larger infrastructure fixes required to deal with wastewater treatment plant improvements, indoor air quality fixes and chemical inventory improvements at NETL and ARC.....	+1,236
Other ES&H Actions	
▪ The decrease in FY 2007 will provide for limited actions in support of the following activities: (1) enhanced occupational medicine and industrial hygiene surveillance activities required due to historic worker exposure issues (e.g., beryllium and organic chemicals) at ARC and NETL, (2) the development and implementation of a limited occupational medical program at ARC, and (3) the development of a risk assessment for on-site hazardous exposure to legacy chemicals at ARC.....	-1,017
Total Funding Change, Fossil Energy Environmental Restoration...	**+211**

Import/Export Authorization

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[a]	FY 2006 Current Appropriation	FY 2007 Request
Import/Export Authorization					
Import/Export Authorization	1,774	1,799	-18	1,781	0
Total, Import/Export Authorization	1,774	1,799	-18	1,781	0

Mission

The Office of Import/Export Authorization (OIEA) manages the regulatory review of natural gas imports and exports. In addition, the program exercises regulatory oversight of the conversion of existing oil and gas-fired powerplants, processes exemptions from the statutory provisions of the Powerplant and Industrial Fuel Use Act of 1978 (FUA), as amended, and processes certifications of alternate fuel capability pursuant to the provisions of the amended FUA.

Benefits

These regulatory activities help promote the national energy strategy goal of securing future energy supplies by helping to ensure: the availability of reliable, competitively priced natural gas; and that surplus domestic gas supplies can be marketed internationally in a competitive and environmentally sound manner.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Import/Export Authorization	**1,600**	**1,781**	**0**

In FY 2007, funding for this activity will be requested under the Fossil Energy Research and Development Program Direction line as a result of the consolidation of all program direction activity. Regulatory activities will continue using the funds available in the program direction account.

In FY 2006, modify or rescind three conversion orders. Process 50 certifications of coal capability and three exemptions. Process 226 gas import/export applications. Provide support for consultations

a Includes a rescission of $18,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

with U.S. trading partners. Provide regulatory compliance and industry monitoring. Provide petroleum policy support for ASFE.

In FY 2005, modified or rescinded three conversion orders. Processed 50 certifications of coal capability and three exemptions. Processed 226 gas import/export applications. Provided support for consultations with U.S. trading partners. Provided regulatory compliance and industry monitoring. Provided petroleum policy support for ASFE. The electricity regulatory functions of this program have been transferred to the Office of Electricity Delivery and Energy Reliability.

Program Support	**174**	**0**	**0**
Fund technical and program management support.			
Total, Import/Export Authorization	**1,774**	**1,781**	**0**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Import/Export Authorization	
▪ **Import/Export Authorization**	
This reduction is a result of the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account. Work currently funded within this budget line will be funded in the program direction line beginning in FY 2007	-1,781
Total Funding Change, Import/Export Authorization	**-1,781**

Advanced Metallurgical Research

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[a]	FY 2006 Current Appropriation	FY 2007 Request
Advanced Metallurgical Research..	9,861	8,000	-80	7,920	0
Total, Advanced Metallurgical Research.....	9,861	8,000	-80	7,920	0

Mission

The Advanced Metallurgical Research program conducts inquiries, technological investigations, and research concerning the extraction, processing, use, and disposal of mineral substances under the mineral and materials science program at the Albany Research Center (ARC) in Oregon.

Projects are focused on areas where there are large potential public benefits, but where industry would not invest on their own. The program addresses the full life cycle of materials production and cost-effective processing of improved materials through to their disposal and recycling. For example, the program seeks to determine the factors that limit service life of materials in industrial, structural, or engineering applications and to provide solutions to service-life problems through new materials technology. Since this research has application to a range of materials being used, its collective benefits are applied to a broad cross-section of the industry that could result in better products across a wide spectrum, thus improving U.S. competitiveness.

Another focus is to develop and demonstrate technologies that will create public benefits by reducing waste and pollution. For example, for the last four years the Program has sought ways to sequester CO_2, a greenhouse gas, by converting it to a stable mineral form; such a process, if proved practical and economic, could contribute to Fossil Energy's goal of a near-zero atmospheric emission power plant. Thus, the research at ARC directly contributes to Fossil Energy's objectives by providing information on the performance characteristics of materials being specified for the current generation of power systems, on the development of cost-effective materials for inclusion in FutureGen systems, and for solving environmental emission problems related to fossil fired energy systems. The program at ARC stresses full participation with industry through partnerships and emphasizes cost sharing to the fullest extent possible.

Benefits

The Advanced Metallurgical Research Program creates public benefits by carrying out long-term, high-risk research on materials that are key to the energy industry. These benefits relate directly to the DOE

a Includes a rescission of $80,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006.

Energy Strategic Goal to protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy. The research program also contributes to the Science Strategic Goal of protecting our national and economic security by providing world-class scientific research capacity and advancing scientific knowledge.

Strategic and Program Goals

The Department's Strategic Plan identifies four strategic goals (one each for defense, energy, science, and environmental aspects of the mission plus seven general goals that tie to the strategic goals). The Advanced Metallurgical Research program supports the following goal:

Energy Strategic Goal
General Goal 4, Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The Advanced Metallurgical Research program has one program goal that contributes to General Goal 4 in the "goal cascade":

Program Goal 04.55.00.00: Near-Zero Atmospheric Emissions Coal-based Electricity and Hydrogen Production – create public/private partnerships to provide technology to ensure continued electricity production from the extensive U.S. fossil fuel resource, including control technologies to permit reasonable-cost compliance with emerging regulations, and ultimately, by 2015, near-zero atmospheric emission plants (including carbon) that are fuel-flexible, and capable of multi-product output and efficiencies over 60% with coal and 75% with natural gas.

Contribution to Program Goal 04.55.00.00 (Near-Zero Atmospheric Emissions Coal-based Electricity and Hydrogen Production)

The Advanced Metallurgical Research program contributes to this goal through participation in Advanced Research, Sequestration, and IGCC research efforts. These efforts currently include private sector cost sharing. Demonstration experimentations are currently underway for improved slagging gasifier refractories, improved temperature sensing apparatus, integrated pollution control removal techniques, along with collaborative efforts to improve carbon sequestration.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Advanced Metallurgical Research	**9,861**	**7,920**	**0**
• **Advanced Metallurgical Research**	**9,762**	**7,920**	**0**

In FY 2007, funding for this activity will be requested under the Fossil Energy Research and Development Program Direction line as a result of the consolidation of all program direction activity. Advanced Metallurgical Research activities at the Albany Research Center will continue using the funds available in the program direction account.

(dollars in thousands)

FY 2005	FY 2006	FY 2007

In FY 2006, continue research contributions to Fossil Energy's Coal Research Initiative programs, such as the FutureGen project, in the area of increased component service life. Service improvement research by development of new materials, protection of current materials, and real-time corrosion sensors, and refractory repair techniques will be conducted for gasifier operating temperatures and pressures. Carbon dioxide containment through enhancement of natural geologic formation seals research will be performed. The Albany Research Center's support to the Solid State Energy Conversion Alliance (SECA) through material development, fabrication, and performance evaluation will continue for solid oxide fuel cell applications. A portion of this funding ($1,287,000) was provided as a Congressionally Directed Activity. *Participants include: ARC.*

In FY 2005, continued research to contribute to Fossil Energy's near-zero atmospheric emission energy systems by extending component service lifetimes through the improvement and protection of current materials, by the design of new materials, and by defining the service operating conditions for new materials in order to ensure their safe and effective use. Emphasis is placed on high-temperature erosion testing and modeling in environments anticipated for near zero atmospheric emissions concepts, on the development of sulfidation/oxidation resistant materials, and development and repair of refractory materials, for coal gasifiers. The Albany Research Center participated in efforts to develop, fabricate and evaluate the performance of materials to be used in solid oxide fuel cell applications. These included metallic interconnects, heat exchanger materials and reformer materials to support the SECA fuel cell goal of significantly reducing the cost of producing commercial, environmentally friendly solid oxide fuel cells. Continued research focused on developing an economically and environmentally acceptable integrated process for disposal of carbon dioxide. Redirected emphasis to application of mineral carbonation reactions to address leakage/sealing issues in geological sequestration approaches. *Participants include: ARC.*

• **Program Support**	**99**	**0**	**0**
Fund technical and program management support.			
Total, Advanced Metallurgical Research	**9,861**	**7,920**	**0**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Advanced Metallurgical Research	
This reduction is a result of the consolidation of all program direction funds under the program direction line within the Fossil Energy Research and Development account. Work currently funded within this budget line will be funded in the program direction line beginning in FY 2007	-7,920
Total Funding Change, Advanced Metallurgical Research	**-7,920**

National Academy of Sciences Program Review

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation	FY 2007 Request
National Academy of Sciences Program Review					
National Academy of Sciences Program Review.....	493	0	0	0	0
Total, National Academy of Sciences Program Review.....	493	0	0	0	0

Mission

This program provides for a study by the National Research Council (NRC) of prospective (future) benefits of Fossil Energy R&D. In FY 2003, FY 2004, and FY 2005 funding was appropriated to the Department's Office of Energy Efficiency and Renewable Energy (EERE), which is being combined with Fossil Energy (FE) funding for the NRC study. Benefits estimation methodologies traditionally used by DOE's energy programs are resource intensive and complex. The NRC is attempting to develop and test a methodology that is more simple and intuitive. In Phase II (FY 2004 funding), which will be completed in FY 2006, the methodology is being refined and demonstrated via case studies. Further refinement and demonstrations will occur in Phase III (FY 2005 funding).

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
National Academy of Sciences Program Review	**493**	**0**	**0**

No funding is requested for this activity in FY 2007 and FY 2006.

In FY 2005, a study by the National Research Council (NRC) of prospective future benefits of Fossil Energy R&D was conducted.

Total, National Academy of Sciences	**493**	**0**	**0**

Special Recruitment Programs

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[a]	FY 2006 Current Appropriation	FY 2007 Request
Special Recruitment Programs					
Special Recruitment Programs	656	656	-7	649	656
Total, Special Recruitment Programs	656	656	-7	649	656

Mission

The Office of Fossil Energy has developed two programs to help attract minority and other highly qualified technical and engineering students to work in the development of fossil fuels. They are the "Pipeline Universities" program, and the Mickey Leland Energy Fellowship program.

The intent of the Pipeline Universities program is to collaborate with the Nation's top earth science and engineering universities to provide a "pipeline" of future employees who will become the successor managers and technical scientists of the future.

The Mickey Leland Energy Fellowship program is a 10 week summer internship program that offers minority students majoring in math, science and engineering an opportunity to learn about fossil energy programs and initiatives. Fossil Energy is working closely with historically black colleges and universities, Hispanic serving institutions and Tribal colleges and universities to encourage minority students who are studying in academic disciplines needed in the execution of the Fossil Energy mission, to pursue careers with the Federal government.

Benefits

The benefit of these programs for the Office of Fossil Energy is that it provides a steady flow of diverse, technically trained personnel who are familiar with the balance between applying science to energy security problems and who can enter Federal service prepared to deal with the complex technical and policy issues associated with U.S. economic and energy security.

a Includes a rescission of $7,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Special Recruitment Programs	**656**	**649**	**656**

In FY 2007, FY 2006, and FY 2005, applicants will be recruited and selected to participate in the technical career intern program and the Mickey Leland Energy Fellowship program.

Total, Special Recruitment Programs	**656**	**649**	**656**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Special Recruitment Programs	
The increase will enable Fossil Energy to honor commitments to the students and Universities	+7
Total Funding Change, Special Recruitment Programs	+7

Cooperative Research and Development

Funding Profile by Subprogram [a]

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[b]	FY 2006 Current Appropriation	FY 2007 Request
Cooperative Research and Development					
Cooperative Research and Development	8,052	6,000	-60	5,940	0
Total, Cooperative Research and Development	8,052	6,000	-60	5,940	0

Mission

The Cooperative Research and Development program supports activities of federal/industry/research institute endeavors and federal/state/industry partnerships. It was originally created in FY 1989 and provided the federal share of support for Jointly Sponsored Research Programs (JSRP) at the Western Research Institute (WRI) and the University of North Dakota Energy and Environmental Research Center (UNDEERC). The research projects under the JSRP at those centers receive at least 50 percent cost sharing from non-federal partners. The Department anticipates that these centers can compete successfully for Fossil Energy funding through the competitive solicitation process.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Cooperative Research and Development	**8,052**	**5,940**	**0**
▪ **Cooperative Research and Development**	**8,013**	**5,900**	**0**

In FY 2007, the Department anticipates that these centers can compete successfully for Fossil Energy funding through the competitive solicitation process.

FY 2006 and FY 2005, continued support for cooperative research programs at WRI and UNDEERC which are 50-50 cost-shared with non-federal clients. Funding will be split evenly between the two participants.

a SBIR/STTR funding in the amount of $231,000 was transferred to the Science Appropriation in FY 2005. Estimates for SBIR/STTR budgeted in FY 2006 are $165,000.

b Includes a rescission of $60,000 in accordance with P.L. 109-148, the Department of Defense Appropriations Act, 2006.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
▪ **Program Support**.....	**39**	**40**	**0**
Fund technical and program management support.			
SBIR/STTR (non-add).....	**—**	**(165)**	**—**
In FY 2005, $206,000 and $25,000 were transferred to the SBIR and STTR programs respectively. The FY 2006 and FY 2007 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.			
Total, Cooperative Research and Development.....	**8,052**	**5,940**	**0**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Cooperative Research and Development	
▪ The Department anticipates that these centers can compete successfully for Fossil Energy funding through the competitive solicitation process.....	-5,940
Total Funding Changes, Cooperative Research and Development.....	**-5,940**

Naval Petroleum & Oil Shale Reserves

Naval Petroleum & Oil Shale Reserves

Naval Petroleum and Oil Shale Reserves

Proposed Appropriation Language

For expenses necessary to carry out naval petroleum and oil shale reserve activities, including the hire of passenger motor vehicles, **[**21,500,000**]** *$18,810,000,* to remain available until expended: Provided, That, notwithstanding any other provisions of law, unobligated funds remaining from prior years shall be available for all naval petroleum and oil shale reserve activities *(Energy and Water Development Appropriations Act, 2006.)*

Explanation of Change

The change reflects a decrease in testing and demonstration projects, fewer well workovers and repair activities at NPR-3, and completion of the project to close inactive permitted landfills at NPR-1.

Naval Petroleum and Oil Shale Reserve
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[a]	FY 2006 Current Appropriation	FY 2007 Request
Naval Petroleum and Oil Shale Reserves	17,750	21,500	-215	21,285	18,810
Total, Naval Petroleum and Oil Shale Reserves	17,750	21,500	-215	21,285	18,810

Preface

Since the Naval Petroleum and Oil Shale Reserve (NPOSR) no longer served the national defense purpose envisioned in the early 1900s, the National Defense Authorization Act for Fiscal Year 1996 (P.L. 104-106) required the sale of the Government's interest in Naval Petroleum Reserve 1 (NPR-1). To comply with this requirement, the Elk Hills field in California was sold to Occidental Petroleum Corporation in 1998. Subsequently, the Department transferred two of the Naval Oil Shale Reserves (NOSR-1 and NOSR-3), both in Colorado to the Department of the Interior's (DOI) Bureau of Land Management. In January 2000, the Department returned the NOSR-2 site to the Northern Ute Indian Tribe. The Energy Policy Act of 2005 transferred administrative jurisdiction and environmental remediation of Naval Petroleum Reserve 2 (NPR-2) in California to the Department of the Interior.

DOE retains the Naval Petroleum Reserve 3 (NPR-3) in Wyoming (Teapot Dome field). The NPR-3 Program's primary focus has been to apply conventional oil field management and operations to produce the stripper field to its economic limit. Initial estimates projected that the field would be shut-in by 2003; however, the favorable oil prices and application of new oil field strategies and technologies have arrested the steep decline in production. Co-located with NPR-3, the Rocky Mountain Oilfield Testing Center (RMOTC) provides opportunities for field testing and demonstration of upstream and environmental products.

Strategic Context

Following publication of the Administration's National Energy Policy, the Department developed a Strategic Plan that defines its mission, four strategic goals for accomplishing that mission, and seven general goals to support the strategic goals. Each appropriation has developed quantifiable goals to support the general goals. Thus the "goal cascade" is the following:

Department Mission →Strategic Goal (25 years)→General Goal (10-15 years)→Program Goal (GPRA Unit) (10-15 years)

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[a] Reflects a 1% rescission in accordance with P.L. 109-148, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico and Pandemic Influenza, 2006.

To provide a concrete link between budget, performance, and reporting, the Department developed a "GPRA" unit concept. Within DOE, a GPRA Unit defines a major activity or group of activities that support the core mission and aligns resources with specific goals. Each GPRA Unit has completed or will complete a Program Assessment Rating Tool (PART). A unique program goal was developed for each GPRA unit.

The goal cascade accomplishes two things. First, it ties major activities for each program to successive goals, and ultimately to DOE's mission. This helps ensure the Department focuses its resources on fulfilling its mission. Second, the cascade allows DOE to track progress against quantifiable goals and to tie resources to each goal at any level in the cascade. Thus the cascade facilitates the integration of budget and performance information in support of the GPRA and the President's Management Agenda (PMA).

Mission

The NPOSR mission has evolved to complete environmental remediation activities and determine the equity finalization of NPR-1 and operate NPR-3 while providing RMOTC as a field demonstration facility.

Benefits

The Department continues activities to finalize its Elk Hills equity interests with ChevronTexaco, co-owner of Elk Hills. Under the *Equity Redetermination Process Agreement*, the ASFE is to impartially determine final equity shares between ChevronTexaco and the Department of Energy. The final equity determinations will be based on all four of the NPR-1 producing zones. Financial settlements will occur after final decisions.

RMOTC's testing and demonstration facility, co-located with NPR-3, offers a place for the U.S. independent oil producers to perform hands-on applied research (testing and demonstration). This applied research helps speed new technology to the marketplace, contributing to a more diverse supply of reliable, affordable and environmentally sound supply of energy. In addition, the Federal government realizes cost savings and/or production increases at NPR-3 when technologies are successfully demonstrated.

Strategic, General, and Program Goals

The Department's Strategic Plan identifies four strategic goals: one each for defense, energy, science, and environmental aspects of the mission plus seven general goals that tie to the strategic goals. The Naval Petroleum and Oil Shale Reserves appropriation supports the following goal:

Energy Strategic Goal: To protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy.

General Goal 4, Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The programs funded within the Naval Petroleum and Oil Shale Reserves appropriation have one Program Goal that contributes to the General Goals in the "goal cascade". This goal is:

Program Goal 04.58.00.00: Petroleum Reserves. Maintain operational readiness of the SPR to drawdown at a sustained rate of 4.4 million barrels per day for 90 days, within 15 days notice by the President. Maintain a 2 million barrel reserve of home heating oil in the U.S. Northeast. While operating NPR-3, utilize as a testing and demonstration field for RMOTC's ongoing research. Continue closeout and equity finalization activities related to NPR #1, and finalize settlement to the State of California with respect to its claims to "school lands".

Contribution to General Goal

The programs within the NPOSR appropriation contribute to General Goal 4 by: 1) Ensuring completion of environmental remediation, cultural resource activities, equity determination, and school lands compensation required as a result of the Elk Hills sale agreements; and 2) Focusing on RMOTC projects that contribute to increased energy security and environmental restoration and remediation.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
General Goal 4, Energy Security			
Program Goal 04.58.00.00 Petroleum Reserves	17,750	21,285	18,810
Total, General Goal 4 (Naval Petroleum and Oil Shale Reserves)	17,750	21,285	18,810

Means and Strategies

NPOSR will use various means and strategies to continue its mission and achieve program goals. The program continues work to close the remaining environmental findings, as required by the agreement between DOE and the California Department of Toxic Substance Control (DTSC). RMOTC will provide to industry a secure, low-risk environment to field evaluate, test, and validate their developing technologies. This environment, free from both production and environmental competing risks, is unique within the government and industry.

Validation and Verification

NPOSR manages detailed, operational measures that are implemented by the contractors. Action plans are reviewed and analyzed at Program Reviews. These reviews provide an opportunity to discuss performance. Budget formulation/ execution assessments are regularly conducted throughout the year, including annual budget validations.

Significant Policy or Program Shifts

To meet the deadline set in the Authorization Act, it was necessary for the Department to commit to a number of activities after closing the sale of the Elk Hills site. The commitments were formalized in several legal agreements. A human health and an ecological Risk Assessment on the 131 DTSC areas of concern are primary activities supported by this budget. Following completion of the Risk Assessments, the program will complete appropriate Corrective Action Studies to determine cleanup in the field. Completion of Risk Assessments and Corrective Action Studies is scheduled for FY 2009.

Since 1996, the NPR-3 field in Wyoming has been focused on producing to its economic limit and pursuing a phased environmental restoration and equipment salvage program at those parts of NPR-3 that are no longer needed for operation. RMOTC provides industry with a secure, low risk environment to field evaluate, test and validate their developing technologies. Incidental benefits are realized by NPR-3 through reduced operating costs and increased production through technologies and techniques tested.

Naval Petroleum and Oil Shale Reserves
Office of Fossil Energy

Funding by Site by Program

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Naval Petroleum and Oil Shale Reserves			
NPOSR – Colorado, Utah, Wyoming	8,835	11,885	10,258
NPR California	5,534	6,450	0
Washington Headquarters	3,381	2,950	8,552
Total, Naval Petroleum and Oil Shale Reserves	17,750	21,285	18,810

Site Description

Naval Petroleum and Oil Shale Reserve -Colorado, Utah and Wyoming
The NPOSR – Colorado, Utah, and Wyoming (CUW), located in Casper, Wyoming supports activities to produce NPR-3 at the maximum efficient rate. This site is co-located with the Rocky Mountain Oilfield Testing Center - a testing and demonstration facility.

Naval Petroleum Reserve – California
The NPR-California field office, located in Bakersfield, California, is responsible for completing closeout activities, environmental remediation, and cultural resource assessment from the sale of the Elk Hills site. In FY 2005, the federal staff from Bakersfield, California relocated to Washington, DC.

