DOE/CF-020
Volume 7

Department of Energy

FY 2008 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
Clean Coal Technology
Ultra-Deepwater Unconventional Natural Gas
Energy Information Administration

February 2007

Volume 7

Office of Chief Financial Officer

DOE/CF-020
Volume 7

Department of Energy

FY 2008 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
Clean Coal Technology
Ultra-Deepwater Unconventional Natural Gas
Energy Information Administration

February 2007

Volume 7

Office of Chief Financial Officer

Printed with soy ink on recycled paper

Fossil Energy Research and Development

[redacted]

Naval Petroleum & Oil Shale Reserves

[redacted]

Elk Hills School Lands Fund

[redacted]

Strategic Petroleum Reserve

[redacted]

Clean Coal Technology

[redacted]

Ultra-Deepwater Unconventional Natural Gas

[redacted]

Energy Information Administration

[redacted]

Fossil Energy Research and Development

Naval Petroleum & Oil Shale Reserves

Elk Hills School Lands Fund

Strategic Petroleum Reserve

Clean Coal Technology

Ultra-Deepwater Unconventional Natural Gas

Energy Information Administration

Volume 7

Table of Contents

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

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

	FY 2006 Current Approp.	FY 2007 Cong. Request	FY 2007 CR Rate	FY 2008 Cong. Request	FY 2008 Request vs. FY 2007 Request $	FY 2008 Request vs. FY 2007 Request %
Discretionary Summary By Appropriation						
Energy And Water Development, And Related Agencies Appropriation Summary:						
Energy Programs						
Energy supply and Conservation	1,812,397	1,923,361	1,817,487	2,187,943	+264,582	+13.8%
Fossil energy programs						
Clean coal technology	-20,000	——	-5,000	-58,000	-58,000	N/A
Fossil energy research and development	580,669	469,686	558,204	566,801	+97,115	+20.7%
Naval petroleum and oil shale reserves	21,285	18,810	18,275	17,301	-1,509	-8.0%
Elk Hills school lands fund	83,520	——	2,000	——	——	——
Strategic petroleum reserve	207,340	155,430	155,430	331,609	+176,179	+113.3%
Northeast home heating oil reserve	——	4,950	4,950	5,325	+375	+7.6%
Strategic petroleum account	-43,000	——	——	——	——	——
Total, Fossil energy programs	829,814	648,876	733,859	863,036	+214,160	+33.0%
Uranium enrichment D&D fund	556,606	579,368	556,525	573,509	-5,859	-1.0%
Energy information administration	85,314	89,769	85,185	105,095	+15,326	+17.1%
Non-Defense environmental cleanup	349,687	310,358	309,946	180,937	-129,421	-41.7%
Uranium Sales and Remediation	——	——	——	——	——	——
Science	3,632,044	4,101,710	3,605,000	4,397,876	+296,166	+7.2%
Nuclear waste disposal	148,500	156,420	141,511	202,454	+46,034	+29.4%
Departmental administration	120,595	128,825	102,582	148,548	+19,723	+15.3%
Inspector general	41,580	45,507	41,784	47,732	+2,225	+4.9%
Innovative Technology Loan Guarantee Program	——	——	——	8,390	+8,390	N/A
Total, Energy Programs	7,576,537	7,984,194	7,393,879	8,715,520	+731,326	+9.2%
Atomic Energy Defense Activities						
National nuclear security administration:						
Weapons activities	6,355,297	6,407,889	6,412,001	6,511,312	+103,423	+1.6%
Defense nuclear nonproliferation	1,619,179	1,726,213	1,620,901	1,672,646	-53,567	-3.1%
Naval reactors	781,605	795,133	780,343	808,219	+13,086	+1.6%
Office of the administrator	354,223	386,576	341,991	394,656	+8,080	+2.1%
Total, National nuclear security administration	9,110,304	9,315,811	9,155,236	9,386,833	+71,022	+0.8%
Environmental and other defense activities:						
Defense environmental cleanup	6,129,729	5,390,312	5,551,812	5,363,905	-26,407	-0.5%
Other defense activities	635,578	717,788	638,129	763,974	+46,186	+6.4%
Defense nuclear waste disposal	346,500	388,080	346,163	292,046	-96,034	-24.7%
Total, Environmental & other defense activities	7,111,807	6,496,180	6,536,104	6,419,925	-76,255	-1.2%
Cerro grande fire activities	742	——	——	——	——	——
Total, Atomic Energy Defense Activities	16,222,853	15,811,991	15,691,340	15,806,758	-5,233	-0.0%
Power marketing administrations:						
Southeastern power administration	5,544	5,723	5,544	6,463	+740	+12.9%
Southwestern power administration	29,864	31,539	29,864	30,442	-1,097	-3.5%
Western area power administration	231,652	212,213	212,213	201,030	-11,183	-5.3%
Falcon & Amistad operating & maintenance fund	2,665	2,500	2,500	2,500	——	——
Colorado River Basins	——	-23,000	——	-23,000	——	——
Total, Power marketing administrations	269,725	228,975	250,121	217,435	-11,540	-5.0%
Federal energy regulatory commission	——	——	——	——	——	——
Subtotal, Energy And Water Development and Related Agencies	24,069,115	24,025,160	23,335,340	24,739,713	+714,553	+3.0%
Uranium enrichment D&D fund discretionary payments	-446,490	-452,000	——	-463,000	-11,000	-2.4%
Excess fees and recoveries, FERC	-50,015	-19,221	——	-17,462	+1,759	+9.2%
Total, Discretionary Funding	**23,572,610**	**23,553,939**	**23,335,340**	**24,259,251**	**+705,312**	**+3.0%**

Strategic Performance Overview

The Overviews in these budget requests will describe, Mission, Benefits, Strategic Themes, and Funding by Strategic 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, the Overviews will address R&D Investment Criteria, and Program Assessment Rating Tool (PART).