Washington Headquarters
The headquarters office located in Washington, DC supports NPR-1 closeout as well as the independent evaluation/recommendation of final equity for Elk Hills. There are geologic, petrophysical and reservoir engineering services required to prepare and support the Government's equity position before an Independent Petroleum Engineer and the Assistant Secretary for Fossil Energy (ASFE).

Naval Petroleum and Oil Shale Reserves

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[a]	FY 2006 Current Appropriation	FY 2007 Request
Naval Petroleum and Oil Shale Reserves					
Production and Operations	8,555	13,211	-132	13,079	10,514
Management	9,195	8,289	-83	8,206	8,296
Total, Naval Petroleum and Oil Shale Reserves	17,750	21,500	-215	21,285	18,810

Public Law Authorization:
P. L. 94-258, "Naval Petroleum Reserves Production Act" (1976)

Mission
The NPOSR mission has evolved to complete environmental remediation activities and determine the equity finalization of NPR-1, and operate NPR-3 while providing RMOTC as a field demonstration facility.

Benefits
The Department continues activities to finalize its Elk Hills equity interests with ChevronTexaco, co-owner of Elk Hills. Under the *Equity Redetermination Process Agreement*, the ASFE is to impartially determine final equity shares between ChevronTexaco and the Department of Energy. The final equity determinations will be based on all four of the NPR-1 producing zones.

RMOTC's testing and demonstration facility, co-located with NPR-3, offers a place for the U.S. independent oil producers to perform hands-on applied research (testing and demonstration). This applied research helps speed new technology to the marketplace, contributing to a more diverse supply of reliable, affordable and environmentally sound supply of energy sources. RMOTC serves as the only field scale, dedicated testing laboratory for the oil and gas industry that does not have production and environmental risks affecting the decision whether to allow the new technology to be tested. This is the largest attribute that helps speed new technology to the marketplace.

[a] Reflects a 1% rescission in accordance with P.L. 109-148, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico and Pandemic Influenza, 2006.

Production and Operations

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Production and Operations			
NPR-1 Closeout	3,128	4,438	3,704
NPR-3 Operations	1,429	4,514	3,810
NPR-3 Environmental Remediation	1,040	0	0
Rocky Mountain Oilfield Testing Center	2,958	4,127	3,000
Total, Production and Operations	8,555	13,079	10,514

Description

The mission of the Production and Operations subprogram includes:

- Environmental remediation and cultural resource activities required as a result of the Elk Hills sale agreement. To meet the deadline set in the Authorization Act, it was necessary for the Department to commit to a number of activities after closing the sale. The commitments were formalized in several legal agreements between DOE, Occidental, Chevron, and the State of California. Activities include completing environmental and archaeological work; assessing sites where remediation was not completed before the sale; and concluding any lawsuits related to the operation of Elk Hills that had been brought by third parties against the Government and/or its contractors.

- Ongoing conventional oil field management and operations at NPR-3. Since 1996, the program's primary focus has been to operate NPR-3 in Wyoming to its economic limit. Initial estimates projected that the field would be shut-in by 2003; however, the favorable oil prices and application of new oil field strategies and technologies have arrested the decline in production. On October 4, 2005, the President signed a report to Congress - Continued Production of the Naval Petroleum Reserves Beyond April 5, 2006 – which authorizes production through April 5, 2009. The actual economic life of the field is contingent upon a variety of factors including oil prices, technological advances, and production costs.

- Field testing and demonstration of upstream oil and gas technologies at the Rocky Mountain Oilfield Testing Center (RMOTC), which is co-located with NPR-3.

Benefits

Revenues from production at Wyoming's Naval Petroleum Reserve No. 3 (Teapot Dome field) are estimated to be $6.6 million dollars in FY 2007.

RMOTC's testing and demonstration facility, co-located with NPR-3, offers a place for the U.S. independent oil producers to perform hands-on applied research (testing and demonstration). This applied research helps speed new technology to the marketplace, contributing to a more diverse supply

of reliable, affordable and environmentally sound supply of energy sources. In addition, the Federal government realizes cost savings and/or production increases at NPR-3 when technologies are successfully demonstrated.

Detailed Justification

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
NPR-1 Closeout	**3,128**	**4,438**	**3,704**

Continue Elk Hills environmental and archeological closeout activities. Perform a human health and an ecological Risk Assessment on the 131 California Department of Toxic Substances Control (DTSC) areas of concern. Following completion of Risk Assessments, complete appropriate Corrective Action Studies to determine cleanup in the field. Continue negotiations with ChevronTexaco on the disposition of sites listed on Exhibit H of the Unit Plan Contract Termination Agreement.

FY 2005 funding supports continued ecological scoping assessment and study of background levels of chemicals of concern (COCs) as well as documentation of the results of cultural resource work. FY 2006 includes site models for potential risk to human health and environment, completion of the project to clean close 3 inactive permitted landfills, and initiation of site-specific sampling. FY 2007 continues risk assessments and site-specific sampling.

NPR-3 Operations	**1,429**	**4,514**	**3,810**

Continue to maintain and produce 722 wells. FY 2007 revenues deposited to the U.S. Treasury are expected to be $6.6 million. Maintain (replace and repair) 150 miles of oil and gas pipelines at NPR-3 to prevent environmental releases. Maintain rolling stock and equipment to support field operations and RMOTC. Maintain approximately 100 miles of road throughout the field.
FY 2005 requirements were offset with available carryover.

NPR-3 Environmental Remediation	**1,040**	**0**	**0**

Fiscal year 2005 includes funding to plug and abandon dormant wells and other restoration activities. No activities are planned in FY 2006 and FY 2007.

Rocky Mountain Oilfield Testing Center	**2,958**	**4,127**	**3,000**

Supports testing partners seeking the use of the facility for new technologies. Focus area include: oil and gas exploration/production; drilling and well completions; remote sensing; infrastructure technologies; coalbed natural gas development; unconventional oil development; methane hydrates; and renewable and energy efficiency technologies.

Total, Production and Operations	**8,555**	**13,079**	**10,514**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Production & Operations	
▪ **NPR-1 Closeout**	
The decrease is due to completion of the project to clean close 3 inactive permitted landfills.	-734
▪ **NPR-3 Operations**	
The decrease reflects fewer scheduled well workover and pipeline maintenance and repair activities.	-703
▪ **Rocky Mountain Oilfield Testing Center**	
The decrease reflects fewer testing and demonstration projects of new technologies for independent oil producers.	-1,128
Total, Production and Operations	**-2,565**

Management

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Management			
Program Direction	5,319	5,025	4,949
Equity	1,726	1,487	1,026
Business Management & Support	2,150	1,694	2,321
Total, Management	9,195	8,206	8,296

Description

Management supports all business management activities associated with NPR-1 closeout, as well as supporting the settlement of equity shares with ChevronTexaco, the minority owner of Elk Hills. Program Direction reflects costs for the federal staffs who provide guidance and program planning as well as contractor personnel who provide analytical support for policy decisions, ensure that the DOE safety programs are administered in accordance with OSHA policy, and provide IT support by maintaining servers, hardware and software.

Benefits

The final equity determinations will be made on all four of the NPR-1 producing zones. Financial settlements will occur after final decisions have been made.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
▪ **Program Direction**	**5,319**	**5,025**	**4,949**

Provides salaries, travel, contractor support services and other related expenses to support the management and execution of the NPOSR program.

• **Salaries and Benefits**	**3,906**	**3,777**	**3,632**

FTEs perform policy and planning, equity determination, petroleum engineering, financial management, procurement, environment and safety, and administration of reimbursable work programs.

• **Travel**	**240**	**212**	**211**

Provides travel for resolution of equity issues, western energy issues, and to assure the accomplishment of NPR-1 closeout activities.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
• **Support Services**.....	**226**	**199**	**204**
Provide analytic support for policy decisions, ensure that the DOE safety programs are administered in accordance with OSHA policy, ensure environmental reporting is maintained, and provide information technology support.			
• **Other Related Expenses**	**947**	**838**	**902**
Major elements are communications, utilities, building leases, reproduction services, supplies, equipment and materials.			
▪ **Equity**.....	**1,726**	**1,487**	**1,026**
The Dry Gas Zone, Carneros Zone and Stevens Zone are finalized. A final recommendation for the Shallow Oil Zone is expected by the independent petroleum engineer in 2005. The process is expected to take until 2007 for final ASFE decision.			
FY 2005, FY 2006 and FY 2007 funding supports the independent petroleum engineer, legal support, and expert technical analysis/ consultation required to support the final Fossil Energy decision.			
▪ **Business Management and Support**.....	**2,150**	**1,694**	**2,321**
Continue payments for post-employment medical and dental benefits to former Management & Operating (M&O) contractor employees. Continue general operational and administrative support at the field sites.			
**Total, Management ..... **	**9,195**	**8,206**	**8,296**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Management	
▪ **Program Direction**	
Decrease reflects rehires (for retirees) at lower grade levels	-76
▪ **Equity**	
The decrease reflects fewer support activities as the final equity determination is completed.	-461
▪ **Business Management & Support**	
Additional support for site sampling activities at NPR-1 and an increase for RMOTC security and IT support.	+627
Total, Production and Operations	**+90**

Program Direction

Funding Profile by Category

	FY 2005	FY 2006	FY 2007
NPR California			
Salaries and Benefits	756	770	0
Travel	28	25	0
Support Services	0	0	0
Other Related Expenses	257	249	0
Total, NPR California	2,696	1,044	0
Full Time Equivalents	4	4	0
NPOSR – Colorado, Utah, Wyoming (CUW)			
Salaries and Benefits	1,950	1,950	1,995
Travel	160	141	144
Support Services	0	0	0
Other Related Expenses	513	437	439
Total, NPOSR CUW	2,623	2,528	2,578
Full Time Equivalents	14	17	17
Washington Headquarters			
Salaries and Benefits	1,200	1,057	1,637
Travel	52	46	67
Support Services	226	199	204
Other Related Expenses	177	151	463
Total, Washington Headquarters	1,655	1,453	2,371
Full Time Equivalents	5.6	11	15
Total, Program Direction			
Salaries and Benefits	3,906	3,777	3,632
Travel	240	212	211
Support Services	226	199	204
Other Related Expenses	947	837	902
Total, Program Direction	5,319	5,025	4,949
Total, Full Time Equivalents	23.6	32	32

Support Services by Category

(dollars in thousands)

	FY 2005	FY 2006	FY 2007	$ Change	% Change
Management Support					
Preparation of Program Plans	226	199	204	+5	+2.5%
Total, Management Support	226	199	204	+5	+2.5%
Total, Support Services	226	199	204	+5	+2.5%

Other Related Expenses by Category

(dollars in thousands)

	FY 2005	FY 2006	FY 2007	$ Change	% Change
Other Related Expenses					
Rent to GSA	15	15	15	+0	+ 0.0%
Rent to Others	227	235	240	+5	+2.1%
Communications, Utilities, Misc.	100	100	105	+5	+5.0%
Printing and Reproduction	30	25	27	+2	+ 8.0%
Other Services	343	260	329	+69	+6.1%
Purchases from Gov. Accounts	64	46	46	+0	+ 0.0%
Operation and Maintenance of Equip.	5	7	7	+0	+ 0.0%
Supplies and Materials	135	130	133	+3	+ 2.3%
Equipment	28	20	0	-20	-100.0%
Total, Other Related Expenses	947	838	902	+64	+1.6%

NAVAL PETROLEUM AND OIL SHALE RESERVES
PROJECTED FEDERAL REVENUES
(Dollars in thousands)

Naval Petroleum Reserve No. 3												
	FY 2005			FY 2006			FY 2007			FY 2008		
	Production	Price	Revenues ($000)	Production	Price	Revenues ($000)	Production	Price	Revenues ($000)	Production	Price	Revenues ($000)
Crude Oil	415 BOPD	$48.87	$7,406	397 BOPD	$48.47	$7,026	361 BOPD	$47.36	$6,246	329 BOPD	$46.24	$5,549
Liquid Products	1,100 GPD	$0.93/ gal	$373	1,150 GPD	$0.93/ gal	$391	1,105 GPD	$0.93/ gal	$375	1,060 GPD	$0.93/ gal	$360
Total NPR-3			$7,779			$7,417			$6,621			$5,909
	FY 2009			FY 2010			FY 2011					
	Production	Price	Revenues ($000)	Production	Price	Revenues ($000)	Production	Price	Revenues ($000)			
Crude Oil	329 BOPD	$45.12	$5,420	300 BOPD	$44.00	$4,810	273 BOPD	$44.00	$4,377			
Liquid Products	1,018 GPD	$0.93/ gal	$346	977 GPD	$0.93/ gal	$332	938 GPD	$0.93/ gal	$318			
Total NPR-3			$5,766			$5,142			$4,695			

Naval Petroleum Reserve Number 2
Royalties from 17 Lease Agreements
(Transferred to DOI – August 2005)

	FY 2005		
	Production	Price	Revenues ($000)
Crude Oil	168 BOPD	$45.00	$2,759
Natural Gas	660 MCF/D	$2.30	$554
Liquid Products	424 GPD	$.30/ gal	$46
Total NPR-2			$3,359

Elk Hills School Lands Fund

Elk Hills School Lands Fund

Elk Hills School Lands Fund

Proposed Appropriation Language

[For necessary expenses in fulfilling installment payments under the Settlement Agreement entered into by the United States and the State of California on October 11, 1996, as authorized by section 3415 of Public Law 104—106, $48,000,000 for the payment to the State of California for the State Teachers' Retirement Fund, of which $46,000,000 will be derived Elk Hills School Lands Fund.] *(Energy and Water Development Appropriation Act, 2006.)*

Explanation of Change

There is no FY 2007 request.

Elk Hills School Lands Fund
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Current Adjustments	FY 2006 Current Appropriations	FY 2007 Request
Elk Hills School Lands Fund					
California Teachers' Pension Fund Payment	0	48,000	0	48,000	0
Advance Appropriation	36,000	36,000	0	36,000	0
Total, Elk Hills School Lands Fund	36,000	84,000	0	84,000	0

Preface

The Elk Hills School Lands Fund provides a source of funding for a settlement with the State of California with respect to its longstanding claims to two parcels of land within NPR-1.

Strategic Context

Following publication of the Administration's National Energy Policy, the Department developed a Strategic Plan that defines its mission, four strategic goals for accomplishing that mission, and seven general goals to support the strategic goals. Each appropriation has developed quantifiable goals to support the general goals. Thus, the "goals cascade" is the following:

Department Mission → Strategic Goal (25 yrs) → General Goal → Program Goal (GPRA Unit) (10-15 yrs)

To provide a concrete link between budget, performance, and reporting, the Department developed a "GPRA[a] unit" concept. Within DOE, a GPRA Unit defines a major activity or group of activities that support the core mission and aligns resources with specific goals. Each GPRA Unit has completed or will complete a Program Assessment Rating Tool (PART). A unique program goal was developed for each GPRA unit. A numbering scheme has been established for tracking performance and reporting.[b]

The goal cascade accomplishes two things. First, it ties major activities for each program to successive goals and, ultimately, to DOE's mission. This helps ensure the Department focuses its resources on fulfilling its mission. Second, the cascade allows DOE to track process against quantifiable goals and to tie resources to each goal at any level in the cascade. Thus, the cascade facilitates the integration of budget and performance information in support of the GPRA and the President's Management Agenda (PMA).

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[a] Government Performance and Results Act of 1993

[b] The numbering scheme uses the following numbering convention: First 2 digits identify the General Goal that (01 through 07); second two digits identify the GPRA Unit; the last four digits are reserved for future use.

Mission
The Elk Hills School Lands Fund's mission is to provide a source of funding to fulfill the Settlement Agreement between DOE and the State of California with respect to its longstanding claims to two parcels of land within NPR-1.

Benefits
The agreement calls for payment from the contingent fund to the State of California, subject to appropriation, of 9% of the net proceeds from the sale of the Government's interest in NPR-1.

Strategic Goals
The Department's Strategic Plan identifies four strategic goals: one each for defense, energy, science, and environmental aspects of the mission plus seven general goals that tie to the goals. The Elk Hills School Lands Fund appropriation supports the following goal:

Energy Strategic Goal: To protect our national and economic security by promoting a diverse supply of reliable, affordable, and environmentally sound energy.

General Goal 4, Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing reliable delivery of energy, guarding against energy emergences, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The program funds within the Elk Hills School Lands Fund appropriation have one program goal that contributes to the General Goals in the goal cascade. This goal is:

Program Goal 04.58.00.00: Petroleum Reserves. Maintain operational readiness of the Strategic Petroleum Reserve to drawdown at a sustained rate of 4.4 million barrels per day for 90 days, within 15 days notice by the President. Maintain a 2 million barrel reserve of home heating oil in the U.S. Northeast. While operating NPR-3, utilize as a testing and demonstration field for the Rocky Mountain Oilfield Testing Center's ongoing research. Continue closeout and equity finalization activities related to NPR#1 and finalize settlement to the State of California with respect to its claim to "school lands".

Contribution to General Goal
The Elk Hills School Lands Fund contributes to General Goal 4 by fulfilling the settlement agreement between DOE and the State of California with respect to its longstanding claims to parcels of land within NPR-1.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
General Goal 4, Energy Security			
Program Goal 04.58.00.00, Petroleum Reserves	36,000	84,000	0
Total, General Goal 4 (Elk Hills School Lands Fund)	36,000	84,000	0

Elk Hills School Lands Fund

Funding by Site by Program

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Elk Hills School Lands Fund			
State of California	36,000	84,000	0
Total, Elk Hills School Lands Fund	36,000	84,000	0

Major Changes or Shifts by Site

Elk Hills School Lands Fund

- There is no request for funding in 2007. The time and levels of any future budget request are dependent on the schedule and results of the equity finalization process.

Site Description

State of California

The State of California is the recipient of payments from the contingent fund.

Elk Hills School Lands Fund

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation	FY 2007 Request
Elk Hills School Lands Fund					
California Teachers' Pension Fund Payment	0	48,000	0	48,000	0
Advance Appropriation	36,000	36,000	0	36,000	0
Total, Elk Hills School Lands Fund	36,000	84,000	0	84,000	0

Public Law Authorization:
P.L. 104-106, National Defense Authorization Act for FY 1996

Mission

The Elk Hills School Lands Fund's mission is to provide a source of funding to fulfill the Settlement Agreement between DOE and the State of California with respect to its longstanding claims to two parcels of land within NPR-1. The FY 2006 payment of $84 million reflects the seventh installment payment. The time and levels of any future budget request are dependent on the schedule and results of the equity finalization process.

Benefits

The agreement calls for payment from the contingent fund to the State of California, subject to appropriation, of 9% of the net sales proceeds, with respect to its longstanding claims to two parcels of land ("school lands") within NPR-1.

Elk Hills School Lands Fund

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Elk Hills School Lands Fund			
California Teachers' Pension Fund Payment	0	48,000	0
Advance Appropriation	36,000	36,000	0
Total, Elk Hills School Lands Fund	36,000	84,000	0

Description

The Elk Hills School Lands Fund provides a source of funding for a settlement with the State of California with respect to its longstanding claims to two parcels of land within NPR-1. The first installment payment was appropriated in FY 1999. No appropriation was provided in FY 2000, but the FY 2000 Interior and Related Agencies Appropriations Act provided an advance appropriation of $36 million, which was paid in FY 2001 (second installment). The third, fourth and fifth installments of $36 million were paid at the beginning of FY 2002, FY 2003, and FY 2004 respectively. The FY 2004 Appropriations Act contained an advance appropriation for the sixth installment payable on October 1, 2004. The FY 2005 amended request added an additional $36 million. The FY 2006 payment of $84 million reflects the seventh installment payment. The time and levels of any future budget request are dependent on the schedule and results of the equity finalization process.

Benefits

The agreement calls for payment from the contingent fund to the State of California, subject to appropriation, of 9% of the net sales proceeds, with respect to its longstanding claims to two parcels of land ("school lands") within NPR-1.

Detailed Justification

(dollars in thousands)

	FY 2005	**FY 2006**	**FY 2007**
Elk Hills School Lands Fund	**36,000**	**84,000**	**0**

FY 2005 and FY 2006 reflect payments six and seven of the Settlement Agreement. The amount of the final payment cannot be determined until the equity determination process is completed and all associated costs are known.

Total, Elk Hills School Lands Fund	**36,000**	**84,000**	**0**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Elk Hills School Lands Fund	
▪ **Final Payment**	
The decrease reflects the seventh payment in FY 2006. The time and levels of any future budget request are dependent on the schedule and results of the equity finalization process..…….….	-84,000
Total Funding Change, Elk Hills School Lands Fund	**-84,000**

Strategic Petroleum Reserve

Strategic Petroleum Reserve

Strategic Petroleum Reserve

Proposed Appropriation Language

For necessary expenses for Strategic Petroleum Reserve facility development and operations and program management activities pursuant to the Energy Policy and Conservation Act of 1975, as amended (42 U.S.C. 6201 et seq.) including the hire of passenger motor vehicles, the hire, maintenance, and operation of aircraft, the purchase, repair, and cleaning of uniforms, the reimbursement to the General Services Administration for security guard services, [166,000,000] *$155,430,000* to remain available until expended. *(Energy and Water Development Appropriations Act, 2006).*

Explanation of Change

The decrease reflects the FY 2006 completion of site modifications for the relocation of the degas plant from the Big Hill facility to the Bryan Mound facility.

Strategic Petroleum Reserve
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation	FY 2007 Request
Strategic Petroleum Reserve	169,710	166,000	-1,660[a]	164,340	155,430
Transfer/Offsets	-43,000		+43,000[b]	+43,000	0
Total, Strategic Petroleum Reserve	126,710	166,000	+41,340	207,340	155,430

Preface

The Strategic Petroleum Reserve is the cornerstone of the U.S. energy security program. It provides the United States with strategic and economic protection against disruptions in oil supplies. The program's goal is to mitigate the Nation's energy and security vulnerabilities. The subprograms within the Strategic Petroleum Reserve appropriation are:

- Facilities Development and Operations
- Management

This Overview will describe Strategic Context, Mission, Benefits, Strategic Goals, and Funding by General Goal. These items together put the appropriation in perspective. The Annual Performance Results and Targets, Means and Strategies, and Validation and Verification sections address how the goals will be achieved and how performance will be measured. Finally, this Overview will address the Program Assessment Rating Tool (PART) and significant program and policy shifts.

Strategic Context

Following publication of the Administration's National Energy Policy, the Department developed a Strategic Plan that defines its mission, four strategic goals for accomplishing that mission, and seven general goals to support the strategic goals. Each appropriation has developed quantifiable goals to support the general goals. Thus the "goal cascade" is the following:

Department Mission →Strategic Goal (25 years)→General Goal (10-15 years)→Program Goal (GPRA Unit) (10-15 years)

To provide a concrete link between budget, performance, and reporting, the Department developed a "GPRA" unit concept. Within DOE, a GPRA Unit defines a major activity or group of activities that support the core mission and aligns resources with specific goals. Each GPRA Unit has completed or

[a] Reflects a 1% rescission in accordance with P.L. 109-148, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico and Pandemic Influenza, 2006.

[b] Reflects $43,000,000 transferred to/returned from the SPR Petroleum Account to finance the Hurricane Katrina Drawdown.

will complete a Program Assessment Rating Tool (PART). A unique program goal was developed for each GPRA unit.

The goal cascade accomplishes two things. First, it ties major activities for each program to successive goals, and ultimately to DOE's mission. This helps ensure the Department focuses its resources on fulfilling its mission. Second, the cascade allows DOE to track progress against quantifiable goals and to tie resources to each goal at any level in the cascade. Thus the cascade facilitates the integration of budget and performance information in support of the GPRA and the President's Management Agenda (PMA).

Mission

The mission of the Strategic Petroleum Reserve (SPR) is to store petroleum to reduce the adverse economic impact of a major petroleum supply interruption to the US and to carry out obligations under the international energy program. The Reserve will be filled to 700 million barrels in 2006 through purchase of oil using sale receipts from the September 2005 emergency oil sale. This inventory level will provide 57 days of net import protection.

Benefits

The U.S. reliance on oil and U.S. net oil import levels (forecast to increase) combined with location of significant global oil reserves in regions of the world subject to political unrest, have made the U.S. vulnerable to supply disruptions. The presence of the SPR provides protection from supply disruptions.

Strategic, General, and Program Goals

The Department's Strategic Plan identifies four strategic goals: one each for defense, energy, science, and environmental aspects of the mission plus seven general goals that tie to the strategic goals. The Strategic Petroleum Reserve appropriation supports the following goal:

Energy Strategic Goal: To protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy.

General Goal 4, Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The programs funded within the Strategic Petroleum Reserve appropriation have one Program Goal that contributes to the General Goals in the "goal cascade". This goal is:

Program Goal 04.58.00.00: Petroleum Reserves. Maintain operational readiness of the Strategic Petroleum Reserve to drawdown at a sustained rate of 4.4 million barrels per day for 90 days, within 15 days notice by the President.

Contribution to General Goal

The programs within the SPR appropriation contribute to General Goal 4 by assuring the Reserve is maintained in a high state of readiness. Assurance is measured by how quickly the program can respond to a Presidential direction to draw down; how much of the oil inventory in SPR storage is available; and the cost efficiency of operations. Facilities Development and Operations funds all requirements associated with developing and maintaining facilities for the storage of petroleum, operations associated with placing petroleum into storage, and operational readiness initiatives associated with drawing down and distributing the inventory within 13-15 days notice in the event of an emergency. Management funds personnel and administrative expenses related to maintaining the Project Management Office (New Orleans, Louisiana) and the Program Office (Washington, DC), as well as contract services required to support management and the technical analysis of program issues.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
General Goal 4, Energy Security			
Program Goal 04.58.00.00 Petroleum Reserves	126,710	207,340	155,430
Total, General Goal 4, (Strategic Petroleum Reserve)	126,710	207,340	155,430

Annual Performance Results and Targets

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
General Goal 4, Energy Security					
Strategic Petroleum Reserve					
Completed the transfer of Phase II and III - Federal Royalty Oil to the SPR. (MET GOAL - Added approximately 19.6 million barrels of Royalty Oil that contributed to the total delivery to inventory of 42.5 million barrels from all Exchange and Federal Royalty Oil agreements.)	Increased crude oil inventory to 628 million barrels. (GOAL NOT MET - The inventory of the SPR at the end of September was 624.4MMB. The variance was caused by deferral of nearly 20 MMB in oil receipts during the Venezuela oil crisis. For this deferral, we will receive an additional 2.9MMB crude premium.)	Increased crude oil inventory to 656 million barrels. (EXCEEDED GOAL: End of year inventory was 670 million barrels.)	Increased crude oil inventory to 690 million barrels. (EXCEEDED GOAL: End of year inventory was 693.2 million barrels.)		
Awarded firm fixed-price turnkey (design/build) contract to provide a portable degas plant for continuous removal of excess gas from the SPR crude oil inventory. (MET GOAL)	Completed the Degas Plant design. (MET GOAL)	Commenced full Degas Plant operations at a rate of 100,000 – 150,000 barrels per day by May 2004. (MET GOAL: Processing started April 16). Degas 23 MMB of crude oil inventory. (MET GOAL)			
				Achieve maximum sustained (90 day) drawdown rate of 4.4 MMB.	Achieve maximum sustained (90 day) drawdown rate of 4.4 MMB.
				Achieve operating cost per barrel of capacity of $0.201.	Achieve operating cost per barrel of capacity of $0.201

Means and Strategies

The SPR will use various means and strategies to continue its mission and achieve program goals. Assurance of a readiness posture will be accomplished through internal readiness reviews, assessments, exercises, and tests. Effectiveness of the SPR to mitigate the economic damage of severe oil supply disruptions will be influenced by the SPR's size (inventory and capacity) and ability to deliver into the marketplace. From FY 1999 through August 2005, the Department used agreements with the Department of the Interior to use Federal Royalty Oil to fill the SPR to 700 million barrels.

In April 2004, the SPR placed a transportable degas plant into service at the Big Hill facility to ensure availability of crude oil inventories within environmental and safety constraints. This process prevents the off-gassing of VOCs above safe levels during oil movements through commercial distribution points. The self-contained plant will be relocated to Bryan Mound (2007) and to West Hackberry (2011) after the degas of designated oil inventory at Big Hill.

Performance can be affected by several external factors including:

- Growing petroleum consumption and import dependence
- Petroleum market conditions, and
- Developments in the commercial distribution system (i.e., pipelines, and terminals).

Validation and Verification

There is a hierarchy of performance information for the SPR. The Department collects and tracks the limited "dashboard" measures. The SPR Program Office monitors the "critical few", specific, short and long-term measures. The SPR Project Management Office manages the detailed, operational measures that are implemented by the contractors. Organizational and action plans are reviewed and analyzed at quarterly Program Reviews. Monthly Project Assessments and Project Reviews are conducted to analyze performance against all milestones and contracts. These reviews provide an opportunity to discuss performance and provide direction to contractors. These same measures are reviewed daily during the site managers' site status meetings. Budget formulation/ execution assessments are regularly conducted throughout the year, including annual budget validations. Other evaluations include: semiannual Management & Operating (M&O) contractor award fee performance assessments against Work Authorization Directives; on-site reviews to verify operational, maintenance and management performance data; and draw down readiness quarterly reviews.

Program Assessment Rating Tool (PART)

The Department implemented a tool to evaluate selected programs. PART was developed by the Office of Management and Budget (OMB) to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. The current focus is to establish outcome- and output-oriented goals, the successful completion of which will lead to benefits to the public, such as increased national security and energy security, and improved environmental conditions.

Assessment under the PART found the SPR to be an effective program - well designed with a clear mission. The total program score was 92%, with individual sections scoring as follows: Program Purpose and Design - 100%, Strategic Planning – 88%, Program Management - 100%, and Program Results – 87%.

Major FY 2005 Achievements

The Program completed the Royalty-in-Kind (RIK) oil transfer program with the Department of the Interior in August 2005. The Reserve inventory reached 700 million barrels, consistent with the President's direction. In September 2005, the Department loaned 9.8 million barrels of oil to refiners and sold 11 million barrels in response to Hurricane Katrina.

Significant Policy or Program Shifts

During 2003, the cavern storage capacity was re-evaluated revealing an additional 27 million barrels of capacity available for crude oil storage. This added capacity results from the dissolution of salt by water injected into the caverns during oil movements and the recertification of an existing 12 million barrel cavern previously considered too gassy for long term crude oil storage.

The Strategic Petroleum Reserve continues to intermittently operate at a higher security alert. Additional security protection officers have been placed on duty at all sites and a series of security measures have been implemented, as directed by the Office of Security Operations within the Department. In addition, permanent physical security enhancements have been implemented in response to the perceived threat of continued terrorist activity.

Facilities Maintenance and Repair

The Department's Facilities Maintenance and Repair activities are tied to its programmatic missions, goals, and objectives. Facilities Maintenance and Repair activities funded by this budget are displayed below.

Direct-Funded Maintenance and Repair

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Strategic Petroleum Reserve	42,392	30,287	36,984
Total, Direct-Funded Maintenance and Repair	42,392	30,287	36,984

Strategic Petroleum Reserve
Office of Fossil Energy

Funding by Site by Program

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Strategic Petroleum Reserve			
Bayou Choctaw, LA Storage Facility	6,329	15,371	9,233
Big Hill, TX Storage Facility	18,465	25,763	24,064
Bryan Mound, TX Storage Facility	12,068	28,083	19,404
National Energy Technology Laboratory	860	888	897
Oak Ridge National Laboratory	6,329	15,371	9,233
Sandia National Laboratory	2,667	2,696	2,780
SPR Program Office, Washington, DC	4,492	13,787	4,739
SPR Project Management Office, New Orleans, LA	66,565	85,448	76,581
West Hackberry, LA Storage Facility	14,914	34,958	17,382
Total, Strategic Petroleum Reserve	126,710	207,340	155,430

Major Changes or Shifts by Site

Bayou Choctaw
- Bayou Choctaw has no new capital or construction projects in FY 2007. The prior-year projects for security perimeter fences, small craft intrusion barriers, and site-wide card access systems were completed.

Big Hill Site
- In FY 2007, new projects begin for site facility upgrades, and protective shelters for raw water/crude oil pumps.
- In December 2006, complete vapor pressure degas operations.

Bryan Mound Site
- Site modifications for the degas plant relocation were funded in FY 2006.
- Physical move of degas plant from Big Hill to Bryan Mound occurs September 2007.

West Hackberry Site
- In FY 2007, the major project for replacement of the raw water intake pipeline is completed. Pipeline will be operational in August 2007.

Site Description

Bayou Choctaw Site
The Bayou Choctaw storage facility is 12 miles southwest of Baton Rouge, LA. The site has storage capacity of 76 million barrels.

Big Hill Site
The Big Hill storage facility is 26 miles southwest of Beaumont Texas. The site has storage capacity of 170 million barrels.

Bryan Mound Site
The Bryan Mound storage facility is three miles southwest of Freeport, Texas. The site has storage capacity of 251 million barrels.

National Energy Technology Laboratory
The National Energy Technology Laboratory (NETL) located in Morgantown, WV, Pittsburgh, PA and Tulsa, OK is a multipurpose laboratory, owned and operated by the U.S. Department of Energy. NETL conducts detailed analysis of crude oil streams, caverns and storage cavern composites to ascertain the quality of stored oil on selected oil samples. These measurements include the vapor pressure and gas-oil ratio.

Oak Ridge National Laboratory
The Oak Ridge National Laboratory (ORNL), located in Oak Ridge, TN, provides analytic support to the SPR by documenting SPR analysis models, assisting in the development of SPR oil valuation and bid analysis tools, evaluating potential applications of DIS-Risk model approach related to energy policy issues and evaluating SPR planning alternatives.

Sandia National Laboratory

The Sandia National laboratory, located in Albuquerque, NM, provides technical, comprehensive, site-specific engineering research and development support for the planning, design, development, and monitoring of Strategic Petroleum Reserve (SPR) crude oil storage facilities.

SPR Program Office
The Program Office, located in Washington, DC, plans the overall program, establishes priorities, provides policy and guidance and establishes technical performance. The Office is also responsible for providing public/private sector policy liaison, coordinating Headquarters interface activities, and retaining overall accountability for program success.

SPR Project Management Office
The SPR Project Management Office, located in New Orleans, LA, is responsible for operations oversight and management, facilities design and construction, and overall contractor management at the four storage facilities.

West Hackberry Site
The West Hackberry storage facility is 25 miles southwest of Lake Charles, LA. The site has storage capacity of 230 million barrels.

Facilities Development and Operations

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation	FY 2007 Request
Strategic Petroleum Reserve					
Facilities Development and Operations	109,946	149,000	+41,510[a]	190,510	138,040
Management	16,764	17,000	-170[b]	16,830	17,390
Total, Strategic Petroleum Reserve	126,710	166,000	+41,340	207,340	155,430

Public Law Authorization:

Public Law 94-163, "Energy Policy and Conservation Act" (FY 2003) As Amended

Mission

The mission of the Strategic Petroleum Reserve (SPR) is to store petroleum to reduce the adverse economic impact of a major petroleum supply interruption to the US and to carry out obligations under the international energy program. The Reserve inventory reached 700 million barrels, consistent with the President's direction. In September 2005, the Department loaned 9.8 million barrels of oil to refiners and sold 11 million barrels in response to Hurricane Katrina.

Benefits

The U.S. reliance on oil and U.S. net oil import levels (forecast to increase) combined with location of significant global oil reserves in regions of the world subject to political unrest, have made the U.S. vulnerable to supply disruptions. The presence of the SPR provides protection from supply disruptions.

[a] Reflects return of financing for Hurricane Katrina Drawdown (+$43,000,000) offset by a 1% rescission (-$1,490,000) in accordance with P.L. 109-148, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico and Pandemic Influenza, 2006.

[b] Reflects a 1% rescission in accordance with P.L. 109-148, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico and Pandemic Influenza, 2006.

Facilities Development and Operations

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Facilities Development and Operations			
Security	15,176	19,025	19,296
Power	5,420	4,890	4,988
Operations and Maintenance	86,782	154,973	111,079
Support Services	2,568	2,622	2,677
Environmental Review for Expansion	0	9.000	0
Total, Facilities Development and Operations	109,946	190,510	138,040

Description

The mission of Facilities Development and Operations is to provide for all requirements associated with developing and maintaining facilities for the storage of petroleum, and operations associated with placing petroleum into storage. Under this subprogram, the mission-essential facilities are monitored, evaluated, maintained, and tested to verify their readiness and availability. Primary operational systems at these facilities are the Raw Water Supply, Brine Disposal, and Crude Oil Systems. Major types of equipment and facilities are crude oil meters, crude oil pumps, raw water pumps, brine pumps, oil and brine tanks, brine disposal wells, and crude oil storage caverns.

The Energy Policy Act of 2005 directs the Secretary of Energy to select sites by August 8, 2006 for expansion of the SPR to one billion barrels. This requires the preparation of an Environmental Impact Statement under the National Energy Policy Act, before making a decision on site selection. Funding for this Environmental Review process is included in FY 2006.

Benefits

This subprogram provides funding for protection from supply disruptions. The U.S. reliance on oil and U.S. net oil import levels (forecast to increase) combined with location of significant global oil reserves in regions of the world subject to political unrest, have made the U.S. vulnerable to supply disruptions.

Detailed Justification

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Security	**15,176**	**19,025**	**19,296**

Budget reflects a cost effective security program providing an essential level of security services during all security conditions. Assures that the protection of SPR personnel, crude oil operations, classified matter, equipment, and facilities is consistent with the Site Security Plan and drawdown implementation. The major security effort is managed by the Management and Operating contractor with a subcontractor for the security protection force.

FY2005 requirements were offset by uncosted balances remaining on the security force subcontract. FY2006 and FY 2007 reflect full funding for the protection force subcontract (207 FTEs), as well as acquisition and maintenance of weapons systems, conducting tactical training, and management of security and emergency operations.

Power	**5,420**	**4,890**	**4,988**

Includes power costs at all sites for operational readiness, degas operations, and oil fill. Includes requirements for Non-Hydro Renewable Power per Executive Order 13123.

FY2005 completes power requirements associated with fill to 700 million barrels. FY2006 reflects requirements for site operations and maintenance and includes power for a diesel-driven recovery test at Bryan Mound and maximum rate systems test exercises at all other sites. FY 2007 supports maximum rate systems test exercises at all sites.

Operations and Maintenance	**86,782**	**154,973**	**111,079**

The request supports oil movements, oil accountability, cavern integrity testing, corrosion control, and site subsidence surveys. Preventive, corrective, predictive, and facilities maintenance ensure the functionality and reliability of operational systems. Maintenance construction projects involving engineering, procurement, construction, fabrication, installation, and testing are scheduled to prolong the life of buildings, structures, and physical systems. Major system test exercises are conducted (pipelines and piping, emergency power, recovery systems, security systems, and cavern integrity) to demonstrate drawdown capability and verify mission-readiness. Vapor pressure mitigation continues as well as safety and health activities, fire protection, quality assurance, property management, data systems and environmental support to ensure the SPR maintains compliance with laws, rules, regulations, and requirements.

FY2005 and FY2006 include the replacement of the Raw Water Intake Pipeline at the West Hackberry site as well as site modifications and relocation of the degas plant from Big Hill to Bryan Mound.

FY 2007 includes construction projects for site facility upgrades at Big Hill, Bryan Mound and West Hackberry as well as protective shelters for raw water and crude oil pumps at Big Hill.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Support Services	**2,568**	**2,622**	**2,677**

The request supports funding requirements for technical support across all sites in the areas of configuration management, scheduling, audits of oil inventories and facilities revenue.

FY2005 through FY2007 reflects subcontractor headcount (23 FTEs) to support these activities.

Environmental Review for Expansion	**0**	**9,000**	**0**

The Energy Policy Act of 2005 requires the Secretary of Energy to select sites by August 8, 2006, for expansion of the SPR to one billion barrels. Funding supports preparation of an Environmental Impact Statement under the National Energy Policy Act.

Total, Facilities Development and Operations	**109,946**	**190,510**	**138,040**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Facilities Development & Operations	
▪ **Security**	
The increase is due to escalation (+526) offset by the decrease from replacements of body armor, thermal imagery equipment, and pepper spray (-255) in FY 2006.	+271
▪ **Power**	
The increase is due to escalation (+26) and an FY 2007 max rate STE and crude oil pig at Bryan Mound (+280) offset by fewer months of degas plant operations (-208).	+98
▪ **Operations and Maintenance (O&M)**	
The decrease is due to completion in FY 2006 of deferred O&M activities to finance the Hurricane Katrina Drawdown (-34,000); the completion of site modifications for the degas plant move (-9,193) and the upgrade of the LAN/WAN infrastructure (-701).	-43,894

	FY 2007 vs. FY 2006 ($000)
Facilities Development & Operations (continued)	
▪ **Support Services**	
The increase is due to escalation..	+55
▪ **Environmental Review for Expansion**	
The decrease reflects completion of NEPA activities to support site selection for expansion of the SPR.	-9,000
Total, Facilities Development and Operations	**-52,470**

Capital Operating Expenses and Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Site Wide Card Access Systems (All Sites)	0	1,000	0
Raw Water Small Craft Intrusion Barriers (All Sites)	0	619	0
Bryan Mound Access Roads (MM-574)	0	0	584
Site Perimeter Security Access Roads (MM-591)	0	0	600
Capital Equipment	12,566	10,021	10,628
Total, Capital Operating Expenses	12,566	11,640	11,812

Construction Projects

(dollars in thousands)

	Total Estimated Cost (TEC)	Prior-Year Appro-priations	FY 2005	FY 2006	FY2007	Unapprop-riated Balance
Big Hill Building 800 Renovation (MM-604)	1,610	0	1,134	0	0	0
Big Hill Building 801 Renovation & Temperature Control Upgrades (MM-605)	1,071	0	754	0	0	0
Site Facility Upgrades (Big Hill, Bryan Mound & West Hackberry)	1,207	0	0	0	850	0
Total, Construction			1,888	0	850	

Major Items of Equipment *(TEC $2 million or greater)*

(dollars in thousands)

	Total Project Cost (TPC)	Total Estimated Cost (TEC)	Prior-Year Appro-priations	FY 2005	FY 2006	FY 2007	Completion Date
West Hackberry Raw Water Intake Pipeline (WH-MM-463)[a]	N/A	26,586	24,080	0	0	0	FY 2006
Paving and Surfacing of Site Roads at West Hackberry (WH-MM-332)	N/A	2,266	1,596	0	0	0	FY 2006
Relocate Raw Water Intake Structure Transmission Line (MM-342)	N/A	2,603	0	1,833	0	0	FY 2005
Protective Shelters for Raw Water Pumps (MM-263)	N/A	2,624	0	0	0	1,848	FY 2007
Protective Shelters for Crude Oil Pumps (MM-610)	N/A	2,130	0	0	0	1,500	FY 2007
Total, Major Items of Equipment			0	1,833	0	3,348	

[a] Utilized prior-year contractor savings.

Strategic Petroleum Reserve
Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Management			
Salaries and Benefits	13,204	13,507	13,818
Travel	503	517	528
Support Services	856	1,111	924
Other Related Expenses	2,201	1,695	2,120
Total, Management	16,764	16,830	17,390

Description

The mission of Management is to provide for all costs of personnel and administration related to maintaining the Project Management Office in New Orleans, Louisiana and the Program Office in Washington, DC. Includes funding for contract services required to support management and the technical analysis of program issues.

Benefits

Management provides funding for federal staff and contract support services to ensure protection from oil supply disruptions. Reliance on oil and U.S. net oil import levels (forecast to increase) combined with location of significant global oil reserves in regions of the world subject to political unrest, have made the U.S. vulnerable to oil supply disruptions.