Strategic Context

Following publication of the Administration's National Energy Policy, the Department developed a Strategic Plan that defines its mission, five strategic themes for accomplishing that mission, and 16 strategic goals to support the strategic goals. Each appropriation has developed quantifiable goals to support the strategic goals. Thus, the "performance cascade" is the following:

Department Mission → Strategic Theme → Strategic Goal → GPRA Unit Program Goal (GPRA Unit) → Annual Targets → Milestones

The performance 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).

To provide a concrete link between budget, performance, and reporting, the Department developed a "GPRA[1] 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.[2]

R&D Investment Criteria

Another important component of our strategic planning – and the President's Management Agenda – is 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

[1] Government Performance and Results Act of 1993

[2]The numbering scheme uses the following numbering convention: x.x.xx.xx. The first position identifies the Strategic Theme (01 through 05); the second position identifies the Strategic Goal; the third position identifies the GPRA Unit Program; the fourth position is reserved for future use.

appropriateness and need for Federal assistance; relevance to the industry and the marketplace; identification of a transition point 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.

OMB-OSTP on-going guidance describes the R&D investment criteria fully and identifies steps agencies should take to fulfill them. Where appropriate throughout these justification materials, especially in the Explanation of Funding Changes subheadings, specific R&D investment criteria and requirements are cited to explain the Department's allocation of resources.

Fossil Energy Research and Development

Fossil Energy Research and Development

Table of Contents

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, 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), $566,801,000 to remain available until expended of which $108,000,000 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 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, $73,000,000 (of which $58,000,000 shall be derived by transfer from "Clean Coal Technology") is available, after coordination with the private sector, for a request for proposals for 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 if a Clean Coal Power Initiative application selected after enactment of this legislation for negotiation under this or any other Act in any fiscal year is not awarded within two years from the date the application was selected, negotiations shall cease and the federal funds committed to the application shall be retained by the Department for future coal-related research, development and demonstration projects, except that the time limit may be extended at the Secretary's discretion for matters outside the control of the applicant, or if the Secretary determines that extension of the time limit is in the public interest: Provided further, That the Secretary may not delegate this responsibility for applications greater than $10,000,000: Provided further, That financial assistance for costs in excess of those estimated as of the date of award of original Clean Coal Power Initiative financial assistance may not be provided in excess of the proportion of costs borne by the Government in the original agreement and shall be limited to 25 percent of the original financial assistance: 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.

Fossil Energy Research and Development
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2007 CR	FY 2008 Request
Fossil Energy Research and Development				
Coal	366,762	330,119	352,572	426,602
Natural Gas Technologies	31,801	0	30,571	0
Petroleum - Oil Technology	30,805	0	29,613	0
Program Direction	105,872	129,196	101,776	129,973
Plant and Capital Equipment	19,800	0	19,034	0
Fossil Energy Environmental Restoration	9,504	9,715	9,136	9,570
Import/Export Authorization	1,781	0	1,712	0
Advanced Metallurgical Research	7,920	0	7,614	0
Special Recruitment Programs	649	656	624	656
Cooperative Research and Development	5,775	0	5,552	0
Total, Fossil Energy Research and Development	580,669	469,686	558,204	566,801
Clean Coal Technology				
Deferral of Unobligated Balances, FY 2005	257,000	0	0	0
Deferral of Unobligated Balances, FY 2007	-257,000	257,000	257,000	0
Deferral of Unobligated Balances, FY 2008	0	0	-257,000	257,000
Rescission Request	0	-203,000	0	0
Appropriation	0	0	15,000	0
Rescission Uncommitted Balances	-20,000	0	-20,000	-149,000
Transfer to Fossil Energy R&D (FutureGen)	0	-54,000	0	-108,000
Transfer to Fossil Energy R&D (Clean Coal Power Initiative)	0	0	0	-58,000
Total, Clean Coal Technology	-20,000	0	-5,000	-58,000
Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund				
Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	50,000	0	50,000

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2007 CR	FY 2008 Request
Receipts Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	-50,000	0	-50,000
Repeal Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	-50,000	0	-50,000
Repeal Receipts Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	50,000	0	50,000
Total, Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	0	0	0
Strategic Petroleum Reserve	207,340	155,430	155,430	331,609
Strategic Petroleum Account	-43,000	0	0	0
Northeast Home Heating Oil Reserve	0	4,950	4,950	5,325
Naval Petroleum & Oil Shale Reserves	21,285	18,810	18,275	17,301
Elk Hills School Lands Funds	83,520	0	2,000	0
Total, Fossil Energy	829,814	648,876	733,859	863,036

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 (FER&D) 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 through sequestration.

Within the Energy and Water Development Appropriation, Fossil Energy Research and Development has ten programs: Coal, Natural Gas Technologies, Petroleum - Oil Technology, 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. Consistent with the FY 2006 and FY 2007 Budgets, the Natural Gas Technologies and Oil Technology programs are being terminated in FY 2008. The Energy Policy Act of 2005 (Public Law 109-58) created a mandatory Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research program. Consistent with the FY 2007 Budget, the Budget proposes to cancel the program through a future legislative proposal.