Management

Funding Profile by Category

(dollars in thousands/whole FTEs)

	FY 2005	FY 2006	FY 2007
Washington Headquarters			
Salaries and Benefits	3,103	3,174	3,247
Travel	160	163	166
Support Services	856	1,111	924
Other Related Expenses	723	685	752
Total, Washington Headquarters	4,842	5,133	5,089
Full Time Equivalents	21	26	26
Strategic Petroleum Reserve Project Office			
Salaries and Benefits	10,101	10,333	10,571
Travel	343	354	362
Other Related Expenses	1,478	1,010	1,368
Total, SPR Project Office	11,922	11,697	12,301
Full Time Equivalents	93.3	96	96
Total, Management			
Salaries and Benefits	13,204	13,507	13,818
Travel	503	517	528
Support Services	856	1,111	924
Other Related Expenses	2,201	1,695	2,120
Total, Management	16,764	16,830	17,390
Total, Full Time Equivalents	114.3	122	122

Detailed Justification

(dollars in thousands)

FY 2005	FY 2006	FY 2007
Salaries and Benefits	**13,204**	**13,507**	**13,818**

Funds salaries and benefits for 122 full time equivalent employees to assure achievement of Level 1 Performance criteria for drawdown and distribution. Provides for support and oversight of M&O contractor and subcontractor activities and program operations.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Travel	**503**	**517**	**528**
Provides travel to assure capability to achieve Level 1 Performance criteria for drawdown and distribution.			
Support Services	**856**	**1,111**	**924**
Provide analytic support for SPR development, fill and distribution policy decisions. Includes distribution modeling maintenance.			
Other Related Expenses	**2,201**	**1,695**	**2,120**
Major elements are communications, building lease and electric power for DOE-occupied space (New Orleans, Louisiana). Includes training, small purchases, personal computer hardware/software, supplies and materials for federal staff.			
Total, Management	**16,764**	**16,830**	**17,390**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Salaries and Benefits	
Increase reflects escalation	+311
Travel	
Increase reflects escalation	+11
Support Services	
Decrease in analytical support for policy decisions.	-187
Other Related Expenses	
Increase reflects escalation (+51), scheduled upgrade of computer hardware (+30) and computer service support (+344).	+425
Total Funding Change, Program Direction	**+560**

Support Services by Category

(dollars in thousands)

	FY 2005	FY 2006	FY 2007	$ Change	% Change
Technical Support					
Economic and Environmental Analyses ...	856	1,111	924	-187	-16.8%
Total, Technical Support	856	1,111	924	-187	-16.8%
Total, Support Services.....	856	1,111	924	-187	-16.8%

Other Related Expenses by Category

(dollars in thousands)

	FY 2005	FY 2006	FY 2007	$ Change	% Change
Other Related Expenses					
Rent to Others.....	466	469	478	+9	+1.9%
Communications, Utilities, Misc.	33	35	35	+0	+0.0%
Other Services.....	1,379	973	1,359	+386	+39.7%
Supplies and Materials.....	128	123	123	0	+ 0.0%
Equipment.....	195	95	125	+30	+31.5%
Total, Other Related Expenses	2,201	1,695	2,120	+425	+25.1%

SPR Petroleum Account
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[a]	FY 2006 Current Appropriation	FY 2007 Request
SPR Petroleum Account					
Transfers/Offsets	+43,000	0	-43,000	-43,000	0
Total, SPR Petroleum Account	43,000	0	-43,000	-43,000	0

Preface

The Strategic Petroleum Reserve is the cornerstone of the U.S. energy security program. It provides the United States with strategic and economic protection against disruptions in oil supplies. The program's goal is to mitigate the Nation's energy and security vulnerabilities and to serve as the global benchmark for petroleum reserves. The SPR Petroleum Account funds all SPR petroleum inventory acquisitions, associated transportation and customs duties, and incremental drawdown expenses.

This Overview will describe Strategic Context, Mission, Benefits, Strategic Goals, and Funding by General Goal. These items together put the appropriation in perspective. The Annual Performance Results and Targets, Means and Strategies, and Validation and Verification sections address how the goals will be achieved and how performance will be measured. Finally, this Overview will address the Program Assessment Rating Tool (PART) and significant program and policy shifts.

Strategic Context

Following publication of the Administration's National Energy Policy, the Department developed a Strategic Plan that defines its mission, four strategic goals for accomplishing that mission, and seven general goals to support the strategic goals. Each appropriation has developed quantifiable goals to support the general goals. Thus the "goal cascade" is the following:

Department Mission →Strategic Goal (25 years)→General Goal (10-15 years)→Program Goal (GPRA Unit) (10-15 years)

To provide a concrete link between budget, performance, and reporting, the Department developed a "GPRA" unit concept. Within DOE, a GPRA Unit defines a major activity or group of activities that support the core mission and aligns resources with specific goals. Each GPRA Unit has completed or will complete a Program Assessment Rating Tool (PART). A unique program goal was developed for each GPRA unit.

[a] Reflects funds transferred from & returned to the SPR Facilities Account to finance the Hurricane Katrina Drawdown.

The goal cascade accomplishes two things. First, it ties major activities for each program to successive goals, and ultimately to DOE's mission. This helps ensure the Department focuses its resources on fulfilling its mission. Second, the cascade allows DOE to track progress against quantifiable goals and to tie resources to each goal at any level in the cascade. Thus the cascade facilitates the integration of budget and performance information in support of the GPRA and the President's Management Agenda (PMA).

Mission

The mission of the Strategic Petroleum Reserve (SPR) is to store petroleum to reduce the adverse economic impact of a major petroleum supply interruption to the US and to carry out obligations under the international energy program.

Benefits

The U.S. reliance on oil and U.S. net oil import levels (forecast to increase) combined with location of significant global oil reserves in regions of the world subject to political unrest, have made the U.S. vulnerable to supply disruptions. The presence of the SPR provides protection from supply disruptions.

Strategic, General, and Program Goals

The Department's Strategic Plan identifies four strategic goals: one each for defense, energy, science, and environmental aspects of the mission plus seven general goals that tie to the strategic goals. The SPR Petroleum appropriation supports the following goal:

Energy Strategic Goal: To protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy.

General Goal 4, Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The programs funded within the SPR Petroleum appropriation have one Program Goal that contributes to the General Goals in the "goal cascade". This goal is:

Program Goal 04.58.00.00: Petroleum Reserves. Maintain operational readiness of the Strategic Petroleum Reserve to drawdown at a sustained rate of 4.4 million barrels per day for 90 days, within 15 days notice by the President.

Contribution to General Goal

The programs within the SPR Petroleum appropriation contribute to General Goal 4 by assuring the program can respond to a Presidential direction to draw down and providing for the acquisition, transportation, and injection of petroleum into the Reserve.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
General Goal 4, Energy Security			
Program Goal 04.58.00.00 Petroleum Reserves	43,000	-43,000	0
Total, General Goal 4 (SPR Petroleum Account)	43,000	-43,000	0

Annual Performance Results and Targets

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results
General Goal 4, Energy Security			
SPR Petroleum Account			
Completed the transfer of Phase II and III - Federal Royalty Oil to the SPR. (MET GOAL - Added approximately 19.6 million barrels of Royalty Oil that contributed to the total delivery to inventory of 42.5 million barrels from all Exchange and Federal Royalty Oil agreements.)	Increased crude oil inventory to 628 million barrels. (GOAL NOT MET - The inventory of the SPR at the end of September was 624.4MMB. The variance was caused by deferral of nearly 20 MMB in oil receipts during the Venezuela oil crisis. For this deferral, we will receive an additional 2.9MMB crude premium.)	Increased crude oil inventory to 656 million barrels. (EXCEEDED GOAL: End of year inventory was 670 million barrels.)	Increased crude oil inventory to 690 million barrels. (EXCEEDED GOAL: End of year inventory was 693.2 million barrels.)

Means and Strategies

The SPR will use various means and strategies to continue its mission and achieve program goals. Assurance of a readiness posture will be accomplished through internal readiness reviews, assessments, exercises, and tests. Effectiveness of the SPR to mitigate the economic damage of severe oil supply disruptions will be influenced by the SPR's size (inventory and capacity) and ability to deliver into the marketplace. From FY 1999 through August 2005, the Department used agreements with the Department of the Interior to use Federal Royalty Oil to fill the SPR to 700 million barrels. In September 2005, in response to Hurricane Katrina, 9.8 million barrels of oil were loaned and 11 million barrels were sold to refiners. In FY 2006, $559 million of Katrina sales receipts will be used to purchase oil to replace the oil sold in September 2005.

Performance can be affected by several external factors including:

- Growing petroleum consumption and import dependence
- Petroleum market conditions, and
- Developments in the commercial distribution system (i.e., pipelines, and terminals).

Validation and Verification

There is a hierarchy of performance information for the SPR. The Department collects and tracks the limited "dashboard" measures. The SPR Program Office monitors the "critical few", specific, short and long-term measures. The SPR Project Management Office manages the detailed, operational measures that are implemented by the contractors. Organizational and action plans are reviewed and analyzed at quarterly Program Reviews. Monthly Project Assessments and Project Reviews are conducted to analyze performance against all milestones and contracts. These reviews provide an opportunity to discuss performance and provide direction to contractors. These same measures are reviewed daily during the site managers' site status meetings. Budget formulation/ execution assessments are regularly conducted throughout the year, including annual budget validations. Other evaluations include: semiannual Management & Operating (M&O) contractor award fee performance assessments against Work Authorization Directives; on-site reviews to verify operational, maintenance and management performance data; and draw down readiness quarterly reviews.

Program Assessment Rating Tool (PART)

The Department implemented a tool to evaluate selected programs. PART was developed by the Office of Management and Budget (OMB) to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of the PART provides a means through which programs can assess their activities differently than through traditional reviews. The current focus is to establish outcome- and output-oriented goals, the successful completion of which will lead to benefits to the public, such as increased national security and energy security, and improved environmental conditions.

Assessment under the PART found the SPR to be an effective program - well designed with a clear mission. The total program score was 92%, with individual sections scoring as follows: Program Purpose and Design - 100%, Strategic Planning – 88%, Program Management - 100%, and Program Results – 87%.

Major FY 2005 Achievements

The Program completed the Royalty-in-Kind (RIK) oil transfer program with the Department of the Interior in August 2005. The Reserve inventory reached 700 million barrels, consistent with the President's direction. In September 2005, the Department loaned 9.8 million barrels of oil to refiners and sold 11 million barrels in response to Hurricane Katrina.

Significant Policy or Program Shifts

The cavern storage capacity was re-evaluated during 2003, revealing an additional 27 million barrels of capacity available for crude oil storage. This added capacity results from the dissolution of salt by water injected into the caverns during oil movements and the recertification of an existing 12 million barrel cavern previously considered too gassy for long term crude oil storage.

SPR Petroleum Account
Office of Fossil Energy

Funding by Site by Program

(dollars in thousands)

	FY 2005[a]	FY 2006	FY 2007
SPR Petroleum Account			
Bayou Choctaw, LA Storage Facility	1,293	0	0
Big Hill, TX Storage Facility	3,101	0	0
Bryan Mound, TX Storage Facility	2,984	0	0
SPR Project Management Office, New Orleans, LA	16,242	-43,000	0
West Hackberry, LA Storage Facility	19,380	0	0
Total, SPR Petroleum Account	43,000	-43,000	0

Site Description

Bayou Choctaw Site
The Bayou Choctaw storage facility is 12 miles southwest of Baton Rouge, LA. The site has storage capacity of 76 million barrels.

Big Hill Site
The Big Hill storage facility is 26 miles southwest of Beaumont Texas. The site has storage capacity of 170 million barrels.

Bryan Mound Site
The Bryan Mound storage facility is three miles southwest of Freeport, Texas. The site has storage capacity of 251 million barrels.

SPR Project Management Office
The SPR Project Management Office, located in New Orleans, LA, is responsible for operations oversight and management, facilities design and construction, and overall contractor management at the four storage facilities.

West Hackberry Site
The West Hackberry storage facility is 25 miles southwest of Lake Charles, LA. The site has storage capacity of 230 million barrels.

[a] Reflects financing for planned 30 million barrel drawdown.

SPR Petroleum Account

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation	FY 2007 Request
SPR Petroleum Account					
Oil Acquisition and Drawdown Operations	43,000	0	-43,000	-43,000	0
Total, SPR Petroleum Account	43,000	0	-43,000	-43,000	0

Public Law Authorization:

Public Law 94-163, "Energy Policy and Conservation Act" (FY 2003) As Amended

Mission

The mission of the SPR Petroleum Account is to fund all SPR petroleum inventory acquisitions, associated transportation and customs duties, terminal throughput changes and incremental drawdown expenses.

In September 2005, the President determined that events in connection with Hurricane Katrina resulted in a severe energy supply interruption within the terms of the Energy Policy and Conservation Act. The drawdown and sale of 11 million barrels of crude oil from the Reserve also allowed the United States to meet its obligations under the International Energy Agency's initial collective response to the hurricane.

Benefits

The U.S. reliance on oil and U.S. net oil import levels (forecast to increase) combined with location of significant global oil reserves in regions of the world subject to political unrest, have made the U.S. vulnerable to supply disruptions. The presence of the SPR provides protection from supply disruptions.

Oil Acquisition and Drawdown Operations

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Oil Acquisition and Drawdown Operations	43,000	-43,000	0
Total, Facilities Development and Operations	43,000	-43,000	0

Description

Post Hurricanes Rita and Katrina in 2005, the Reserve loaned 9.8 MMB of crude oil via exchanges and sold 11.0 MMB via a Presidentially-directed drawdown. Since balances in the Petroleum Account were not sufficient to fully fund a drawdown, the Department invoked the authority granted in P.L. 106-113 to transfer funding to the SPR Petroleum Account from any funds available – in this case the SPR Facilities Account. Compliant with this legislative language, the funds were replenished to the SPR Facilities Account in FY 2006 from oil sale receipts.

Benefits

This subprogram provides funding for protection from supply disruptions. The U.S. reliance on oil and U.S. net oil import levels (forecast to increase) combined with location of significant global oil reserves in regions of the world subject to political unrest, have made the U.S. vulnerable to supply disruptions.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Oil Acquisition and Drawdown Operations	**43,000**	**-43,000**	**0**

No FY 2007 activity.

FY2005 and FY 2006 reflects the transfer & return of financing for the drawdown and sale of 11 million barrels of crude oil. Drawdown activities include power, site labor, operations, maintenance, and security.

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Oil Acquisition and Drawdown Operations	
Reflects the return of financing to the SPR Facilities Account from the revenues realized during the Hurricane Katrina drawdown.	+43,000
Total, SPR Petroleum Account	**+43,000**

Northeast Home Heating Oil Reserve

Proposed Appropriation Language

For necessary expenses for Northeast Home Heating Oil Reserve storage, operation, and management activities pursuant to the Energy Policy and Conservation Act [of 2005], *$4,950,000,* to remain available until expended. *(Energy and Water Development Appropriations Act, 2006.)*

Explanation of Change

The change reflects the use of prior year carryover in FY 2006.

Northeast Home Heating oil Reserve
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation[a]	FY 2007 Request
Northeast Home Heating Oil Reserve	4,930	0	0	0	4,950
Total, Northeast Home Heating Oil Reserve	4,930	0	0	0	4,950

Preface

The Northeast Home Heating Oil Reserve is a permanent part of America's energy readiness effort (separate from the Strategic Petroleum Reserve) assuring home heating oil supply for the northeast states if there is a regional severe energy supply interruption of heating oil.

Strategic Context

Following publication of the Administration's National Energy Policy, the Department developed a Strategic Plan that defines its mission, four strategic goals for accomplishing that mission, and seven general goals to support the strategic goals. Each appropriation has developed quantifiable goals to support the general goals. Thus, the "goals cascade" is the following:

Department Mission → Strategic Goal (25 yrs) → General Goal → Program Goal (GPRA Unit) (10-15 yrs)

To provide a concrete link between budget, performance, and reporting, the Department developed a "GPRA[b] unit" concept. Within DOE, a GPRA Unit defines a major activity or group of activities that support the core mission and aligns resources with specific goals. Each GPRA Unit has completed or will complete a Program Assessment Rating Tool (PART). A unique program goal was developed for each GPRA unit. A numbering scheme has been established for tracking performance and reporting.[c]

The goal cascade accomplishes two things. First, it ties major activities for each program to successive goals and, ultimately, to DOE's mission. This helps ensure the Department focuses its resources on fulfilling its mission. Second, the cascade allows DOE to track process against quantifiable goals and to tie resources to each goal at any level in the cascade. Thus, the cascade facilitates the integration of budget and performance information in support of the GPRA and the President's Management Agenda (PMA).

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[a] FY 2006 was funded by use of prior-year balances.

[b] Government Performance and Results Act of 1993

[c] The numbering scheme uses the following numbering convention: First 2 digits identify the General Goal that (01 through 07); second two digits identify the GPRA Unit; the last four digits are reserved for future use.

Mission

On July 10, 2000, the President directed the Department of Energy to establish a heating oil reserve in the Northeast capable of assuring home heating oil for the Northeast states if there is a regional severe supply energy interruption. On March 6, 2001, Energy Secretary Abraham formally notified Congress that the Administration would establish the Reserve as a permanent part of America's energy readiness effort, separate from the Strategic Petroleum Reserve.

Benefits

Two million barrels of heating oil will provide an assurance for the Northeast against a supply disruption for approximately 10 days, the time required for ships to carry heating oil from the Gulf of Mexico to New York harbor for distribution. The Reserve was originally established in commercial facilities located in New York Harbor and New Haven, Connecticut. In 2001, the Secretary approved the relocation of 250,000 barrels of heating oil inventory from Connecticut to Rhode Island, giving the Reserve additional truck and marine loading options.

Strategic Goals,

The Department's Strategic Plan identifies four strategic goals: one each for defense, energy, science, and environmental aspects of the mission plus seven general goals that tie to the goals. The Northeast Home Heating Oil Reserve appropriation supports the following goal:

Energy Strategic Goal: To protect our national and economic security by promoting a diverse supply of reliable, affordable, and environmentally sound energy.

General Goal 4, Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing reliable delivery of energy, guarding against energy emergences, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The program funds within the Northeast Home Heating Oil Reserve appropriation have one program goal that contributes to the General Goals in the goal cascade. This goal is:

Program Goal 04.58.00.00: Petroleum Reserves. Maintain operational readiness of the Strategic Petroleum Reserve to drawdown at a sustained rate of 4.4 million barrels per day for 90 days, within 15 days notice by the President. Maintain a 2 million barrel reserve of home heating oil in the U.S. Northeast. While operating NPR-3, utilize as a testing and demonstration field for the Rocky Mountain Oilfield Testing Center's ongoing research. Continue closeout and equity finalization activities related to NPR#1 and finalize settlement to the State of California with respect to its claim to "school lands".

Contribution to General Goal

The Northeast Home Heating Oil Reserve contributes to General Goal 4 by assuring that it is maintained in a high state of readiness and capable of completing a drawdown of the heating oil inventory in 10 days. Assurance is measured by how quickly the program can respond to a Presidential direction to drawdown; how much of the inventory in storage is available; and the cost of operations.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006[a]	FY 2007
General Goal 4, Energy Security			
Program Goal 04.58.00.00, Petroleum Reserves	4,930	0	4,950
Total, General Goal 4 (Northeast Home Heating Oil Reserve)	4,930	0	4,950

Means and Strategies

The Northeast Home Heating Oil Reserve will use various means and strategies to continue its mission and achieve program goals. Assurance of a readiness posture will be accomplished through internal readiness reviews, assessments, exercises, and tests. Effectiveness of the Heating Oil Reserve to mitigate the economic damage of severe heating oil supply disruptions will be influenced by the Reserve's ability to deliver into the marketplace.

Validation and Verification

There is a hierarchy of performance information for the SPR. The Department collects and tracks the "critical few" measures. The SPR Program Office monitors limited, specific, short and long-term measures. The SPR Project Management Office manages the detailed, operational measures that are implemented by the contractors. Organizational and action plans are reviewed and analyzed at quarterly Program Reviews. Monthly Project Assessments and quarterly Project Reviews are conducted to analyze performance against all milestones and contracts. These reviews provide an opportunity to discuss performance and provide direction to contractors. These same measures are reviewed daily during site managers' site status meetings. Budget formulation/execution assessments are regularly conducted throughout the year, including annual budget validations. Other evaluations include: semiannual M&O contractor award fee performance assessment against Work Authorization Directives; on-site reviews to verify operational, maintenance and management performance data; and drawdown readiness quarterly reviews.

[a] FY 2006 was funded by use of prior-year balances.

Northeast Home Heating Oil Reserve

Funding by Site by Program

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Northeast Home Heating Oil Reserve			
Amerada Hess (Woodbridge, NJ)	2,340	2,400	2,400
Morgan Stanley (New Haven , CT)	1,200	1,200	1,200
Motiva (New Haven , CT)	600	600	600
Motiva (Providence, RI)	600	600	600
Washington Headquarters	190	525	150
Total, Northeast Home Heating Oil Reserve	4,930	5,325	4,950

Site Description

Amerada Hess (Woodbridge, NJ)

The Amerada Hess Terminal is located in the New York Harbor (Woodbridge, NJ) currently holds one million barrels of home heating oil.

Morgan Stanley (New Haven, CT)

The Magellan Terminal is located in New Haven, CT and currently holds 500,000 barrels of home heating oil.

Motiva (New Haven, CT)

The Motiva Terminal is located in New Haven, CT and currently holds 250,000 barrels of home heating oil.

Motiva (Providence, RI)

The Motiva Terminal is located in Providence, RI, and currently holds 250,000 barrels of home heating oil.

Washington Headquarters

The headquarters office located in Washington, DC handles development and maintenance of the Northeast Home Heating Oil Reserve bid platform and other technical and management support to maintain readiness. Also administers the quality and management surveillance support from Defense Energy Support Center (DESC).

Northeast Home Heating Oil Reserve

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation[a]	FY 2007 Request
Northeast Home Heating Oil Reserve	4,930	0	0	0	4,950
Total, Northeast Home Heating Oil Reserve	4,930	0	0	0	4,950

Public Law Authorization:
P.L. 94-163, "Energy Policy and Conservation Act" (FY 2003)

Mission

On July 10, 2000, the President directed the Department of Energy to establish a heating oil reserve in the Northeast capable of assuring home heating oil for the Northeast states during times of very low inventories and significant threats to immediate further supply. On March 6, 2001, Energy Secretary Abraham formally notified Congress that the Administration would establish the Reserve as a permanent part of America's energy readiness effort, separate from the Strategic Petroleum Reserve.

Benefits

Two million barrels of heating oil will protect the Northeast against a disruption for 10 days, the time required for ships to carry heating oil from the Gulf of Mexico to New York harbor for distribution. The Reserve was originally established in commercially facilities located in New York Harbor and New Haven, Connecticut. In 2001, the Secretary approved the relocation of 250,000 barrels of heating oil inventory from Connecticut to Rhode Island, giving the Reserve additional truck and marine loading options.

[a] FY 2006 was funded by use of prior-year balances.

Northeast Home Heating Oil Reserve

Funding Schedule by Activity

(dollars in thousands)

	FY 2005	FY 2006[a]	FY 2007
Northeast Home Heating Oil Reserve			
Commercial Storage Leases	4,740	0	4,800
Information Technology Support	115	0	125
Quality Control & Analysis	75	0	25
Total, Northeast Home Heating Oil Reserve	4,930	0	4,950

Description

The Northeast Home Heating Oil Reserve assures a home heating oil supply for the Northeast states during times of very low inventories and significant threats to immediate further supply. The Reserve is a permanent part of America's energy readiness effort, separate from the Strategic Petroleum Reserve.

Benefits

Two million barrels of heating oil will protect the Northeast against a disruption for 10 days, the time required for ships to carry heating oil from the Gulf of Mexico to New York harbor for distribution. The Reserve was originally established in commercial facilities located in New York Harbor and New Haven, Connecticut. In 2001, the Secretary approved the relocation of 250,000 barrels of heating oil inventory from Connecticut to Rhode Island, giving the reserve additional truck and marine loading options.

Location	Amount of Distillate	Distribution Capability (minimum contractual capabilities)
Amerada Hess (NY harbor)	1,000,000 BBL	100,000 BPD
Motiva (New Haven, CT)	250,000 BBL	25,000 BPD
Morgan Stanley (New Haven, CT)	500,000 BBL	50,000 BPD
Motiva (Providence, RI)	250,000 BBL	25,000 BPD

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006[a]	FY 2007
Northeast Home Heating Oil Reserve	**4,930**	**0**	**4,950**

Continues operation of the Reserve, including lease of commercial storage space, and administrative support from the Defense Energy Support Center.

[a] FY 2006 was funded by use of prior-year balances.

	(dollars in thousands)		
	FY 2005	**FY 2006[a]**	**FY 2007**
FY2005 and FY 2006 activities include storage leases, program administration, and mock sales exercises with industry participation to test and evaluate the sales processes, procedures and on-line system.			
Total, Northeast Home Heating Oil Reserve	**4,930**	**0**	**4,950**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Northeast Home Heating Oil Reserve	
▪ **Northeast Home Heating Oil Reserve**	
The change reflects the use of Prior Year Balance ($5,325,000) in FY 2006 and the FY 2007 requirement of all new budget authority	+4,950
Total Funding Change, Northeast Home Heating Oil Reserve	**+4,950**

[a] FY 2006 was funded by use of prior-year balances.

Clean Coal Technology

Clean Coal Technology

Clean Coal Technology
([DEFERRAL AND] RESCISSION *AND TRANSFER*)

Proposed Appropriation Language

Of the funds made available under this heading for obligation in prior years, [$257,000,000 shall not be available until October 1, 2006: *Provided*, That funds made available in previous appropriations Acts shall be made available for any ongoing project regardless of the separate request for proposal under which the project was selected: *Provided further*, That $20,000,000 of uncommitted balances is rescinded] $*203,000,000 are cancelled*.

Explanation of Change

$203,000,000 of balances are cancelled and through appropriations language in the Fossil Energy Research and Development account $54,000,000 are transferred from Clean Coal Technology to Fossil Energy Research and Development. These balances are no longer needed to complete active projects in this program.

Clean Coal Technology

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation	FY 2007 Request
Clean Coal Technology					
Deferral of Unobligated Balances, FY 2005	0	257,000	0	257,000	0
Advance Appropriation	97,000	0	0	0	0
Deferral of Unobligated Balances, FY 2007	0	-257,000	0	-257,000	257,000
Rescission	0	0	0	0	-203,000
Rescission Uncommitted Balances	0	-20,000	0	-20,000	0
Transfer to Fossil Energy R&D	0	0	0	0	-54,000
Deferral	-257,000	0	0	0	0
Total, Clean Coal Technology	-160,000	-20,000	0	-20,000	0

Mission

The Clean Coal Technology program is a government and industry co-funded effort to provide technical and operational data of innovative coal technologies demonstrated at commercial scale. Beginning in 1985, the Department administered five competitive solicitations selecting projects with the potential to satisfy the requirements of the energy markets while improving the environmental performance of coal-based technologies. To date, more than thirty projects have been successfully completed, providing the marketplace with valuable performance experience and data for a variety of applications.

For FY 2005, an appropriation of $97 million was made available and the availability of $257 million was deferred to FY 2006. For FY 2006, $20 million was rescinded and the availability of $257 million was deferred to FY 2007 to be used for FutureGen. These balances are no longer needed to complete active projects in the Clean Coal Technology program and will be redirected to the Fossil Energy R&D program for work on the FutureGen project. For FY 2007, the Budget proposes to transfer $54 million from Clean Coal Technology to the Fossil Energy Research and Development program for work on the FutureGen project. The Budget also proposes to cancel $203 million in prior-year balances and requests an advanced appropriation of $203 million for the FutureGen project in FY 2008.

For FY 2007, the Department proposes no new funding. Prior year funding exists to meet all outstanding commitments to ongoing projects. Funds for the administration of the program are specifically requested under the Program Direction account.

Benefits

Demonstrating technologies that improve the performance and extend the service of the Nation's reliable coal-based generating capacity is vital for supporting today's economy. The CCT Program is establishing the engineering and scientific foundation for the next generation of clean coal technologies that will be capable of near-zero atmospheric emissions and generation efficiencies twice that of the existing coal fleet.

Strategic Goals

The Department's Strategic Plan identifies four strategic goals one each for defense, energy, science, and environmental aspect of the mission plus seven general goals that tie to the strategic goals. The Fossil Energy Research and Development appropriation supports the following goal:

General Goal 4, Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The Clean Coal Technology program has one program goal which contributes to the General Goal 4 in the "goal cascade":

Program Goal 04.55.00.00: Zero Emission Coal-Based Electricity and Hydrogen Production: Create public/private partnerships to provide technology to ensure continued electricity generation from the extensive U.S. fossil fuel resource, including control technologies to permit reasonable-cost compliance with emerging regulations, and ultimately, by 2015, zero emission plants (including carbon) that are fuel-flexible, and capable of multi-product output and energy efficiencies over 60 percent with coal and 75 percent with natural gas.

Contribution to General Goal

Clean Coal Technology contributes to General Goal 4 through demonstrating technologies that improve the performance and extend the service of the Nation's reliable coal-based generating capacity.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Goal 4, Energy Security			
Clean Coal Technology	-160,000	-20,000	0
Total, General Goal 4 (Clean Coal Technology)	-160,000	-20,000	0

Clean Coal Technology

Funding Profile by Subprogram

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation	FY 2007 Request
Clean Coal Technology					
Clean Coal Technology	-160,000	-20,000	0	-20,000	0
Total, Clean Coal Technology	-160,000	-20,000	0	-20,000	0

Mission

The Clean Coal Technology (CCT) program is a government and industry co-funded effort to provide technical and operational data of innovative coal technologies demonstrated at commercial scale. Beginning in 1985, the Department administered five competitive solicitations selecting projects with the potential to satisfy the requirements of the energy markets while improving the environmental performance of coal-based technologies. To date, more than thirty projects have been successfully completed, providing the marketplace with valuable performance experience and data for a variety of applications.

For FY 2005, an appropriation of $97 million was made available and the availability of $257 million was deferred to FY 2006. For FY 2006, $20 million was rescinded and the availability of $257 million was deferred to FY 2007, to be used for FutureGen. These balances are no longer needed to complete active projects in the Clean Coal Technology program and will be redirected to the Fossil Energy R&D program for work on the FutureGen project. For FY 2007, the Budget proposes to transfer $54 million from Clean Coal Technology to the Fossil Energy Research and Development program for work on the FutureGen project. The Budget also proposes to cancel $203 million in prior-year balances and requests an advanced appropriation of $203 million for the FutureGen project in FY 2008.

For FY 2007, the Department proposes no new funding. Prior year funding exists to meet all outstanding commitments to ongoing projects. Funds for the administration of the program are specifically requested under the Program Direction account.

Benefits

Demonstrating technologies that improve the performance and extend the service of the Nation's reliable coal-based generating capacity is vital for supporting today's economy. The CCT Program is establishing the engineering and scientific foundation for the next generation of clean coal technologies that will be capable of near zero emissions and generation efficiencies twice that of the existing coal fleet.

Detailed Justification

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Clean Coal Technology	**-160,000**	**-20,000**	**0**
▪ **Cooperative Agreements**	**-160,000**	**-20,000**	**0**

For FY 2007, the Department proposes to transfer $54 million and cancel $203 million of the deferral from FY 2006. Complete operational and reporting activities for the Clean Coal Diesel project. *Participants include: TIAX LLC*

For FY 2006, $20 million was rescinded and the availability of $257 million was deferred to FY 2007. Restart operational activities for the Clean Coal Diesel project. Seek final resolution of a go/no-go decision for the Kentucky Pioneer project. *Participants include: TIAX LLC and Kentucky Pioneer Energy, Ltd. with FuelCell Energy and Global Energy.*

For FY 2005, an appropriation of $97 million was made available and the availability of $257 million was deferred to FY 2006. The gasification portion of the Kentucky Pioneer project continued in the permitting and design phase. For the project to proceed, the participant will have to resolve permitting issues and establish a power sales agreement. The JEA Circulating Fluid Bed Combustor project completed testing and reporting activities. Activities for the Clean Coal Diesel project were on hold pending resolution of a dispute between the host site and project participant. *Participants include: JEA, TIAX LLC, and Kentucky Pioneer Energy, Ltd. with FuelCell Energy and Global Energy.*

Total, Clean Coal Technology	**-160,000**	**-20,000**	**0**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Clean Coal Technology	
▪ For FY 2006, $20 million was rescinded and the availability of $257 million was deferred to FY 2007, to be used for FutureGen. These balances are no longer needed to complete active projects in the Clean Coal Technology program and will be redirected to the Fossil Energy R&D program for work on the FutureGen project. For FY 2007, the Budget proposes to transfer $54 million from Clean Coal Technology to the Fossil Energy Research and Development program for work on the FutureGen project. The Budget also proposes to cancel $203 million in prior-year balances and requests an advanced appropriation of $203 million for the FutureGen project in FY 2008.	+20,000
Total Funding Changes, Clean Coal Technology	**+20,000**

Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments	FY 2006 Current Appropriation	FY 2007 Request
Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund					
Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund....	0	0	0	0	50,000
Receipts Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund....	0	0	0	0	-50,000
Repeal Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund....	0	0	0	0	-50,000
Repeal Receipts Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund.....	0	0	0	0	50,000
Total, Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	0	0	0	0

Summary

The Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund was created by the Energy Policy Act of 2005 (Public Law 109-58) as a mandatory program beginning in FY 2007. The program would be funded from Federal revenues from oil and gas leases. The Budget proposes to repeal the program through a future legislative proposal, consistent with the decision to terminate the discretionary Oil and Gas programs.

Energy Information Administration

Energy Information Administration

Energy Information Administration

Proposed Appropriation Language

For necessary expenses in carrying out the activities of the Energy Information Administration, [$86,176,000] *$89,769,000*, to remain available until expended.

Explanation of Change

EIA's FY 2007 request is an increase of $4,455,000 over the FY 2006 appropriation. The FY 2007 funding maintains critical energy data coverage, analysis, and forecasting; increases global oil and gas data and modeling capabilities; redesigns key petroleum and natural gas surveys to improve data reliability and statistical accuracy; and redesigns and begins scoping activities on a next-generation U.S. energy model to replace the current National Energy Model System, which will improve the ability to assess and forecast supply, demand, and technology trends impacting U.S. and world energy markets. The FY 2007 program discontinues the EIA-767, *Steam-Electric Plant Operation and Design Report* that collects design parameters and annual operations data on steam-electric plant boilers, generators, and cooling systems.

Energy Information Administration

Overview

Appropriation Summary by Program

	FY 2005 Current Appropriation	FY 2006 Original Appropriation	FY 2006 Adjustments[a]	FY 2006 Current Appropriation	FY 2007 Request
Energy Information Administration	83,819	86,176	-862	85,314	89,769
Total, Energy Information Administration	83,819	86,176	-862	85,314	89,769

Preface

The Energy Information Administration (EIA) is being increasingly called upon to provide timely energy information and analysis on ongoing and topical energy issues to assist the Administration and Congress in their deliberations regarding national and international energy policy. As energy is the foundation of the U.S. economy, it is to EIA that the Nation's leaders, media, and citizens turn for information and analyses when an energy disruption occurs, when debates on competing national energy development and utilization strategies are discussed, when business and personal energy investment decisions are made, and when government and industry policymakers need access to the most comprehensive source of energy data. EIA strives to be this Nation's premier source of unbiased energy information, analysis, and forecasting. Its activities have generated numerous compliments from customers, including Congressional committee chairmen and others.

As the energy industry restructures, expands, and becomes increasingly more complex and interdependent, EIA must revise and update its energy data collection and analysis capabilities to reflect the current industry composition and operation, in order for EIA to continue to provide the most comprehensive picture of energy markets and industry. This budget request presents EIA's planned program funding and resource requirements, and includes a description of how EIA's planned activities support the Department of Energy's (DOE) strategic goals.

Within the Energy Information Administration appropriation, EIA has one program: Energy Information Administration, with no subprograms.

This Overview will describe Strategic Context, Mission, Benefits, Strategic Goals, and Funding by General Goal. These items together put the appropriation in perspective. The Annual Performance Results and Targets, Means and Strategies, and Validation and Verification sections address how the

[a] Reflects a FY 2006 rescission of $861,760 cited in the *Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act, 2006* (P.L. 109-148).

goals will be achieved and how performance will be measured. Finally, this Overview will address Program Assessment Rating Tool (PART) and Significant Program Shifts.

Strategic Context
Following publication of the Administration's National Energy Policy, the Department developed a Strategic Plan that defines its mission, four strategic goals for accomplishing that mission, and seven general goals to support the strategic goals. Each appropriation has developed quantifiable goals to support the general goals. Thus, the "goal cascade" is the following:

Department Mission ? Strategic Goal (25 yrs) ? General Goal (10-15yrs) ? Program Goal (GPRA unit) (10-15 yrs)

To provide a concrete link between budget, performance, and reporting, the Department developed a "GPRA[a] unit" concept. Within DOE, a GPRA unit defines a major activity or group of activities that support the core mission and align resources with specific goals. Each GPRA unit has completed or will complete a Program Assessment Rating Tool. A unique program goal was developed for each GPRA unit. A numbering scheme has been established for tracking performance and reporting.

The goal cascade accomplishes two things. First, it ties major activities for each program to successive goals and, ultimately, to DOE's mission. This helps ensure the Department focuses its resources on fulfilling its mission. Second, the cascade allows DOE to track progress against quantifiable goals and to tie resources to each goal at any level in the cascade. Thus, the cascade facilitates the integration of budget and performance information in support of the GPRA and the President's Management Agenda (PMA).

Mission
The Energy Information Administration is a leader in providing high-quality, policy-neutral energy information to meet the requirements of the Congress, the Executive Branch, industry, and the public in a manner that promotes sound policymaking, efficient markets, and public understanding.

Benefits
Every Congress and Administration since EIA's inception have come to rely on EIA's data and analysis to provide the basis for energy policy development, debates, and decisions. These stakeholders request and depend on EIA to investigate, analyze and produce credible and reliable reports on the potential impact of energy policy proposals, and to present a clear, accurate, and concise assessment of topical energy issues and events. EIA is a non-policy making, unbiased, and independent information and analysis resource to which the Congress and the Administration can turn to provide the continuous flow of reliable and credible energy information and analysis needed to make informed energy policy decisions. All of EIA's customers and stakeholders, which also include energy consumers, producers, investors, State and local governments, and international agencies and governments, depend on EIA's policy-neutral energy data and analysis.

[a] Government Performance and Results Act of 1993

Strategic, General, and Program Goals

The Department's Strategic Plan identifies four strategic goals (one each for defense, energy, science, and environmental aspects of the mission) plus seven general goals that tie to the strategic goals. The Energy Information Administration appropriation supports the following goal:

Energy Strategic Goal: To protect our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy.

General Goal 4, Energy Security: Improve energy security by developing technologies that foster a diverse supply of reliable, affordable, and environmentally sound energy by providing for reliable delivery of energy, guarding against energy emergencies, exploring advanced technologies that make a fundamental improvement in our mix of energy options, and improving energy efficiency.

The program, funded within the Energy Information Administration appropriation, has one Program Goal that contributes to the General Goals in the "goal cascade". This goal is:

Program Goal 04.61.00.00, Energy Information Administration: EIA's information program is relevant, reliable and consistent with changing industry structures, and EIA's products are accurate and timely.

Contribution to General Goal

EIA contributes to the Energy Security goal by providing national and international energy data, analysis, information, and forecasts to meet the needs of policymakers and the public. EIA's energy data collection, analysis, and dissemination promote sound policymaking, efficient markets, and public understanding.

EIA's priority is to maintain high quality, core energy data programs and modeling methodologies essential to providing timely and accurate energy information, analysis, and forecasts. EIA will continue to collect, analyze and disseminate energy information, and provide analyses and forecasts to Administration and Congressional energy policymakers, State and local governments, industry, educational institutions, the news media, and the public. EIA will accomplish its mission through the use of surveys, expert analyses, and various information collection and dissemination techniques, most notably the Internet. EIA also will continue investment in resources to assure the long-term accuracy of energy data and analyses, which reflect changes in various energy sectors resulting from actions such as: the restructuring of energy industries, demographic changes, new fuel standards, and other legislative decisions.

Major FY 2005 Achievements

As energy prices have surged, the demand for energy information and analysis has proportionally increased. It has fallen to EIA to provide objective, policy-neutral energy data, analyses, and forecasts to the Administration and the Congress, as well as to State governments, international agencies, industry, educational institutions, the news media, and the public. The number of requests for more disaggregated data and sophisticated analyses has steadily grown, and increasingly requires EIA to postpone planned work, adjust planned energy information product delivery dates, reduce the scope of its energy studies, and abbreviate the scope of planned and requested reports.

In addition to quick responses, recurring meetings, and presentations to State agencies, trade groups, international groups, and foreign governments, EIA provided special briefings to Congress, the General Accounting Office, the Executive Branch, and high-ranking Federal officials (see Accomplishments section). EIA estimates these special, unplanned and non-reimbursed reports for Congress and the Administration cost one to two million dollars annually in personnel resources (salary & benefits), an amount that does not include overhead costs (office space, electricity, phones, etc.).

Of specific note, in FY 2005 EIA:

- improved data collection and processing allowing data and information to be released in a more timely manner;
- implemented a new survey and updated other surveys in response to EIA customer needs;
- expanded internet data collection to improve timeliness and data quality; and
- redesigned and expanded EIA's Web site.

Funding by General and Program Goal

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
General Goal 4, Energy Security			
Program Goal 04.61.00.00, Energy Information Administration	83,819	85,314	89,769
Total, General Goal 4, (Energy Information Administration)	83,819	85,314	89,769

Annual Performance Results and Targets

FY 2002 Results	FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets
General Goal 4, Energy Security Energy Information Administration					
In FY 2002, EIA had an increase of over 2.3 million unique users of EIA's Web site. (Met Goal)	In FY 2003 EIA had an increase of over 2 million unique users of EIA's Web site. (Met Goal)	Target: Increase the number of unique monthly users of EIA's Web site by at least 20 percent per year through 2005 from a FY 1997 baseline of 37,000 monthly users. Results: In FY04 EIA had an increase of over 2 million users of EIA's Web site. (Met Goal)	Timeliness of EIA Information Products: 85 percent of EIA recurring products meet their release date targets. Results: In FY 2005, 91 percent of products met their release date targets. (Met Goal)	Timeliness of EIA Information Products: 90 percent of selected EIA recurring products meet their release date targets (all product types).	Timeliness of EIA Information Products: 90 percent of selected EIA recurring products meet their release date targets (all product types).
In FY 2002, EIA provided 85 informational briefings for high-level policymakers in the Administration and Congress. (Met Goal)	In FY 2003, EIA provided 96 informational briefings for high-level policymakers in the Administration and Congress. (Met Goal)	Target: Conduct informational briefings for high-level energy policy-makers in the Administration and Congress to provide timely information and analyses on topical energy issues and situations. Results: In FY 2004, EIA provided 78 information briefings for high-level policymakers. (Met Goal)	Quality of EIA Information Products: 90 percent or more of customers rate themselves in customer surveys as satisfied or very satisfied with the quality of EIA information. Results: In FY 2005, 90% of customers were satisfied or very satisfied with the quality. (Met Goal)	Quality of EIA Information Products: 90 percent or more of customers are satisfied or very satisfied with the quality of EIA information.	Quality of EIA Information Products: 90 percent or more of customers are satisfied or very satisfied with the quality of EIA information.
In FY 2002, EIA's work received 96 citations in major media outlets. (Met Goal)	In FY 2003, EIA's work received 236 citations in major media outlets. (Met Goal)	Target: Increase the number of citations of EIA in major media outlets by at lease an average of 10 percent per year through 2003 from a FY 1999 baseline of 79, and then maintain a constant level of media citations +/- 10%. Results: In FY 2004, EIA's work received 259 citations in major media outlets. (Met Goal)	Relevancy and Reliability of EIA Information Program: 70 percent of key EIA survey frames[a] will have sufficient industry coverage to produce accurate supply, demand and price statistics. Results: In FY 2005, 86 percent of key survey frames had sufficient industry coverage. (Met Goal)		
				Efficiency Measure: Cost savings realized from a subset of surveys, released on schedule. Target: Actual cost will be less than the baseline adjusted for inflation.	Efficiency Measure: Cost savings realized from a subset of surveys, released on schedule. Target: Actual cost will be less than the baseline adjusted for inflation.