Mission

The mission of the FER&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 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 impacts 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 2006 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 GDP growth of 3.0 percent annually between 2003 and 2030
- World oil price reaching about $50 (2004 dollars) in 2030
- Price per thousand cubic feet of natural gas delivered to all users of $ 8.22/mcf in 2030

EIA also provides projections under alternative economic assumptions from 2.4 to 3.5 percent annual GDP growth between 2004 and 2030. Across this range, total energy consumption may grow by anywhere from 22 to 47 percent between 2004 and 2030. 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 from 2008 through 2030 due to lower costs for all energy consumption, ranging from $31 to $238 billion dollars (2004 dollars, discounted at 3 percent, consistent with National Research Council guidelines). These are gross estimates – costs to achieve them are not included. The ranges are based on outputs from alternative scenarios, including one with higher (compared to the AEO Reference Case) oil and gas prices, and one with a carbon emission constraint. In the high fuel price scenario, the 2030 world oil price is $90/barrel and the average price for natural gas delivered to all users is $13.26/mcf.

Documentation of the 2006 FE benefits results, methodology, and assumptions is expected to be completed by March 31, 2007, and will be provided at www.netl.doe.gov. Benefits stated above from advanced technology deployment beyond 2030 are not considered, since the 2006 NEMS is limited to a 2030 time frame.

Other types of benefits may also occur from deploying advanced technology. Reduced environmental impacts are not counted in benefits estimates if reductions respond to assumed regulations, since the reductions would occur in the absence of advanced technology. However, cost savings due to emission reductions from advanced technologies are considered an economic benefit. In addition, there may be economic benefits from longer-term activities such as those from the hydrogen, and portions of the carbon sequestration program 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. Currently, benefits estimates assume that R&D goals are met. 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 work on prospective benefits of Government-supported energy R&D.

Strategic Themes and Goals and GPRA Unit Program Goals

The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, environmental, and management aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Fossil Energy Research and Development appropriation supports the following goals:

Strategic Theme 1, Energy Security: Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.1, Energy Diversity: Increase our energy options and reduce dependence on oil, thereby reducing vulnerability to disruption and increasing the flexibility of the market to meet U.S. needs.

Strategic Goal 1.2, Environmental Impacts of Energy: Improve the quality of the environment by reducing greenhouse gas emissions and environmental impacts to land, water, and air from energy production and use.

The programs funded within the Fossil Energy Research and Development appropriation have three GPRA Unit Program Goals that contribute to the Strategic Goals 1.1 and 1.2 in the "goal cascade." These goals are:

GPRA Unit Program Goal 1.2.08.00**:** "Near-Zero Atmospheric Emissions" Coal-Based Electricity and Hydrogen Production: Create public/private partnerships to develop technology capable of addressing air emissions concerns associated with coal use while providing domestically secure, cost-efficient electricity generation, including the development of near-zero atmospheric emissions technologies and, by 2012, completion of a prototype, "near-zero atmospheric emissions" plant (including carbon) that is coal fuel-flexible, and capable of multi-product output ultimately, by 2015, leading to an advanced class of power plants capable of achieving energy efficiencies over 60 percent (exclusive of energy consumption for sequestration) with coal.

GPRA Unit Program Goals 1.1.09.00 and 1.1.10.00 cover oil and gas activities, and will not be achieved with the termination of these programs in FY 2008.

Contribution to Strategic Goal

FE contributes to Strategic Goal 1.2 through its Coal Program. The Coal Program pursues GPRA Unit Program Goal 1.2.08.00 above and encompasses the following activities:

- The Clean Coal Power Initiative, by or before 2010 will initiate demonstration of advanced coal-based power generation technologies capable of achieving: 45 percent electrical efficiency (exclusive of energy consumption for carbon capture), greater than 90 percent mercury removal at a cost of 70 percent of current technology; 0.15 lb/MMBtu NO_x at 75 percent of the cost of current technology (selective catalytic reactors), and by 2011 up to 90% carbon capture and sequestration or beneficial reuse of carbon. 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 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 (in constant 2003 dollars). 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 when integrated into gasification based power plants. By 2012, advanced turbines, capable of firing up to 100% hydrogen, will be integrated into coal based power plants that separate, capture, and sequester CO_2. This "near-zero" atmospheric emissions plant configuration will sequester 90 percent of the generated CO_2 with 99 percent storage permanence at less than 10 percent increase in the cost of energy services in 2012.

- The Carbon Sequestration program, by 2012 will develop technologies to separate, capture, transport, and sequester carbon using either direct or indirect systems that result in a less than 10 percent increase in the cost of electricity. By 2012, the program will have developed methodology capable of predicting CO_2 storage capacity in geologic formations to within +/- 30 percent. In support of this goal, the Department will initiate an expedited schedule for the multi-year Phase III of the Regional Partnership Program. In FY 2008, Phase III work will include the conduct of at least four large scale field tests. Phase III incorporates conducting preparatory work for such tests, including site evaluation work, site characterization R&D, site selection, completion of the NEPA Process for selected sites, and other work. In coordination with the current partnerships, the program will determine the "highest potential" opportunities for the initial expedited round of large scale sequestration tests in saline, coal, and/or oil and gas bearing formations. Phase III work will begin with physical characterization of the surface and subsurface, reservoir modeling, and collection of information to satisfy NEPA requirements. After the characterization and NEPA review, the program will conduct an initial round of at least four large volume sequestration tests.

- 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 01.02.08.00, i.e. Near-Zero Atmospheric 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, or $30/barrel crude oil 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), and kilowatt-scale 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 2008. Prior year funds will be used to conduct ongoing projects.

Funding by Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Goal 1.2, Environmental Impacts of Energy			
GPRA Unit Program Goal 121.08.00, Near-Zero Atmospheric Emissions Coal-Based Electricity and Hydrogen Production	366,762	330,119	426,602
Strategic Goal 1.1, Energy Diversity			
GPRA Unit Program Goal 1.1.09.00, Natural Gas Technologies, Abundant Affordable Gas	31,801	0	0
GPRA Unit Program Goal 1.1.10.00, Petroleum - Oil Technology, Abundant Oil	30,805	0	0
Total Strategic Goals 1.1 and 1.2	429,368	330,119	426,602
All Other			
Program Direction	105,872	129,196	129,973
Plant and Capital Equipment	19,800	0	0
Fossil Energy Environmental Restoration	9,504	9,715	9,570
Import/Export Authorization	1,781	0	0
Advanced Metallurgical Research	7,920	0	0
Special Recruitment Programs	649	656	656
Cooperative Research and Development	5,775	0	0
Total, All Other	151,301	139,567	140,199
Total, Strategic Goal 1.1 and 1.2 (Fossil Energy Research and Development)	580,669	469,686	566,801

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 2006	FY 2007	FY 2008
National Energy Technology Laboratory	10,377	8,326	11,009
Total, Direct-Funded Maintenance and Repair	10,377	8,326	11,009

Fossil Energy Research and Development

Office of Fossil Energy

Funding by Site by Program

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Ames National Laboratory			
Coal	930	1,020	1,055
Argonne National Laboratory (East)			
Coal	2,944	3,489	2,125
Petroleum – Oil Technology	1,055	0	0
Total, Argonne National Laboratory (East)	3,999	3,489	2,125
Brookhaven National Laboratory			
Coal	100	200	0
Natural Gas Technologies	150	0	0
Total, Brookhaven National Laboratory	250	200	0
Idaho National Engineering and Environmental Laboratory			
Coal	1,016	1,025	565
Natural Gas Technologies	165	0	0
Petroleum – Oil Technology	80	0	0
Total, Idaho National Engineering and Environmental Lab	1,261	1,025	565
Lawrence Berkeley National Laboratory			
Coal	1,850	1,238	1,667
Natural Gas Technologies	825	0	0
Petroleum – Oil Technology	1,046	0	0
Total, Lawrence Berkeley National Laboratory	3,721	1,238	1,667
Lawrence Livermore National Laboratory			
Coal	390	310	375
Petroleum – Oil Technology	215	0	0
Total, Lawrence Livermore National Laboratory	605	310	375
Los Alamos National Laboratory			
Coal	1,445	1,071	1,041

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Petroleum – Oil Technology	610	0	0
Total, Los Alamos National Laboratory	2,055	1,071	1,041
National Energy Technology Laboratory			
Coal	336,304	295,072	402,393
Natural Gas Technologies	28,078	0	0
Petroleum – Oil Technology	24,473	0	0
Program Direction	79,176	94,449	97,689
Plant and Capital Equipment	19,800	0	0
Fossil Energy Environmental Restoration	6,033	6,300	6,295
Cooperative Research and Development	5,735	0	0
Advanced Metallurgical Research	7,920	0	0
Total, National Energy Technology Laboratory	507,519	395,821	506,377
Oak Ridge National Laboratory			
Coal	6,157	5,966	3,871
Natural Gas Technologies	300	0	0
Petroleum – Oil Technology	675	0	0
Total, Oak Ridge National Laboratory	7,132	5,966	3,871
Pacific Northwest Laboratory			
Coal	5,480	5,450	5,350
Natural Gas Technologies	450	0	0
Total, Pacific Northwest Laboratory	5,930	5,450	5,350
Sandia National Laboratories			
Coal	1,399	1,175	1,200
Petroleum – Oil Technology	15	0	0
Total, Sandia National Laboratories	1,414	1,175	1,200
Washington Headquarters			
Coal	8,747	14,103	6,960
Natural Gas Technologies	1,833	0	0
Petroleum – Oil Technology	2,636	0	0
Program Direction	26,696	34,747	32,284
Fossil Energy Environmental Restoration	3,471	3,415	3,275
Import/Export Authorization	1,781	0	0

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Special Recruitment Programs	649	656	656
Cooperative Research and Development	40	0	0
Total, Washington Headquarters	45,853	52,921	43,175
Total, Fossil Energy Research and Development	580,669	469,686	566,801

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.

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.

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.

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.

Lawrence Livermore National Laboratory

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

Coal
Research will focus on geologic sequestration approaches.

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.

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.

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.

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.

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.

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.

Washington Headquarters

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

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.

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

Coal

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Coal			
Clean Coal Power Initiative	48,135	4,957	73,000
FutureGen	17,326	54,000	108,000
Fuels and Power Systems	301,301	271,162	245,602
Total, Coal	366,762	330,119	426,602

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 producing 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 GPRA Unit Program Goals

The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, environmental, and management aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Coal program supports the following goal:

Strategic Theme 1, Energy Security: Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.2, Environmental Impacts of Energy: Improve the quality of the environment by reducing greenhouse gas emissions and environmental impacts to land, water, and air from energy production and use.

The Coal program has one program goal which contributes to Strategic Goal 1.2 in the "goal cascade".

GPRA Unit Program Goal 1.2.08.00: Create public/private partnerships to develop technology capable of addressing air emissions concerns associated with coal use while providing domestically secure, cost-efficient electricity generation, including the development of near-zero atmospheric emissions technologies and, by 2012, completion of a prototype near-zero atmospheric emission plant (including carbon) that is coal fuel-flexible, and capable of multi-product output and ultimately, by 2015, leading to an advanced class of power plants capable of achieving efficiencies over 60 percent (exclusive of energy consumption for carbon capture) with coal.

Contribution to GPRA Unit Program Goal 1.2.08.00 (Near-Zero Atmospheric Emissions Coal-Based Electricity and Hydrogen Production)

- The Clean Coal Power Initiative subprogram by or before 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 achieving: 45 percent electrical efficiency, (exclusive of energy consumption for carbon capture); greater than 90 percent mercury removal at a cost of 70 percent of current technology, 0.15 lb/MMBtu NO_x at 75 percent of the cost of current technology (selective catalytic reactors), and by 2011 up to 90% carbon capture, and sequestration or beneficial reuse of carbon. These technologies 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 supported technology development in anticipation of regulatory limits that are now being implemented through the Clean Air Interstate Rule and the Clean Air Mercury Rule. These rules were promulgated in 2005, giving the private sector an incentive to develop the technologies required to reduce their pollutant emissions. Because the government role in development of these technologies has shifted to the private sector, the Innovations for Existing Plants subprogram is terminated.