[a] Survey frames are a list, map, or other specification of the units that constitute the available information relating to the population of interest for a particular collection effort.

Page 247

Means and Strategies

In FY 2007 EIA's program will consist of data collection necessary to fulfill most statutory requirements for the maintenance of an energy database, the publication of reports and analyses that are used by a wide variety of customers in the public and private sectors, maintenance of the National Energy Modeling System for long-term energy markets analysis, the maintenance of the Short-Term Integrated Forecasting System for near-term energy market analysis and forecasting, and customer forums and surveys to maintain an up-to-date product and service mix.

Over the next several years, many external factors will increase the criticality and visibility of EIA's data and analyses including:

- Dramatic price volatility in U.S. markets for petroleum and natural gas, which increases demand for up-to-date information, analyses, and projections.
- Congressional and other customer requests for analyses and forecasts regarding the effects of energy price volatility, and potential energy policies and environmental policies with energy impacts.
- Continual restructuring of the electric and natural gas industries, which has made energy use and price data, especially at the end-use level, much more difficult to obtain from new and emerging merchant providers.
- Trading of New York Mercantile Exchange (NYMEX)-cleared derivatives based directly on EIA inventory numbers.

EIA's data and analysis is especially critical to Federal policymakers and State governments, who increasingly rely on these data and analyses to understand and respond to the current and emerging effects of energy industry developments on consumers nationally and in their particular State. However, EIA will face a challenge in maintaining the quality of its data due to:

- The increasing amount of work needed to keep survey response rates high with respondents increasingly more difficult to reach and more resistant to completing surveys.
- The need for updated energy consumption and expenditures data collection procedures, especially those related to the natural gas and electric markets, due to the more complex energy supply structure.

Validation and Verification

To validate and verify program performance, EIA conducts an annual customer satisfaction survey. EIA's senior management reviews the results of the customer survey, and uses the information to adjust available resources to improve EIA outcomes, such as to enhance the quality of EIA's Web site, improve customer services, reengineer electronic products, and adjust the information product mix. EIA tracks product usage levels in many ways, including the impact of EIA data on energy markets; number of requests from Congress and the Administration for testimony, briefings, reports and analysis; number of customers and the products they use; number of telephone inquiries; number of news media citations; number of Web site file downloads, etc.

EIA's statistical survey development, of which survey frames are a crucial portion, is driven by EIA's information quality guidelines. EIA has performance standards to ensure the quality (i.e., objectivity, validity, accuracy, reliability, utility, and integrity) of energy information it disseminates to the public. EIA also strives for transparency about information and methods to improve understanding and to facilitate reproducibility of the information and results of analytical investigations on critical energy issues and topics. For additional information about EIA's quality program see: http://www.eia.doe.gov/neic/aboutEIA/guidelines.html.

EIA's results on performance measures are presented to senior management on a quarterly basis. Included is the percent of recurring products that meet their release date, the number of unique monthly users of EIA's Web site, and the percent of customers satisfied with the quality of EIA information. Management also tracks the number of media citations and discussions with high-level policymakers in the Administration and the Congress.

Program Assessment Rating Tool (PART)

The Department implemented PART to evaluate selected programs. PART was developed by the Office of Management and Budget (OMB) to provide a standardized way to assess the effectiveness of the Federal Government's portfolio of programs. The structured framework of PART provides a means through which programs can assess their activities, employing sound business principles.

The current focus is to establish outcome- and output-oriented goals, and a sound business plan to reach and measure the attainment of each goal through an efficient use of provided resources. It is the successful completion of projects and execution of programs that will lead to benefits for the public, such as increased national security and energy security and improved environmental conditions. The Department will take the necessary steps to continue to improve performance.

EIA was PARTed for the first time in conjunction with the FY 2006 budget process. EIA received a rating of "Results Not Demonstrated." This was primarily the result of the ratings given on performance measures and annual performance targets, and the lack of independent peer review of sufficient scope. In mid-FY 2004, EIA developed a new long-range plan and associated performance measures. At the time of the PART assessment, EIA had not fully established these measures, baselines, and targets. EIA subsequently progressed in developing a series of measures, baselines and targets, and also initiated an independent, external expert review of EIA's program coverage chaired by Professor Denny Ellerman of the Massachusetts Institute of Technology, who independently selected the other reviewers. The external expert review will be completed in early 2006.

Significant Program Shifts

The $89.769 million request will allow EIA to support the needs of the Administration, the Congress, States, industry, and the public for reliable and accurate energy information and analyses. In FY 2007, EIA will:

- Increase global oil and gas markets data and modeling capabilities, which provide the basis for an enhanced global dialogue on the development and use of these key energy resources.
- Improve energy data reliability and statistical accuracy. Accurate data drive investment and trade decisions, improve market function, and lead to efficient pricing. This effort would redesign key petroleum and natural gas surveys to better reflect a changing energy industry, improve statistical methods, resolve data discrepancies, and maintain data relevancy and reliability critical to customers.
- Discontinue the EIA-767, *Steam-Electric Plant Operation and Design Report* that collects design parameters and annual operations data on steam-electric plant boilers, generators, and cooling systems. Some of the data series could potentially be incorporated in other electric power surveys in the future.

Energy Information Administration

Funding by Site by Program

(dollars in thousands)

	FY 2005[a]	FY 2006[b]	FY 2007
Washington Headquarters	83,819	85,314	89,769
Total, Energy Information Administration	83,819	85,314	89,769

Major Changes or Shifts by Site

Washington Headquarters

In FY 2007, EIA will focus special attention in three areas: improving International Oil and Gas Markets Data and Energy Security, improving Energy Data Quality, and replacing EIA's U.S. Energy Model. These efforts are needed to improve comprehensive energy data coverage, analysis, and modeling to support the needs of the Congress, Administration, States, industry, and the public for reliable and accurate energy information and analyses.

- Our efforts in the **International Oil and Gas Markets and Energy Security** area will improve global oil and gas data, providing the basis for an enhanced global dialogue on the development and use of these key energy resources. Inadequate data has contributed to recent oil market volatility, as demand data were repeatedly revised upwards throughout 2004. We will also restart the Foreign Energy Supply Assessment Program, which works in partnership with the U.S. Geological Survey to examine the potential oil and gas supply capabilities of the major hydrocarbon provinces of the world.

- Our **Energy Data Quality Improvements** efforts will focus on improving data reliability and statistical accuracy. Accurate data drive investment and trade decisions, improve market function, and lead to efficient pricing. We will redesign key petroleum and natural gas surveys that are outdated. It is essential to upgrade survey samples to better reflect a changing energy industry, improve statistical methods, resolve data discrepancies, and maintain data relevancy and reliability critical to the Congress, the administration, industry and other customers.

- We will begin scoping activities for design requirements for the next generation **U.S. Energy Model** to improve our ability to assess and forecast supply, demand, and technology trends impacting U.S.

[a] Reflects a FY 2005 rescission of $504,900 cited in the *Consolidated Appropriation Act, 2005* (P.L. 108-447) Division E (Department of the Interior and Related Agencies), and an across-the-board reduction of $675,960 cited in Division J (Other Matters), for a total reduction of $1,180,860.

[b] Reflects a FY 2006 rescission of $861,760 cited in the *Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act, 2006* (P.L. 109-148).

and world energy markets. An updated, reliable and maintainable energy model is needed for EIA to develop timely, accurate, and high quality baseline energy projections and execute policy analyses requested by the Congress and the Administration.

- To focus our resources on the above activities, EIA will discontinue the EIA-767, *Steam-Electric Plant Operation and Design Report*. This survey collects design parameters and annual operations data on steam-electric plant boilers, generators, and cooling systems. Some of the data series could be incorporated in other electric power surveys in the future.

- In addition, EIA will continue to improve efficiency through: 1) expanded use of electronic data collection methods to replace paper-based energy survey respondent forms; 2) consolidating contract requirements, where possible, into less costly support services contracts employing the most cost efficient pricing formula; 3) implementing, as appropriate, recommendations of an independent, external, EIA study team to improve the value of EIA's energy data, analyses and forecasting; 4) absorbing salary and benefit costs; and 5) conducting requirement analyses to replace legacy systems with applications having reduced operating and/or maintenance costs, or providing improved coverage at comparable cost.

Site Description

Washington Headquarters

The Energy Information Administration (EIA), an independent statistical agency, is the Nation's premier source of unbiased energy information, analysis and forecasting. EIA provides timely energy information and analysis to its customers, which include the Administration, the Congress, other national and international leaders, energy policymakers world-wide, media, and citizens.

Program Direction

Funding Profile by Category

(dollars in thousands/whole FTEs)

	FY 2005[a]	FY 2006[b]	FY 2007
Washington Headquarters			
Salaries and Benefits	41,931	43,976	45,076
Travel	312	357	370
Support Services	25,883	24,883	27,973
Other Related Expenses	15,693	16,098	16,350
Total, Program Direction	83,819	85,314	89,769
Total, Full Time Equivalents[c]	354	369	375

Public Law Authorizations:

P.L. 75-688, Natural Gas Act (1938)
P.L. 83-703, Atomic Energy Act (1954)
P.L. 93-275, 15 U.S.C. 761, Federal Energy Administration (FEA) Act (1974)
P.L. 93-319, Energy Supply and Environmental Coordination Act (1974)
P.L. 94-163, Energy Policy and Conservation Act (1975)
P.L. 94-385, 15 U.S.C. 790, Energy Conservation and Production Act (1976)
P.L. 95-91, 42 U.S.C. 7135, Department of Energy (DOE) Organization Act (1977)
P.L. 95-621, Natural Gas Policy Act (1978)
P.L. 95-620, 42 U.S.C. 8301, Powerplant and Industrial Fuel Use Act (1978)
P.L. 96-294, Energy Security Act (1980)
P.L. 97-229, 42 U.S.C. 6245, Energy Emergency Preparedness Act (1982)
P.L. 99-58, National Coal Imports Reporting Act (1985)
P.L. 99-58, 42 U.S.C. 6201, Energy Policy and Conservation Act Amendments of 1985
P.L. 100-42, 42 U.S.C. 8312, Powerplant and Industrial Fuel Use Act Amendments of 1987
P.L. 102-486, 42 U.S.C. 13385, Energy Policy Act (1992)
P.L. 104-13, 44 U.S.C. 3501, Paperwork Reduction Act (1995)
P.L. 105-277, 44 U.S.C. 3504, Government Paperwork Elimination Act (1998)
P.L. 107-347: Title V of E-Government Act of 2002, Confidential Information Protection and Statistical Efficiency Act of 2002 (CIPSEA)
P.L. 109-58, 42 U.S.C. 15801 note, Energy Policy Act (2005)

Other Laws, U. S. Code and Regulations with Significant Provisions Affecting EIA:
5 U.S.C. 552, Freedom of Information Act (1966)

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[a] Reflects a FY 2005 rescission of $504,900 cited in the *Consolidated Appropriation Act, 2005* (P.L. 108-447) Division E (Department of the Interior and Related Agencies), and an across-the-board reduction of $675,960 cited in Division J (Other Matters), for a total reduction of $1,180,860.

[b] Reflects a FY 2006 rescission of $861,760 cited in the *Department of Defense, Emergency Supplemental Appropriations to Address Hurricanes in the Gulf of Mexico, and Pandemic Influenza Act, 2006* (P.L. 109-148).

[c] Excludes one (1) FTE funded by the Nuclear Waste Disposal Fund.

5 U.S.C. 552a, The Privacy Act of 1974
31 U.S.C. 1341, Anti-Deficiency Act (1980)
P.L. 97- 255, Federal Managers' Financial Integrity Act (1982)
P.L. 97-415, 42 U.S.C. 2210, Nuclear Regulatory Commission Authorization Act (1983)
P.L. 99-509, 42 U.S.C. 7135, Omnibus Budget Reconciliation Act (1986)
P.L.101-576, Chief Financial Officers Act (1990)
Government Performance and Results Act (GPRA) (1993)
Government Management Reform Act (GMRA) (1994)
18 U.S.C. 1001 makes it a crime for any person knowingly and willingly to make to any Agency or Department of the United Sates any false, fictitious or fraudulent statements as to any matter within its jurisdiction.
18 U.S.C. 1805 makes it a crime to disclose confidential information.
C.F.R. Title 5, Administrative Personnel
Department of Energy Privacy Act Issuances, Systems DOE-4 (EIA Form 457, Residential Energy Consumption Survey), System DOE-6 (EIA Customer Database), and DOE-59 (Mailing Lists for Requesters of Energy Related Information).

Mission

Program Direction provides the Federal staffing resources and associated costs required to provide overall direction and execution of EIA's mandate to provide high-quality, policy-neutral energy data, analyses, information, and forecasts to meet the requirements of the Administration, the Congress, the States, industry, and the public in a manner that promotes sound policymaking, efficient markets, and public understanding.

As stated in the Departmental Strategic Plan, DOE's Strategic and General Goals will be accomplished not only through the efforts of the major program offices in the Department but with additional effort from offices which support the programs in carrying out the mission. EIA performs critical functions which directly support the mission of the Department. These functions include the development and maintenance of a comprehensive energy database, the dissemination of energy data and analyses for a wide variety of customers in the public and private sectors, and the preparation of specific reports. Statutes require EIA, among many other tasks, to maintain the National Energy Modeling System for mid-term energy market analysis and forecasting; maintain the Short-Term Integrated Forecasting System for near-term energy market analysis and forecasting; conduct surveys of energy use in residences, commercial buildings, and the manufacturing sector; and conduct customer forums and surveys to maintain an up-to-date product and service mix.

EIA is also tasked with responding to inquiries from a broad variety of customers asking for energy information. EIA's customers include energy and environmental policymakers in the Administration and the Congress, agencies of the Federal Government, State and local governments, industry, educational institutions, the news media, and the public. It is also important to note that key oil producing countries, inside and outside the Organization of Petroleum Exporting Countries, and major oil companies consult EIA's data when making their own supply-demand forecasts. EIA's data and analyses serve as a focal point for the international dialogue on energy markets.

EIA's strategy is to make its products and services available to customers through the increasing use of electronic dissemination accessed through the EIA Web site. Based on the growth in usage for the past five years, EIA Web site usage is projected to exceed 26 million unique user sessions in FY 2007. EIA will continue to print only four multi-fuel publications: the *Annual Energy Outlook*, the *Annual Energy*

Review, the *International Energy Outlook*[a], and the *Monthly Energy Review*. EIA will continue to offer its customers a limited print-on-demand service.

In FY 2004 and FY 2005, EIA received a score of "Green" for all Presidential management agenda initiatives. Specifically:

In the area of Human Capital Management:
EIA continues to use its human capital management to drive efficiencies cited in its budget planning. This budget submission supports staffing needs which are geared towards skills that provide the maximum flexibilities for anticipated changes in future energy data and analytical requirements. The budget also supports training for staff involved in the contract management process, which is an area that offers potential greater efficiencies through the implementation of more effective contracting practices including cost-plus incentive fees, performance-based contracting, incorporation of the project management methodology, and acquisition certification for key EIA staff.

In the area of Competitive Sourcing:
Through the use of contractual support to perform the information technology (IT) work previously performed by EIA's Federal staff, EIA has reduced Federal IT staff and increased the use of small businesses. In addition, EIA's remaining Federal IT staff is undergoing a competitive sourcing review.

In the area of Small Business Support:
EIA plans to remain a Departmental leader in the use of small businesses. For FY 2004, EIA exceeded its goal of 47 percent of its contract funding to small businesses. For FY 2005 through FY 2007, EIA projects 47 percent of all contract funds will continue to be awarded to small businesses, provided EIA's IT projections remain constant.

In the area of Financial Management:
EIA will make use of the Department's newly developed financial management system.

In the area of E-Government:
EIA will continue to collect and disseminate energy data, information, analyses, forecasts and reports via the Internet. To date, EIA collects data on 60 surveys via the Internet employing a secure transfer procedure to assure security of information provided. Of note, EIA implemented Internet data collection (IDC) for 3 of 4 coal surveys in FY 2004. Fifty-one percent of the 2003 annual coal survey forms were received through IDC, and, for the 4th quarter 2004 cycle, 93 percent of the quarterly coal surveys were received via IDC. Eighty-six percent of monthly electricity respondents used the IDC to report February 2005 data, compared to 54 percent two years earlier.

EIA Omnibus Procurement (EOP):
In January 2004, EIA awarded its second multiple award contract for personnel, facilities, equipment, material, supplies, and performance-based service contracting. The EOP II covers five functional areas:

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[a] *International Energy Outlook* presents an assessment of the outlook for international energy markets through 2025 (through 2030 as of the 2006 edition), including outlooks for major energy fuels and issues related to electricity and the environment. Projections are prepared using the National Energy Modeling System (NEMS), which consists of multiple independent modules and databases and the modeling systems needed to integrate the individual modules that are used to simulate the end-use demand sectors, energy supply, and electricity generation.

1) Information Management and Product Production Support Services; 2) Energy Analysis and Forecasting Support Services; 3) Communication Services, Records Management & Administrative Support; 4) Information Technology Support Service; and 5) Energy End User Surveys. The EOP II provides a two-year base with a three-year option to extend the performance-based services under cost plus fixed fee, cost plus award fee, and firm fixed price instruments. During FY 2004, EIA completed a memorandum of agreement with the DOE Office of the Chief Information Officer to use a Department-wide IT contract for EIA's IT infrastructure support in lieu of the EOP II contract.

EIA continues to build on the best practices for increasing small business participation. EIA encourages the small business sector to partner with both large and small businesses to meet the Department's small business goal. EIA is forging ahead with cost-effective contracting under this procurement vehicle, extensive training for the Technical Monitors, and future business re-engineering prospects.

Accomplishments

The following time line provides a perspective of significant events in the energy markets and examples of EIA's response to provide energy data and analyses to aid in critical energy policy decisions. The "EIA Response" column, in most cases, does not include the numerous meetings with, and briefings for, Congressional Members and staff. Nor does it include the dozens of telephone and e-mail requests for data and analysis that are received from Congressional staff every quarter.

1st Q FY 2005

Energy Event	EIA Response
Crude oil prices, already high and volatile through late summer, are subject to additional stress in mid-September as Hurricane Ivan has a major adverse impact on oil and natural gas production in the Gulf of Mexico and also affects delivery of oil imports. Refinery operations are also significantly impacted.	EIA's daily situation reports, complied in cooperation with the Minerals Management Service, track production impacts and assess prospects for restoration. EIA's W*eekly Petroleum Status Report* tracks impacts on imports, refinery operations, and crude oil and product stocks. As distillate stocks fell below normal seasonal levels in the aftermath of Ivan, EIA releases its *Winter Fuels Outlook* at the start of October. Congressional and Administration staff concerned with low-income energy assistance issues seek information from EIA staff.
A respondent to EIA's *Weekly Natural Gas Storage Report* submits erroneous data – consumers claim an impact of $200 million to $1 billion on their natural gas costs.	Based on public comment, EIA establishes a new policy that allows revisions to be issued the same day that a significant respondent error is identified, rather than waiting for the next scheduled weekly release. EIA also upgrades its review of data submissions.
Volatility in oil markets raises uncertainty regarding the long-term energy outlook.	EIA issues the *Annual Energy Outlook 2005*, which considers a wide range of future world oil price scenarios. The impact of higher oil prices varies significantly across sectors.

2nd Q FY 2005

Energy Event	EIA Response
EIA's weekly petroleum data site continues to experience severe congestion as market participants and financial media use robotic programs to repeatedly access the site at scheduled release times.	EIA introduces its Gatekeeper system to provide simultaneous data access to all parties. Complaints about oil data release problems fall dramatically.

The increasing number of product specifications, many driven by regulatory requirements, makes it more difficult to assess the adequacy of U.S. petroleum product supplies.	In January 2005, EIA starts reporting more disaggregated petroleum product and blendstock data in the *Petroleum Supply Monthly*.
Markets and policymakers express concern about the timeliness of EIA's electricity and coal stock data.	EIA begins issuing "Monthly Electricity Flash Estimates," which report preliminary electricity sales and generation and power plant coal stocks data 15 days after monthly survey responses are due--an improvement of 30 days from the previous schedule. More timely data dissemination is made possible by Internet Data Collection.
The White House and Department request EIA assistance in modeling impacts of alternative policies to encourage development of new nuclear power plants.	EIA provides extensive modeling analysis that provides a basis for policy decisions within the Administration.
Congress seeks unbiased baseline information as it starts to develop energy and environmental legislation.	EIA provides numerous Congressional staff briefings and Committee testimonies. In addition, EIA issues *Analysis of Alternative Mercury Control Strategies*, prepared at the request of Senate Environment and Public Works Committee Chairman James Inhofe.

3rd Q FY 2005

Energy Event	EIA Response
Congress requests further information from EIA as it develops energy legislation.	Responding to Congressional requests, EIA issues three service reports: *Renewable Fuels Legislation Impact Analysis, Impacts of Modeled Recommendations of the National Commission on Energy Policy*, and *Assessment of Selected Energy Efficiency Policies.* Among other EIA Congressional hearing appearances, EIA testifies on the economics of renewable generating technologies before the Ways and Means Subcommittee on Select Revenue Measures, which is considering the future of production tax credits for these technologies.

4th Q FY 2005

Energy Event	EIA Response
Energy legislation is finalized.	EIA provides an analysis of the House-passed energy bill requested by Senate Energy and Natural Resources Committee Chairman Pete Domenici and Ranking Member Jeff Bingaman.
Oil and natural gas prices both rise steadily through August, in advance of hurricanes.	EIA responds to increased inquiries from the media and the Administration seeking data on, and explanations for, the price increases.
Hurricanes Katrina and Rita strike the U.S. Gulf Coast, impacting oil and gas production, refinery operations, and operations at natural gas processing plants.	During September 2005, the EIA Administrator and Deputy Administrator testify six times before House and Senate Committees to address hurricane impacts on the energy sector. EIA's September *Short-term Energy Outlook,* issued at a time when the long-term energy effects of Katrina have not yet been assessed, includes a new feature: the implications of three alternative recovery scenarios for energy markets.