  - 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.

  - The Advanced Turbines subprogram will, by 2010, complete the R&D to show substantive benefits in efficiency, cost and emissions and demonstrate a combined cycle power island that can produce electricity from coal in an IGCC configuration at 45-50% efficiency (HHV). By 2012, the subprogram will complete the R&D to switch from syngas to a pure hydrogen fuel

with CO_2 separation and sequestration for a near-zero atmospheric emission configuration(s) that can provide electricity with less than a 10% increase in cost. This subprogram will provide advanced CO_2 compression systems and turbine technology, capable of burning pure hydrogen for validation testing at the FutureGen plant.

- The Carbon Sequestration subprogram, by 2012, will develop technologies to separate, capture, transport, and sequester carbon using either direct or indirect systems that result in a less than 10 percent increase in the cost of electricity. By 2012, the program will have developed methodology capable of predicting CO_2 storage capacity in geologic formation to within +/-30 percent. In support of this goal, the Department will initiate an expedited schedule for the multi-year Phase III of the Regional Partnership Program. In FY 2008, Phase III work will include the conduct of at least four large scale field tests. Phase III incorporates conducting preparatory work for such tests, including site evaluation work, site characterization R&D, site selection, completion of the NEPA Process for selected sites, and other work. In coordination with the current partnerships, the program will determine the "highest potential" opportunities for the initial expedited round of large scale sequestration tests in saline, coal, and/or oil and gas bearing formations. Phase III work will begin with physical characterization of the surface and subsurface, reservoir modeling, and collection of information to satisfy NEPA requirements. After the characterization and NEPA review, the program will conduct an initial round of at least four large volume sequestration tests.

- The Fuels subprogram, by 2010, will complete development of modules capable of co-producing hydrogen from coal at $5.50 per million Btu ($0.70 per gallon gasoline equivalent, or $30/barrel crude oil equivalent (without 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 methods, and control system knowledge needed to bridge gaps between basic science and engineering development. Advanced Research Program efforts will allow development, by 2010, of enabling technologies that support the goals of near-zero atmospheric emissions energy (FutureGen) systems.

Funding by Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Goal 1.2, Environmental Impacts of Energy			
GPRA Unit Program Goal 1.2.08.00, Near-Zero Atmospheric Emissions Coal-Based Electricity and Hydrogen Production			
Clean Coal Power Initiative	48,135	4,957	73,000
FutureGen	17,326	54,000	108,000
Fuels and Power Systems	301,301	271,162	245,602
Total, Strategic Goal 1.2 (Coal)	366,762	330,119	426,602

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 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Results	FY 2007 Targets	FY 2008 Targets
GPRA Unit Program Goal 1.2.08.00 (Zero Emissions Coal-Based Electricity and Hydrogen Production)					
Clean Coal Power Initiative					
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. (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. (MET GOAL)	Made go/no go decisions regarding award of cooperative agreements for all projects selected under Round 2 CCPI. (MET GOAL)	Award CCPI-2 projects based on decisions made in FY 2006	Make go/no go decisions regarding continuation applications for projects awarded under Rounds 1 & 2 CCPI. Complete CCPI Round 3 solicitation, proposal evaluations and project selections to assemble the initial portfolio of advanced technology systems that sequester carbon dioxide.
FutureGen					
			Issued site selection solicitation and evaluated sites.	Site selection for FutureGen.	Initiated long-lead procurement of hardware for FutureGen.
Fuels and Power Systems					
Innovations for Existing Plants					
Initiated projects for developing technologies to address emerging electric utility/water issues and combustion byproducts utilization and disposal. (MET GOAL) Completed preliminary field	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	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. (MET	Conducted initial pilot scale slipstream field test of at least one technology capable of 90% mercury removal. (MET GOAL)	Validate technology improvements for mercury capture technology that translate to 50-75% capture at 50-75% of the 2003 cost of conventional technology of $50,000-$70,000 per pound of mercury captured.	No activities- program terminated.

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Results	FY 2007 Targets	FY 2008 Targets
testing of alternative mercury control technologies representing two approaches for achieving 50% or greater 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)	technology capable of achieving 50-70% mercury capture. (MET GOAL)	GOAL)			
Advanced Integrated Gasification Combined Cycle					
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	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. (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	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	Began construction and testing of advanced gas separation technologies. In FY 2006, the Gasification Technologies program moved 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(in constant 2003 dollars) for IGCC systems and efficiency improvements of >1 efficiency points. (MET GOAL)	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 $1150/kW (in constant 2003 dollars) 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 (in constant 2003 dollars) or less.	Validate technology improvements in gas cleanup, air separation, gasifier, and turbine technology that translate to a system with 43% efficiency at a capital cost of $1150/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 (in constant 2003 dollars) or less.

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Results	FY 2007 Targets	FY 2008 Targets
CO_2 from gas streams. (MET GOAL) 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)	gasification system performance by 2010. (NOT MET) 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. (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. (MET GOAL)	contribution of 2-3 percentage points improvement in combined cycle turbine efficiency. (MET GOAL)			
Advanced Turbines					
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 synthesis gas to demonstrate progress towards a 2 ppm NOx emissions goal. (MET GOAL)	Complete prototype combustor module testing, demonstrate performance of achieving single digit NOx at lower flame temperature (2100^o F vs. design inlet temperature of 2500^o F and pressures, and identify the two most promising low NOx, high-hydrogen fueled, combustion concepts for further evaluation and testing in Phase II of the hydrogen turbine development projects.	Initiate development of large frame hydrogen-fired turbine technologies (Phase II), including final combustion system down selection, and complete the test plan for the full head-end combustion system testing to achieve single digit NOx at progressively higher temperature and pressure. Complete preliminary rig tests of 3^{rd} stage turbine blades as input to design for ability to withstand increased power output.

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Results	FY 2007 Targets	FY 2008 Targets
turbines for coal derived synthesis gas. (MET GOAL)	associated with high hydrogen fuels. (MET GOAL)				
Carbon Sequestration					
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. (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. (MET GOAL)	Completed at least two pilot scale tests on emerging advanced capture technologies related to oxyfuel, sorbents, membranes or hydrates. (MET GOAL)	Performed pilot-scale testing and also laboratory testing of different CO2 capture technologies to lead to significant improvement in cost and performance, and initiated field sequestration activities within the Regional Partnerships, including selecting and awarding seven 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. (MET GOAL)	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.	Complete site selection, reservoir modeling, site characterization, and begin injection at depleted oil reservoir, unmineable coal seam, and saline formation to demonstrate that storage of CO_2 in geologic formations is a viable greenhouse gas mitigation option. Award initial round of Phase III (deployment) of the Regional Carbon Sequestration Partnerships, conduct site selection, and complete NEPA activities for at least four large volume field tests. Validate technology improvements of an advanced power plant with carbon capture technology that can be extrapolated and translates to 90% capture at a cost of electricity increase of 19% when compared to a conventional (off-the-shelf) non-capture power plant.

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Results	FY 2007 Targets	FY 2008 Targets
Fuels					
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. (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. (MET GOAL)	Developed 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. (MET GOAL)	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.	Design and build small bench scale prototype system that combines multiple gas separation process and meets or exceeds hydrogen separation target of 95% purity.
Fuel Cells					
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) Conducted cost reduction R&D programs involving near-term developers, Siemens Westinghouse and Fuel Cell Energy, for the fuel cells, including manufacturing and balance of plant (BOP) components. (MET GOAL)	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. (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 and semi-annual peer reviews will communicate progress and define future R&D requirements. (MET GOAL)	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. (MET GOAL) 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. (MET GOAL)	Four SECA industry teams completed phase I prototype validation demonstrating SECA phase I efficiency and cost goals. (MET GOAL) Incorporate seal and interconnect concepts into fuel cell stacks and perform initial tests. (MET GOAL)	Validate technology improvements to the SECA fuel cell stack that reduce projected stack manufacturing costs to at least $250/kW.	Validate technology improvements to the SECA fuel system that reduce projected system manufacturing costs to at least $600/kW. Validate technology improvements to the SECA fuel cell stack that reduce projected stack manufacturing costs to at least $225/kW.

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Results	FY 2007 Targets	FY 2008 Targets
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) Advanced Research 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)					Complete prototype demonstration of distributed fiber optic sensors capable of selective and accurate gas detection of H_2 and CO in high temperature (-500oC), high pressure (200 PSI0 in harsh (high temperature transient, corrosive and erosive) environments to be used in integrated temperature, pressure, and gas measurement applications by 2009. Complete and validate the development of a prototype virtual power plant steady state simulator that can be integrated with NETL's Advanced Process Engineering Co-Simulator (APECS) together with an immersive virtual engineering plant walk-through environment for use by 2011.

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Results	FY 2007 Targets	FY 2008 Targets
					Maintain total administrative overhead costs in relation to total program costs of less than 17 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 2008 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. In the FY 2007 PART (completed in FY 2006 for the FY 2007 budget) the Coal program submitted a single Coal Energy Technology PART which combines these two areas. In this 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. The program was given an overall rating of "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 2006	FY 2007	FY 2008
Clean Coal Power Initiative			
Clean Coal Power Initiative	48,135	4,957	73,000
SBIR/STTR (non-add)	--	(131)	(2,044)
Total, Clean Coal Power Initiative	48,135	4,957	73,000

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.

The program has made significant progress in addressing the CCPI weaknesses cited in last year's budget request, including some progress towards reducing a backlog of unobligated balances, currently at about $500 million. Specific actions taken include the following:

- Improved project selection criteria to ensure consistency with Office of Fossil Energy goals and the Administration's Research and Development Investment Criteria. The program is targeting the Round 3 solicitation of CCPI to advanced technology systems that capture carbon dioxide for sequestration or beneficial reuse, consistent with the program's GPRA Unit Program Goal 1.2.08.00 (Near-Zero Atmospheric Emissions Coal-Based Electricity and Hydrogen Production).
- Ensured that projects progress to commencement of construction in a timely manner. In FY 2006, four projects successfully concluded negotiation activities and initiated project activities.
- Strengthened the Department's ability to withdraw funding from stalled projects. The program has submitted appropriations language that will help to reduce excess unobligated balances in the Clean Coal Power Initiative account by setting time limits on negotiation process. This language will also help address the negotiation delays and cost overruns which have been problematic in the Clean Coal Power Initiative program. The program is also revising its solicitation and contract language to strengthen its ability to withdraw funding from stalled projects. Negotiation efforts were unsuccessful for two projects and these projects were withdrawn from the program. Only one project that was selected four years ago remains without a contract award, and it is anticipated to be withdrawn by the government in the near future.
- Improved project management controls to ensure that desired results are achieved on schedule and on budget. The program has improved and is continuing to further improve the staff skill level and the procedures used in the management of cooperative agreements, including adoption of a DOE-wide standard for managing cooperative agreements and a certification program for the project management staff. The Office of Fossil Energy is also

working to establish project performance metrics to demonstrate the results of improved management. The program has also submitted appropriations language that will help address cost overruns in the Clean Coal Power Initiative account by setting limits on escalation of financial assistance.