	EIA responds to many data and analyses requests from Congress and the Administration regarding hurricane impacts on markets and prices and presents numerous briefings, including one presentation attended by over 200 House staff. EIA institutes a special Web page, *Hurricane Impacts on Energy Markets*, to synthesize daily reports on production, refinery, and natural gas processing plant outages and place them in historical context. The page is updated daily into November, and weekly through the end of CY 2005.
Natural gas supply is a particular concern given the hurricanes' impact on production in the Gulf of Mexico region.	EIA is able to utilize data from its new monthly survey of natural gas production to develop timely and accurate information on production trends within and beyond the region affected by hurricanes. The new survey accelerates the availability of initial natural gas production estimates by 60 days.
High natural gas and heating oil prices raise concerns over winter heating costs.	EIA develops its *Winter Fuels Outlook*, including more detailed information on projected heating costs by region that is made possible by the introduction of improved regional detail in EIA's short-term forecasting tools earlier in FY 2005.

1st Q FY 2006

Energy Event	EIA Response
Oil and natural gas prices remain elevated. Amidst allegations of price gouging following Hurricanes Katrina and Rita, Senate Majority Leader Bill Frist initiates an investigation.	The *Winter Fuels Outlook* is issued in early October. The EIA Administrator and Deputy Administrator testify 4 times in October/November on various aspects of the winter outlook and energy market impacts of the hurricanes. Several briefings for congressional staff occur as well.

Accomplishments in Energy Data Programs

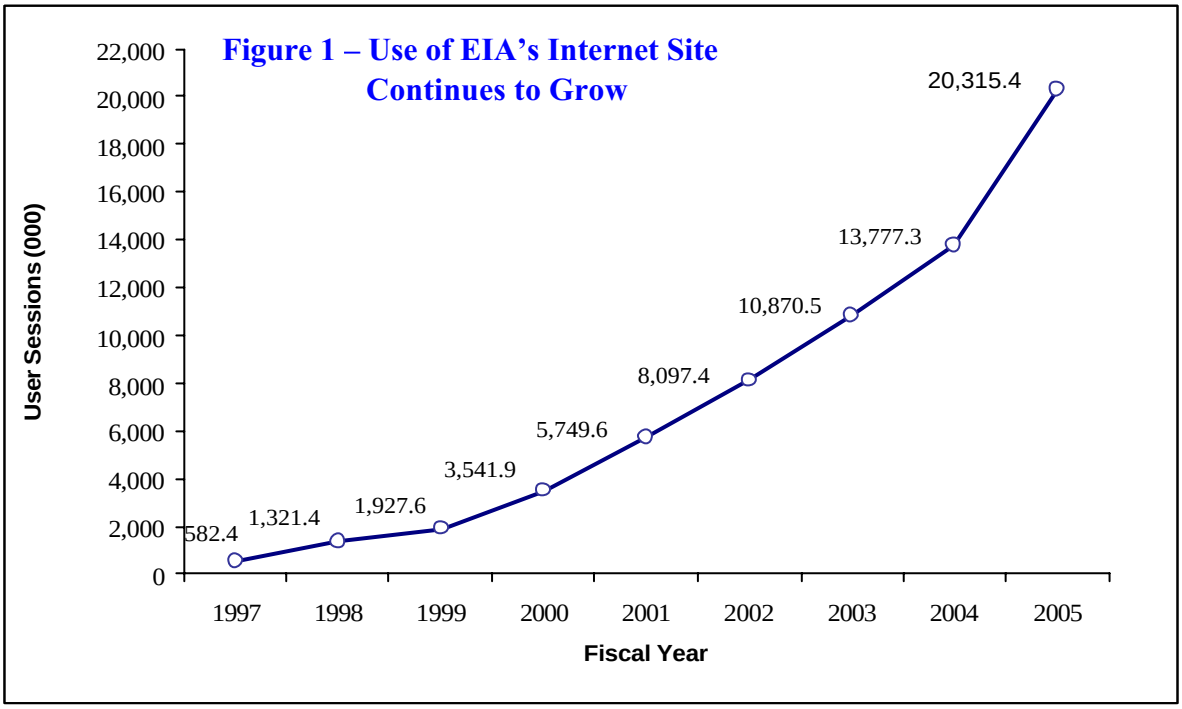
- Data and Information Releases are more timely due to Improvements in Data Collection and Processing.
  - The *Annual Energy Review* was released in August 2005, one month earlier than the previous year's edition, and 3 months earlier than the 2003 release.
  - The *Monthly Energy Review* and the *Electric Power Monthly* are now being released earlier in their monthly schedule.
  - EIA began issuing monthly *Electric Power Flash Estimates*, which report preliminary electricity sales and generation and power plant coal stocks data just 15 days after monthly survey responses are due--30 days earlier than initial data were previously available.
  - EIA developed and introduced a Gatekeeper system to respond to severe Web site congestion during the release of market-sensitive weekly petroleum data. The system allows simultaneous data access to all interested parties.

- New or Updated Surveys Respond to EIA Customer Needs.
  - Beginning in 2005 (pursuant to DOE's Natural Gas Data Initiative), EIA launched its monthly natural gas production survey, which will increase both the timeliness and quality of production data. With excellent respondent cooperation during the first several collection cycles, the survey is on-target to achieve its objectives.
  - EIA successfully updated the weekly and monthly petroleum surveys to reflect major changes in fuel specifications, consistent with regulatory changes at the State and Federal levels. Beginning in January 2005, the new-style data is being disseminated in the *Petroleum Supply Monthly*.

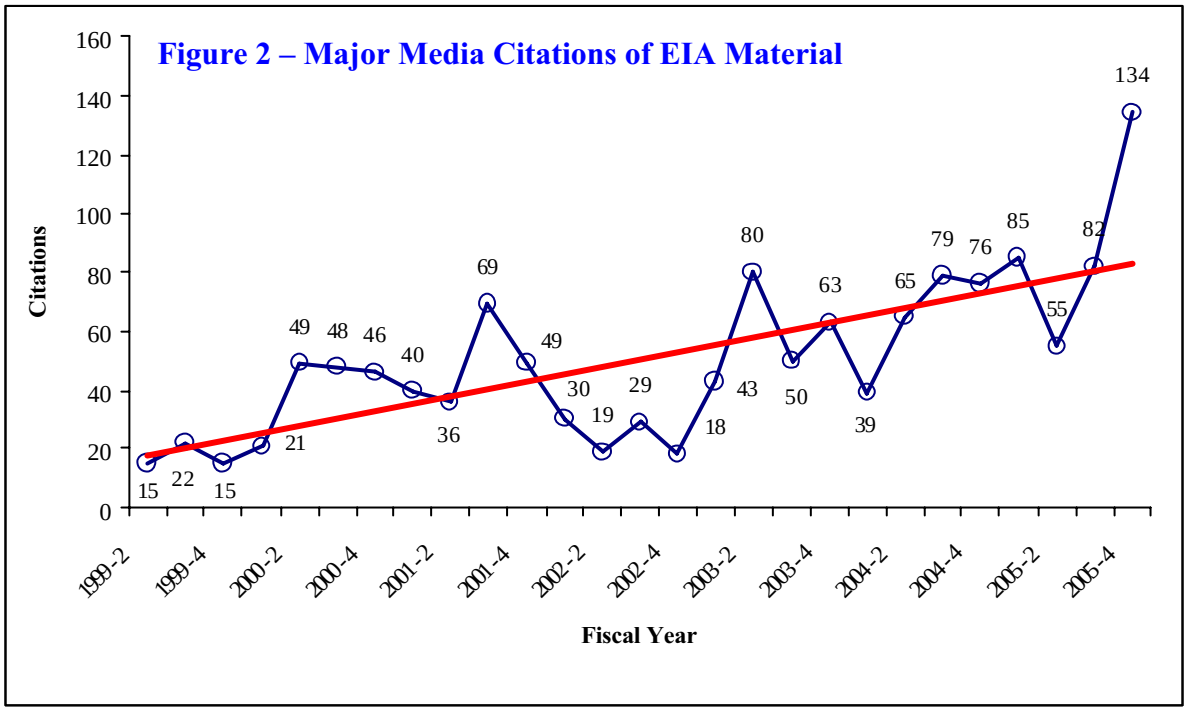
- Expanded Internet Data Collection Improves Timeliness and Data Quality.
  - Internet data collection (IDC) was implemented for 3 of 4 coal surveys in 2004. By 3rd quarter FY 2005, 63 percent of the annual coal survey forms and 96 percent of the quarterly coal surveys were coming in via IDC, compared to 55 percent and 80 percent, respectively, in FY 2004.
  - IDC for the electricity surveys increased substantially. For example, 90 percent of monthly electricity respondents used IDC to report May 2005 data, compared to 54 percent two years earlier. Also, over 80 percent of all annual data filers used the IDC, compared to just 28 percent two years ago.
  - All together, 88 percent (almost 31,000) of all (35,000) coal and electric survey forms used IDC in 2005, compared to just 46 percent two years ago. This has: 1) reduced the resources needed to collect and process the information, as the data is typed into the database by the respondents; 2) increased the accuracy of the data, as built-in edits require the respondents to correct their data before it is submitted; and 3) reduced the amount of time needed to release the information to the public, with the *Electric Power Monthly* now coming out two months earlier and the *Electric Power Annual* about to be released two months ahead of last year's edition.

- Redesigned EIA Web Site Launched after Thanksgiving.
  - EIA's redesigned Web site offers a new look and feel and improves customer's success rate of finding information. The site uses more intuitive topic names and provides new navigation themes on the home page and a standard layout on all second-level pages.

- EIA Web Site Provides More Data and Information to Growing Customer Base.
  - The increased use of electronic technology for energy data dissemination has led to an explosive growth in the number of our data customers and the breadth of their interests, as well as to an increase in the breadth of information distributed.
  - The growth in monthly users of EIA's Internet services is remarkable (see Figure 1). In each of the years since FY 1997, EIA has met or exceeded its goal of increasing the number of monthly users of EIA's Web site by 20 percent annually. In FY 2005, EIA Web site users increased by 47 percent.



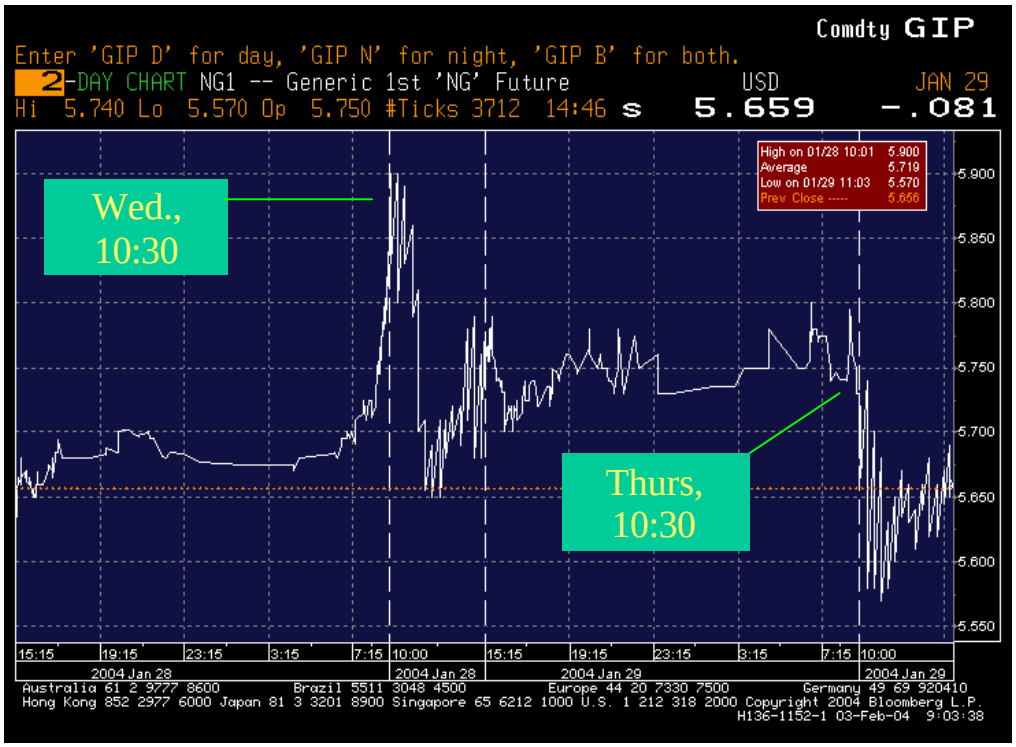
- EIA has increased dramatically the distribution of its information by becoming the dependable source of objective energy information for the major news media, including the *New York Times*, *Washington Post*, *Wall Street Journal*, *USA Today*, and *Los Angeles Times* (see Figure 2). This achievement has enabled our energy data to be seen more widely and used by the general public with minimal cost to the agency.



- EIA's Data Plays a Critical Role in Promoting Efficient Energy Markets.
  - The market depends on EIA natural gas and petroleum data, as no alternative private sources for this data are known. For example, EIA's weekly petroleum inventory and natural gas storage numbers, released each Wednesday and Thursday morning, respectively, have had significant impact on futures' markets. Figures 3 and 4 illustrate these impacts on the natural gas and the crude oil market on January 28 and 29, 2004.

Figure 3: Natural Gas Markets Rely Heavily on EIA Weekly Data

Note the impact on natural gas markets immediately following the release of EIA's Oil and Gas Storage Data.

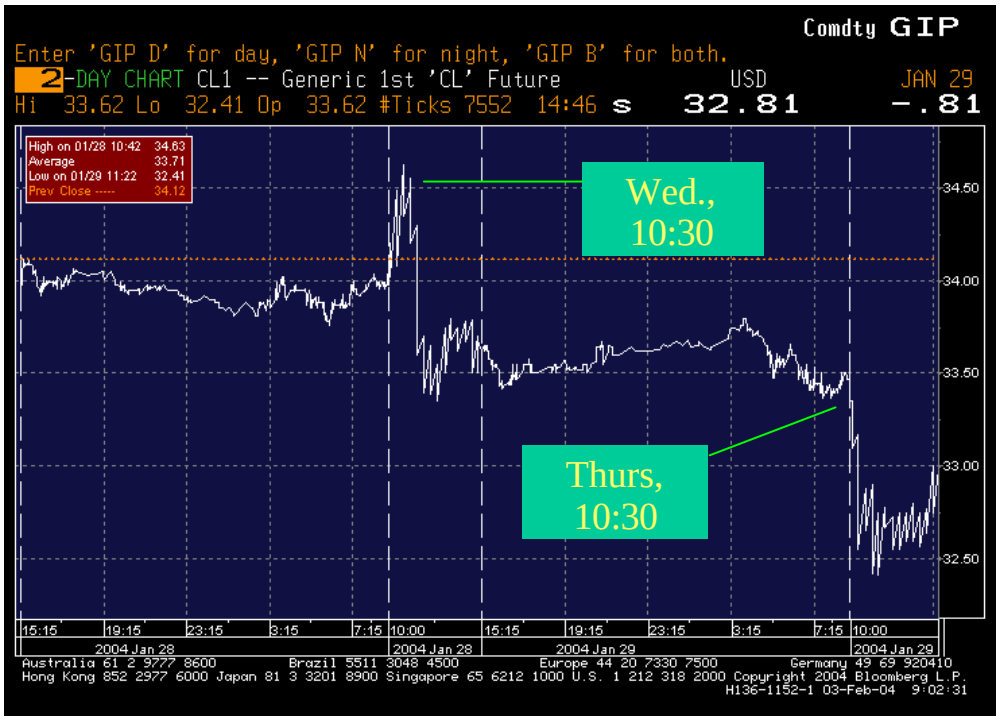


Source: NYMEX Henry Hub Natural Gas Near-Month Futures Contract January 28 (Wed.) and 29 (Thur.), 2004
Bloomberg's data

Figure 4: Oil Markets Rely Heavily on EIA Weekly Data

Note the impact on oil markets immediately following the release of EIA's Oil and Gas Storage Data.

Source: NYMEX Light, Sweet Crude Oil (WTI) Near-Month Futures Contract, January 28 (Wed.) and 29 (Thur.), 2004
Bloomberg's data



- Of interest concerning EIA's weekly reports, the citation in *Natural Gas Intelligence* for November 24, 2004, stated: "A paper circulated earlier this month by Gerald D. Gay [et al] . . . after taking a closer look at the accuracy of the weekly storage predictions of the 34 firms and those in the Bloomberg weekly survey of analysts' predictions . . . analysts providing storage forecasts assisted "significantly in the price discovery" on the natural gas futures market by providing important information . . .We find that analyst forecasts . . . became overall more accurate and less dispersed following the takeover by the [EIA] of responsibility for publishing a key weekly storage report . . ."

- On December 22, 2004, CNN Money reported that "Stocks pulled back off their peak levels of the day but remained in positive territory Wednesday afternoon after oil prices tumbled on an unexpected increase in heating oil inventories. …The U.S. Energy Information Administration reported earlier in the day that fuel inventories rose while analysts had expected stockpiles to drop. Oil prices plunged back below $45 a barrel on the news, with light crude for February [2005] delivery quoted at $44.25 a barrel on the New York Mercantile Exchange."

- In August 2005, EIA's *Short-Term Energy Outlook*, a monthly forecast of national energy demand, supply, and prices that looks out 12 to 24 months, was expanded to include regional forecasts for electricity, natural gas, motor gasoline, heating oil, propane, and macroeconomic activity. The regional forecasts now include prices and demands by Census division (electricity and natural gas), Census region (heating oil and propane), and Petroleum Administration for Defense District (motor gasoline).

Detailed Justification

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Salaries and Benefits	**41,931**	**43,976**	**45,076**

In FY 2007, fund salaries and benefits for 375 Full Time Equivalents (FTEs), including health benefits, overtime, promotions, incentive awards, lump sum leave, and personnel performance awards. This level excludes 1 FTE funded each year by the Nuclear Waste Disposal Fund.

In FY 2007, Federal staff will conduct weekly, monthly, and annual energy data surveys and operate associated data collection and validation systems; disseminate energy data via publications and the Internet; conduct quadrennial surveys of energy use in residences, commercial buildings, and the manufacturing sector, and analyze results on a regional basis; prepare the *Annual Energy Outlook* and the monthly *Short-Term Energy Outlook*; and maintain, update, and operate required energy models.

Federal staff also prepare special modeling analyses requested by the Congress, the Administration, or the Secretary of Energy (e.g., impact assessments of H.R.6 and other energy and climate policy proposals, reports on effects of alternative mercury control strategies and renewable fuels legislation, evaluations of incentives for nuclear energy and the Alaska natural gas pipeline, etc.); provide public and internal analysis and reports (e.g., Energy Situation Analysis Reports) during periods of energy market stress (e.g., Hurricanes Katrina and Rita, Iraq, California, Northeast electrical service blackout, etc.); collect and analyze financial data from major energy companies and data on foreign direct investment; prepare and update Country Analysis Briefs; and operate the National Energy Information Center.

EIA continues to implement its Human Capital Management Plan. EIA has and will continue to reduce skill gaps in mission-critical occupations by replacing vacated industry specialist positions with core-series professional specialists; continue a streamlined hiring process for entry-level and journeyman-level positions; continue the energy industry study program for new recruits; maintain a Succession Plan facilitating continuity of leadership, knowledge transfer, and specific leadership work experiences, and provide rotational opportunities for existing staff to expand their energy experience to more than one fuel area or functional specialty; continue to upgrade the technical expertise of EIA's contracting function; and continue to pursue EIA's formal training/certification of its project managers, IT specialists and technical monitors. For example, over 60 percent of the technical monitors received training in FY 2004. Additional technical monitor training in the development, use and oversight of performance-based contracting procedures was provided in FY 2005.

Travel	**312**	**357**	**370**

Fund travel for EIA personnel to attend training, professional development programs, industry and State conferences; meet with national and international government and energy industry officials; and provide expertise in support of EIA mission.

Support Services	**25,883**	**24,883**	**27,973**

Fund contractual support for EIA's energy data collection, analysis, forecasting activities, and energy information dissemination. Funded work includes survey development and processing, and the automated tools and equipment to collect, store, maintain, protect, and disseminate energy information.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007

- **Oil and Gas** **10,648** **9,957** **11,906**

The Oil and Gas activity designs, develops, operates and maintains oil and gas statistical data collection and dissemination systems and short-term analytical and estimation systems. Activities include the data collection, quality control, processing, and analysis and report preparation activities associated with EIA's oil and gas information products. In addition to their direct use by thousands of customers, these oil and gas data provide essential inputs for EIA's Short-Term Integrated Forecasting System and National Energy Modeling System. Energy information topics cover: petroleum -- focusing on crude oil and refined petroleum product production, supply and price; natural gas -- focusing on natural gas production, storage, consumption and markets; and reserves -- focusing on oil and gas reserves. The company-level data gathered in the oil and gas surveys are edited and aggregated into approximately 60,000 distinct on-line data series, such as weekly natural gas storage levels and retail gasoline prices. The data comprise about a billion characters of information, updated weekly, monthly and annually.

In FY 2007, the Oil and Gas activity will operate 35 petroleum and natural gas surveys, the same number as FY 2006, but 2 fewer than in FY 2005.

The activity supports EIA's International Oil and Gas Markets and Energy Security efforts by resuming the operation of Foreign Energy Supply Assessments Program, which would work in partnership with the U.S. Geological Survey to examine the potential oil and gas supply capabilities of the major hydrocarbon provinces of the world. This effort is critical to support enhanced global dialogue on the development and use of petroleum and natural gas supplies, and to facilitate efficient energy markets.

The activity supports EIA's Energy Data Quality Improvements by reviewing and maintaining the selected petroleum and natural gas survey frames that are reaching the end of their life. This effort is essential to produce accurate statistics, resolve data discrepancies, and keep abreast of changes in the energy industry.