Using approximately $194 million of unobligated funds from projects that were selected, but not awarded, plus appropriations that have not yet been committed to projects, CCPI will complete the Round 3 solicitation, proposal evaluations, and project selections to assemble the initial portfolio of advanced technology systems that capture carbon dioxide for sequestration and beneficial reuse. With this solicitation, all unobligated funds will have been allocated to awarded projects or used for the Round 3 solicitation.

Benefits

By or before 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 (exclusive of energy consumption for carbon capture); greater than 90 percent mercury removal at a cost of 70 percent of current technology; 0.15 lb/MMBtu NO_x at 75 percent of the cost of current technology (selective catalytic reactors), and by 2011 up to 90% carbon capture and sequestration or beneficial reuse of carbon. 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 develop technology capable of addressing air emissions concerns associated with coal use while providing domestically secure, cost-efficient electricity generation, including control technologies to permit reasonable-cost compliance with emerging regulations. CCPI demonstrations drive down the cost and risks of Integrated Gasification Combined Cycle (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 Administration is advancing its vision in clean coal research. The Clean Coal Power Initiative 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 $73 million in FY 2008 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. Combined with unobligated funds from projects that were selected, but not awarded, plus appropriations that have not yet been committed to projects, this budget request will complete funding towards the third round of demonstration projects under the Clean Coal Power Initiative, demonstrating carbon sequestration.

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 new coal technologies for power and hydrogen production, contributes to 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. CCPI 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 three selected under CCPI Round 2. 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. Prior year funding combined with the FY 2008 Budget Request will enable the solicitation of a third round of projects in 2008.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Clean Coal Power Initiative	**48,135**	**4,957**	**73,000**

For FY 2008, continue ongoing Clean Coal Power Initiative (CCPI) Round 1 and Round 2 projects and Power Plant Improvement Initiative (PPII) projects to support the President's Coal Research Initiative. The funding request for FY 2008, combined with prior year funding, will be used for the solicitation of a third round of projects.

For FY 2007, continue ongoing Clean Coal Power Initiative (CCPI) Round 1 and Round 2 and Power Plant Improvement Initiative (PPII) 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), awarded three of the four projects selected under the second CCPI solicitation and initiated design activities. The awarded projects include NeuCo'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. Negotiation activities for Peabody Energy's proposed project ended and the project was withdrawn by the proposer. For projects selected under the first solicitation: initiated operation of Green River Energy's prototype coal dryer and began fabrication of two additional dryers. Initiated integrated testing of NeuCo's optimization control system and operation for We Energies' TOXECON sorbent injection project. Continued design activities for Western Greenbrier's fluidized-bed co-generation and fly-ash utilization project and the University of Kentucky Research Foundation's coal-ash beneficiation processing project. The Gilberton/WMPI coal-to-clean

(dollars in thousands)

FY 2006	FY 2007	FY 2008

fuels project was not awarded. *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, and MEP-1 (Excelsior Energy Inc.).*

For FY 2006, within the Power Plant Improvement Initiative (PPII), completed the operating and reporting activities for Otter Tails' advanced particulate collector demonstration and continued with the extended operating period for Universal Aggregates' ash utilization project. Awarded and initiated design activities for CONSOL Energy's multi-pollutant dry scrubber system. The negotiation efforts were unsuccessful for TIAX's advanced hybrid system for NOx control and the project was withdrawn. *Participants include: Otter Tail Power Corp., Universal Aggregates, LLC, CONSOL Energy, Inc., and TIAX, LLC.*

SBIR/STTR (non-add)	**—**	**(131)**	**(2,044)**

In FY 2006, $1,220,000 and $145,000 were transferred to the SBIR and STTR programs respectively. The FY 2007 and FY 2008 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Total, Clean Coal Power Initiative	**48,135**	**4,957**	**73,000**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Clean Coal Power Initiative	
▪ **CCPI**	
The increase is derived in part from a transfer of $58 million in balances from the Clean Coal Technology program that are no longer needed to complete active projects. The increase will allow for the solicitation of a third round of demonstration projects in 2008.	+68,043
Total Funding Change, Clean Coal Power Initiative	**+68,043**

FutureGen

Funding Schedule by Activity

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
FutureGen			
FutureGen	17,326	54,000	108,000
SBIR/STTR (non-add)	--	(1,497)	(2,994)
Total, FutureGen	17,326	54,000	108,000

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. The objective of FutureGen is to demonstrate the integrated operation of these subsystems and components. The design will allow for subsequent testing for research, development, and demonstration purposes of alternate subsystems and components by the private sector after completion of the Federally cost-shared integrated operation of the initial set of subsystems and components. The Federal cost-share is only for demonstration of the planned set of subsystems and components as part of the project scope to prove feasibility and not for any subsequent research, development, or demonstration of alternate subsystems and components. 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.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
FutureGen	**17,326**	**54,000**	**108,000**

In FY 2008, design will progress from the preliminary to the detailed stage. Early construction planning activities will continue, and long-lead equipment orders will continue to be placed in anticipation of the start of construction in FY 2009. *Participants include: FutureGen Industrial Alliance, Inc.*

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. *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.*

SBIR/STTR (non-add)	**—**	**(1,497)**	**(2,994)**

In FY 2006, $441,000 and $53,000 were transferred to the SBIR and STTR programs respectively. The FY 2007 and FY 2008 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Total, FutureGen	**17,326**	**54,000**	**108,000**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
FutureGen	
The increased funding will 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 and will allow the project to proceed to detailed design along with long-lead procurement of hardware per the baseline schedule consistent with a 2012 start of operations.	+54,000
Total Funding Change, FutureGen	**+54,000**

Fuels and Power Systems

Funding Schedule by Activity

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Fuels and Power Systems			
Innovations for Existing Plants	24,543	16,015	0
Advanced Integrated Gasification Combined Cycle	54,441	53,982	50,000
Advanced Turbines	17,411	12,801	22,000
Carbon Sequestration	64,714	73,971	79,077
Fuels	27,913	22,127	10,000
Fuel Cells	59,788	63,352	62,025
Advanced Research	51,507	28,914	22,500
U.S./China Energy and Environmental Center	984	0	0
SBIR/STTR (non-add)	---	(7,259)	(6,654)
Total, Fuels and Power Systems	301,301	271,162	245,602

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 has ended 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, 2006).