- Conduct Petroleum Surveys and Analyses
  During FY 2007, operate petroleum surveys on weekly, monthly and annual cycles, and process and disseminate the survey data through the Web site and print-on-demand. EIA will strive to maintain the weekly supply data, including the motor gasoline production data, whose customers are policymakers in the Congress, the White House, the Office of the Secretary of Energy, State energy officials, corporate planners, gasoline producers, marketers and gasoline purchasers. For the monthly supply data, continue quality assurance activities to track ultra-low sulphur diesel fuel volumes, locate importers of diesel fuel and analyze major reporting issues for diesel fuel, including downgrading that may occur at various stages in the supply chain. Quality control targets would include maintenance of the total U.S. frame of ethanol producers, ethanol motor gasoline blenders, and importers of special blending components.

  In FY 2007, address deteriorating survey frames by identifying new companies required to report on petroleum surveys, and provide modifications and support to the supply and marketing information database system. Continue data quality projects such as reducing large

unaccounted-for crude oil statistics, missing motor gasoline production, and missing crude and petroleum product imports.

- Conduct Natural Gas Surveys and Analyses
  During FY 2007, operate natural gas surveys on weekly, monthly and annual cycles, and process and disseminate survey data through the Web site and print-on-demand. This program includes the *Weekly Natural Gas Underground Storage Survey*, which is the only weekly gas supply data in the United States and is critical to decisions of supply planners in industry and utilities, as well as to analysts, in assessing the current natural gas supply and demand situation. Continue the current voluntary survey of States to obtain annual data for all States on production and wellhead prices by State.

  In FY 2007, address deteriorating survey frames by identifying new companies required to report on natural gas surveys, provide modifications and support to the information processing system, and continue data quality projects so that surveys reflect changing natural gas markets.

  Due to the growing importance of natural gas, EIA will focus on providing more timely and accurate gas production data. EIA's goal is to publish production data for the United States and leading States or regions approximately 60 days after the producing month, which would significantly improve the current 120-day lead time.

- Conduct Reserves Surveys and Analyses
  During FY 2007, activities include operating the *Annual Survey of Domestic Oil and Gas Reserves* and operating the *Annual Report of the Origin of Natural Gas Liquids Production.* Analytical activities include the operations and maintenance of systems to estimate and forecast natural gas production and productive capacity, and systems to estimate and forecast crude oil production for use in the *Short-Term Energy Outlook*. In FY 2007, make improvements to the survey frames and operations to reduce errors and increase weighted response rates.

  During FY 2007, continue data collection grants to States through the State Heating Oil and Propane Program (SHOPP) to collect heating oil and propane (winter fuels) prices at the State level on a weekly basis. These price data are used in the Department of Health and Human Services Low-Income Home Energy Assistance Program (LIHEAP) to fund heating cost assistance.

- Resume Operating the Foreign Energy Supply Assessment Program (FESAP)
  Operating the FESAP will improve knowledge of the potential oil and natural gas supply capabilities of the major hydrocarbon provinces of the world. Typically, EIA determines or estimates the oil and gas reserves for the known fields in a province. Then, the U.S. Geologic Survey uses this information, combined with its knowledge of the geology, to estimate volumes of undiscovered resources. FESAP used both the reserves and undiscovered resources to construct possible long-term production capacity scenarios from various hydrocarbon provinces. Saudi Arabia would be a good initial choice to revisit due to the

attention it is currently receiving, and the fact that EIA released the last FESAP study on Saudi Arabia in 1983. Canada would also be a good choice for an early study as there are 2.6 trillion barrels of heavy oil and bitumen in-place in Canada.

FESAP supports the Secretary's goal of enhanced global dialogue on development and use of oil and gas resources (as well as the DOE Strategic Plan) by providing the Department, Administration, and the Congress improved global data and modeling capabilities.

- Energy Data Quality Improvements
  During FY 2007, EIA will analyze the statistical design of selected petroleum and natural gas surveys, and review and maintain the survey frames that are reaching the end of their life-cycle. This effort is essential for selecting statistical samples and methodology that produce accurate statistics in the most cost effective manner, and is needed to resolve data discrepancies, keep abreast of changes in the energy industry, and maintain data relevancy. In addition, EIA will be expanding the use of advanced data quality checks in these data collection systems, requiring respondents to resolve apparent discrepancies in their proposed data submissions before they are transmitted to EIA. This approach reduces the time and expense of post-submission data cleaning, yielding both cost reduction and quality improvement once the investment is made.

  These efforts will deliver improved data on U.S. crude and refined product supply, demand, and inventories, which have a major influence on oil markets and prices. These data help shape U.S. energy and associated environmental policy as well as assist policymakers to cope with a variety of geopolitical crises that affects oil supplies. Major oil companies and analysts from key producing countries, inside and outside the Organization of Petroleum Exporting Countries, consult the data when making their own supply and demand forecasts.

- **Coal, Nuclear, Electric and Alternate Fuels** **3,735** **3,557** **3,055**

The Coal, Nuclear, Electric, and Alternate Fuels activity includes the design, development, and maintenance of fuel-specific statistical and short-term analytical and forecasting information systems. It also funds contracts for statistical services in support of collection, processing, and dissemination of selected high priority weekly, monthly, quarterly, and annual data on reserves; supply, disposition, and prices for coal, nuclear, and electric power; and support for short-term forecasting systems.

- Conduct Electric Power Surveys
  In FY 2007, operate electric power data collection surveys, such as the *Monthly Cost and Quality of Fuels for Electric Plants*, EIA-423, which collects monthly data from about 750 fossil-fuel generators with a nameplate capacity of 50 megawatts or greater that are not regulated by the Federal Energy Regulatory Commission (FERC); the *Annual Electric Generator Report*, EIA-860, which collects data from 850 regulated and 1,800 unregulated companies that operate facilities with nameplate capacities of 1 megawatt or greater; and the *Annual Electric Power Industry Report*, Form EIA-861, which collects data from approximately 3,300 regulated entities in the United States and its territories that are involved

in the generation, transmission, and distribution of electricity. Since the restructuring and deregulation activities in the electric power industry, operation of the electric power surveys requires collection and processing of a large volume of additional data, particularly from non-utility facilities.

Discontinue the EIA-767, *Steam-Electric Plant Operation and Design Report*, that collects information annually on design parameters and annual operations data on steam-electric plant boilers, generators, and cooling systems. Some of the data series could potentially be incorporated in other electric power surveys in the future.

- Conduct Coal Surveys
  Operate coal data collection surveys, and, through an interagency agreement, validate data collected by the Mine Safety and Health Administration on its quarterly production form. The quarterly surveys cover manufacturing plants and coke plants on their coal receipts, consumption, stocks, and prices. The annual surveys of coal producers/preparation plants and coal distributors collect data on coal reserves, coal bed statistics, production capacity, sales and revenue, and coal distribution by State-of-origin to State-of-destination, including transportation mode. These data are used to estimate weekly coal production by State and develop short-term and long-term forecasts of coal supply and demand, providing a timely, reliable source of information on market trends for the industry for strategic planning and market analysis and to support rational spot markets and futures markets.

- Conduct Renewable and Alternate Fuel Surveys
  Process annual surveys of manufacturers of solar thermal collectors, photovoltaic cells, and geothermal heat pump equipment. Together with data from the electric power industry, this information is used by policy makers in evaluating legislative proposals for incentives for renewable energy and for planning by the renewable industry. The annual alternative fuel survey gathers data from: (1) Federal, State and fuel provider fleets on their alternative transportation fuel vehicles and the amount of fuel consumed, and (2) auto manufacturers on the number of alternative transportation fueled vehicles that have been made available each year.

- Conduct Uranium Surveys
  Process an annual survey of the uranium producers, marketers, and nuclear plant operators and a quarterly survey of uranium producers, in compliance with Section 1015 of the *Energy Policy Act of 1992*. The data are used together with information on nuclear capacity and generation collected from the electric power industry to develop short-term forecasts of nuclear generation. These forecasts are the basis for fee adequacy studies for the nuclear waste fund and are used to develop long-term forecasts of nuclear fuel cycle requirements and spent fuel discharges.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007

- **Energy Markets and End Use**..... **4,204** **4,508** **4,923**

The Energy Markets and End Use activity includes the design, development, and maintenance of energy statistical and short-term forecasting information systems. This activity conducts surveys on energy consumption and the financial condition of major energy companies, and performs data integration functions to provide comprehensive databases used extensively by EIA's customer base.

- EIA Periodic Analysis Products

  Continue to conduct energy contingency analysis and produce the *Country Analysis Briefs* and the *Energy Situation Analysis Report*--the latter as needed to cover energy emergency activities. Produce monthly updates of the *Short-Term Energy Outlook*, produce the *Summer Motor Gasoline Outlook* and the *Winter Heating Fuels Outlook* annually, validate and analyze the data and produce *Performance Profiles of Major Energy Producers*, and the annual report on *Foreign Direct Investment in U.S. Energy*. Produce the *Annual Energy Review* and the *Monthly Energy Review*.

  In FY 2007, EIA's *Short-Term Energy Outlook* will begin using a forecasting model with increased regional detail, replacing an earlier model that was purely national in scope, and as such missed regional variation in supply, demand and price for natural gas, gasoline, electricity, heating oil, etc. The regional model allows EIA customers to better understand the Nation's complex energy system and helps industry and policymakers better respond to geographic differences in weather, supply disruptions, policies and regulations.

- Conduct Consumption Surveys

  The FY 2007 budget funds three Energy Consumption Surveys on a quadrennial basis. The surveys include field data collection costs and survey processing of the Buildings Survey data and initial data collection and processing of the Energy Supplier Survey portion.

  The *Manufacturing Energy Consumption Survey* (MECS) is the Nation's definitive national survey of manufacturing energy use. This survey, now conducted every 4 years, provides authoritative information, available nowhere else, on energy throughput along with economic and operational characteristics of manufacturers. Linked with production and employment data from Census Bureau economic surveys, the MECS provides consumption information for policy development, market assessment, and public understanding. The MECS provides the ability to assess fuel switching capability and the effects of energy price changes on industry, and provides critical inputs to short and longer-term forecasting activities.

  The *Residential Energy Consumption Survey* (RECS) is the Nation's definitive national survey of household energy use, now conducted every 4 years. This survey, which had its survey frame redesigned in FY 2005, provides authoritative information, available nowhere else, on structural, equipment, and operational characteristics of housing units, along with energy consumption and expenditures. The RECS provides baseline information crucial to understanding societal demand for and use of goods and services. The RECS survey provides critical contributions to EIA's integrated energy statistics and forecasting programs and is

used by other agencies such as EPA and the HHS Low-Income Home Energy Assistance Program.

The redesigned *Commercial Buildings Energy Consumption Survey* (CBECS) is the Nation's definitive, national survey of commercial building energy use in conjunction with characteristics of buildings and their occupants. The CBECS, which receives some co-funding from States and the DOE Office of Energy Efficiency and Renewable Energy (EERE) programs, provides an understanding of factors driving energy use in the commercial sector, which accounts for one-third of the Nation's electricity use, and provides the information necessary for increased energy efficiency in this sector.

This survey, now conducted every 4 years, provides the only national information system regarding characteristics of the United States' commercial building stock. EIA's National Energy Modeling System uses CBECS data for its commercial sector inputs. The Department's EERE programs and Office of Policy and International Affairs use the commercial database for energy efficiency program and policy analysis. The building trades use the national information base for marketing analysis, and the energy research community uses the information base for commercial energy trend assessment. EPA uses the data for assessment of commercial environmental impact analysis.

	FY 2005	FY 2006	FY 2007
▪ **Integrated Analysis and Forecasting**	**2,753**	**2,599**	**3,766**

The Integrated Analysis and Forecasting activity includes the development of forward-looking analyses and forecasts for alternative energy futures for the United States. This activity involves the development and maintenance of the National Energy Modeling System (NEMS) and other modeling systems needed to analyze the interactions of demand, conversion, and supply for all energy sources and their economic and environmental impacts. The statistical services contracts assist in maintaining selected, highest priority mid-term macroeconomic, international, demand, supply, conversion, and integrating components of the NEMS, and in producing the *Annual Energy Outlook*, the *International Energy Outlook*, and the greenhouse gas reporting system.

In FY 2007, the activity begins work on redesigning and scoping the requirements for a next-generation energy model to replace the current NEMS, which was developed in the early 1990s and has exceeded its expected lifecycle.

In addition, this activity supports EIA's International Oil and Gas Markets and Energy Security efforts by assessing the global market for liquefied natural gas (LNG) and its interaction with oil markets, which is key to meeting U.S. future energy needs. This effort is critical to support an enhanced global dialogue on the development and use of petroleum and natural gas supplies, and to facilitate efficient energy markets. This activity also will enhance EIA's existing LNG modeling capabilities that could also be carried forward into a next-generation U.S. energy model.

- Modeling, Forecasting, and Analysis of U.S. Energy Markets
  Maintain and operate--at a slightly-reduced level--the current NEMS, which consists of 12

inter-related energy modules that address future energy demand for the residential, commercial, industrial, and transportation sectors, and future supply of petroleum, natural gas, coal, and renewables. NEMS is the U.S. Government's integrated mid-term energy model, used in preparing the *Annual Energy Outlook*, feature articles on significant topics in mid-term energy markets, and special reports requested by the Congress, the Administration, the Department of Energy, and other Government agencies.

- Modeling, Forecasting, and Analysis of International Energy Markets

  In FY 2007, continue the *International Energy Outlook* (IEO), which is the U.S. Government's publication on mid-term forecasts of world energy markets that is used to answer questions concerning significant issues affecting world energy markets.

  In support of EIA's International Oil and Gas Markets and Energy Security efforts, build a global liquefied natural gas model to enhance EIA's existing LNG modeling capabilities that could also be carried forward into a next generation U.S. energy model. U.S. dependence on LNG is forecast to grow from 3 percent in 2004 to 20 percent in 2030. The model would reflect global competition for stranded natural gas resources that can be used as a source of LNG supply or as feedstock in a gas-to-liquids plant. These improvements are essential to assessing the role of LNG in the U.S. energy market, as EIA's existing LNG model is no longer reliable given fundamental changes in technologies and world energy market conditions.

  This activity supports the Department's effort to enhance the global dialogue on the development and use of energy resources. It contributes to the DOE Strategic Plan by enabling the Department to do a better job in delivering data and analysis needed for understanding energy markets, developing sound policy, and promoting efficient energy markets.

- Voluntary Reporting of Greenhouse Gases Reductions Program

  In FY 2007, EIA will begin collecting and disseminating information under the enhanced Voluntary Reporting of Greenhouse Gases Program in support of the President's Climate Change Initiative. The Program is required under Section 1605(b) of the *Energy Policy Act of 1992*. The Program allows reporting entities to identify and claim emissions reduction activities they have taken; provides a means for entities to identify and replicate emission reduction activities that they may utilize; and provides estimates of voluntary greenhouse gas emissions reductions and other information to the Administration, Congress, and public for policy making purposes.

  The enhanced Program will use the revised guidelines authorized in Section 1605(b) of the *Energy Policy Act of 1992*, for which an Interim Final Rule has recently been developed. In FY 2007, EIA will not publish a complete Inventory of Greenhouse Gas Emissions as it had previously. However, EIA will continue to publish an executive summary of greenhouse gas emissions, which is distributed to the Congress and the public, and provided to the Environmental Protection Agency with estimates of energy-related carbon dioxide emissions.

- U.S. National Energy Model Replacement

  During FY 2007, EIA will begin scoping the requirements of a next-generation National Energy Model System. The current system was developed in the early 1990s and has already exceeded its expected lifecycle. A reliable and maintainable mid-term energy model is needed for EIA to develop baseline energy projections and execute policy analyses requested by the Congress and the Administration. The redesign will likely focus on: (1) improving the representation of energy markets with added flexibility to address new policies and technologies; (2) changing the mathematical representation to allow the use of advanced solution methods, resulting in improved accuracy, stable solutions, and reduced time for model simulations; (3) using modern programming tools, more flexible and powerful than the FORTRAN code used in NEMS, to reduce maintenance and training costs; (4) improving the modeling of the supply of unconventional natural gas, which is becoming an increasingly important component of natural gas supply, affecting both overall deliverability and price; and (5) adding the representation of hydrogen production and distribution to address the Administration's desire to reduce dependence on foreign oil and to decrease emissions of greenhouse gases.

  This effort supports the DOE Strategic Plan by enabling the Department to do a better job in delivering accurate, high quality analysis needed for policy development, efficient energy markets, and promoting a sound global dialogue on energy use.

- **Information Technology** **3,264** **2,942** **2,966**

The Office of Information Technology (OIT) provides EIA-wide desktop, hardware, software, database, network, and other IT support, consistent with EIA's mission requirements as a statistical agency that is statutorily charged with data confidentiality requirements and a significant degree of independence from DOE. By law EIA procures and controls access to its IT infrastructure equipment. However, to seek efficiencies, the Department mandated the use of its IT umbrella contract for EIA's IT infrastructure support starting in FY 2004. EIA continues to use its EOP II multi-award contract for survey data collection and processing applications development and other IT programmatic services.

In FY 2007, EIA will continue to operate and maintain the EIA network consisting of an enterprise server; four Web servers; over 50 production servers; all network communication equipment including hubs, routers, switches, and cables; and peripheral equipment including a storage device for the enterprise server, high speed printers, and robotic tape backup machines. Maintain communication equipment to connect the network with remote sites in Silver Spring, Maryland, and Dallas, Texas, and with individual users.

The FY 2007 Information Technology request continues to support Internet data collection. This project eliminates the paper-based data collection instruments and replaces them with an interactive Internet-based energy data collection system to increase the accuracy and improve timeliness of all energy data collected by EIA.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007

- **National Energy Information Center** **541** **520** **441**

  The National Energy Information Center (NEIC) is the worldwide point of contact for energy information for the Administration, the Congress, State and local government agencies, the academic community, industrial and commercial organizations, foreign governments and international organizations, the news media, the financial community, research and consulting organizations, and the general public.

  Fund contracts for information services to respond to public inquiries, and disseminate EIA products and energy information. For FY 2007, NEIC will respond to approximately 30,000 requests for: 1) EIA data, analyses, and forecasts--most significantly from Executive Branch agencies, Members of Congress and associated staffs, and print and broadcast journalists from major media outlets across the Nation and around the world; 2) extensive EIA Web site support; and 3) referrals to energy information elsewhere in the national and international statistical system. EIA will distribute periodicals; one-time reports; consumer-oriented brochures, flyers, and info cards; and will continue to offer its customers print-on-demand service. NEIC will design and manage 10 Web site channels, including the increasingly popular Energy Kid's Page, and conduct two customer surveys and two Web site usability tests. It also will conduct the Energy Industry Study Program and orientation sessions for all new employees.

- **Statistics and Methods** **404** **432** **481**

  The Statistics and Methods activity provides services in the areas of data quality evaluation; performance measurement; survey and statistical design; development and coordination of definitions and standards governing collection, processing, documentation, and dissemination of energy information; and management of a respondent burden control and public-use forms clearance program.

  In FY 2007, EIA will provide workshops for improving knowledge and skills of EIA staff, statistical services in support of quality assurance, improvement of statistical procedures used within EIA survey systems, and development-oversight of performance measures of EIA's operations and products.

- **Resource Management** **334** **368** **435**

  The Resource Management activity includes overall management and administrative support to EIA, including program and strategic planning, financial management, contracts management, human resource management, resource and workforce analyses, administrative support, logistic support services, and performance statistics support.

  For FY 2007, EIA will: (1) continue to implement processes to improve the efficiency and the timeliness of EIA's human resource, contracting and financial analysis; (2) implement interfaces with Departmental information systems to reduce or eliminate error-prone data entry and processing steps; (3) consolidate contract requirements, where possible, into less costly support services contracts employing the most cost-efficient pricing formula; and (4) continue EIA's support for the President's Management Agenda.

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Other Related Expenses	**15,693**	**16,098**	**16,350**

Other related expenses include goods and services provided through the DOE Working Capital Fund for operations such as building occupancy, utilities, supplies and materials, phone service, copying, mail supplies, procurement management, and payroll processing. This activity also covers employee training tuition; non-Working Capital Fund overhead expenses such as the Dallas Field Office; communications equipment; personal computers; supplies, materials, and services purchased directly by EIA; the Department's required set-aside to cover prior year obligations; and funding for Historical Black Colleges and Universities, Hispanic Serving Institutions, Tribal Colleges and Universities, and commemorative programs.

Total, Program Direction	**83,819**	**85,314**	**89,769**

Explanation of Funding Changes

	FY 2007 vs. FY 2006 ($000)
Salaries and Benefits	
Increase is due to 6 FTEs associated with activities related to the next generation National Energy Model and general pay increases, promotions, and within-grade increases.	+1,100
Travel	
Increase is due to higher cost of transportation, lodging, and meals.	+13
Support Services	
Net increase is due to additional contractual support for EIA's International Oil and Gas Markets and Energy Security, Energy Data Quality Improvements, and U.S. Energy Model Replacement activities, offset by savings from discontinuing the EIA-767, *Steam-Electric Plant Report*.	+3,090
Other Related Expenses	
Net increase is the result of inflationary increase in Working Capital Fund assessments and overhead costs including building occupancy, phone service, IT project management training, and new E-Government assessments, offset by reductions in Supplies and Materials.	+252
Total Funding Change, Program Direction	**+4,455**

Other Related Expenses by Category

(dollars in thousands)

	FY 2005	FY 2006	FY 2007	$ Change	% Change
Other Related Expenses					
Purchases of Goods and Services from Government Accounts[a]	8,322	7,977	8,256	+279	+3.5%
Training	228	230	250	+20	+8.7%
Operation of GOCOs[b]	154	180	180	+0	+0.0%
Supplies and Materials[c]	6,673	7,373	7,326	-47	-0.6%
Grants, Subsidies, and Contributions	316	338	338	+0	+0.0%
Total, Other Related Expenses	15,693	16,098	16,350	+252	+1.6%

[a] Includes Working Capital Fund and Interagency Agreements.
[b] Includes contractual services performed by the National Laboratories.
[c] Includes Dallas Field Office, equipment, supplies, and services.