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

- Advanced Integrated Gasification Combined Cycle (IGCC) - The IGCC program supports both the President's Clear Skies Initiative, the Climate Change Technology Program, and the FutureGen project 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 2008, 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 technology advances for the FutureGen project.

- Advanced Turbines - The Turbines Program is designed to enable the cost effective implementation of the President's Clear Skies Initiative, the Climate Change Technology Program, and the FutureGen project. The focus is on creating the technology base for turbines that will permit the design of near-zero atmospheric emission IGCC plants and a class of plants with carbon capture and sequestration (i.e., FutureGen). FutureGen plants will enhance the continued use of coal our Nation's largest source of fossil fuel while addressing climate change technology concerns. 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 2008, work will continue to address technical issues and ultimately provide turbine technology for burning up to 100% hydrogen. This advanced hydrogen burning, near-zero atmospheric emissions, turbine technology will be available for the FutureGen project and will contribute to achieving the 2010 Advanced Power Systems 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. The technologies developed through the sequestration technology program will be used to benefit the existing and future fleet of fossil fuel power generating facilities, prioritizing the most cost-effective applications, by developing technologies to reduce the cost of electricity impacts and provide key technologies and protocols for the FutureGen facility as it looks to capture, transport, store, and monitor the CO_2 injected in geologic formations.

- 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 GPRA Unit Program Goal 1.2.08.00, Near-Zero Atmospheric Emissions Coal-Based Electricity and Hydrogen Production. Specifically, the program focuses on developing technologies that will facilitate the production of hydrogen derived from coal. Research will target reducing costs specific to hydrogen from coal (versus other hydrogen sources) 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 electricity from domestic coal with near-zero atmospheric emissions of carbon and air pollutants 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.

- Program Direction – In addition to the funding levels reflected in the Fuels and Power Section, there is $21.2 million provided within the program direction account for NETL Program Specific Activities supporting Fuels and Power Systems. This funding supports Federal staff directly associated with conducting the research activities of specific Fuels and Power Systems subprograms. Funding for each of the programs is provided in the Program Direction account as follows:

Integrated Gasification Combined Cycle $2.6 million; Advanced Turbines $3.2 million; Carbon Sequestration $7.0 million; Fuels $2.5 million; Advanced Research $4.9 million; and Fuel Cells $1 million.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Innovations for Existing Plants	**24,543**	**16,015**	**0**
▪ **Super Clean Systems**	**965**	**0**	**0**

In FY 2008, no funding is requested. Projects funded in prior years will be completed with prior year balances.

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.*

▪ **Fine Particulate Control/Air Toxics**	**15,964**	**14,047**	**0**

In FY 2008, no funding is requested. The Fine Particulate ControlAir Toxics activities will use prior year funds to focus on completion of projects awarded in FY 2007 that are directed at achieving at least 90% mercury removal and 50-70% mercury removal with cost reductions of 25-50%. The Innovations for Existing Plants subprogram supported technology development in anticipation of regulatory limits that are now being implemented through the Clean Air Interstate Rule and the Clean Air Mercury Rule. These rules were promulgated in 2005, giving the private sector an incentive to develop the technologies required to reduce their pollutant emissions. Because the government role in development of these technologies has shifted to the private sector, the Innovations for Existing Plants subprogram is terminated.

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 developing technology 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-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, and 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, and TBD.*

- **National Labs-Competitive** **3,761** **1,968** **0**

In FY 2008, no funding is requested.

In FY 2007, a major focus of the research conducted at NETL and/or other national laboratories will be on mercury removal technologies. 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 support of Clear Skies Initiative. *Participants include: NETL And TBD.*

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.*

- **By-Products and Water Management** **2,409** **0** **0**

In FY 2008, no funding is requested. Projects funded in prior years will be completed with prior year balances.

In FY 2007, no funding is requested. Complete an assessment, with prior year 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 be completed, 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 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, and 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, and TBD.*

- **Congressionally Directed Activities – Innovations for Existing Plants** **1,444** **0** **0**
  - **Powerspan Electro Catalytic Oxidation Project** **962** **0** **0**

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

  - **Coal-Waste Slurry Reburn Project** **482** **0** **0**

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

- **SBIR/STTR (non-add)** **--** **(441)** **--**

  In FY 2006, $539,000 and $64,000 were transferred to the SBIR and STTR programs respectively. The FY 2007 amount shown is the estimated requirement for the continuation of the SBIR and STTR program.

Advanced Integrated Gasification Combined Cycle **54,441** **53,982** **50,000**

- **Gasification Systems Technology** **33,215** **32,369** **47,000**

  (a) Gasification: In FY 2008, work at the Power Systems Development Facility (PSDF) will focus on parametric testing using higher rank bituminous coals to determine the degree to which modifications to the transport gasifier (including the addition of a larger riser section and modifications to the solids collection system) will improve carbon conversion and the quality of the synthesis gas and enhance fuel flexibility. Complete evaluation of transport gasifier riser inlet geometry on solids and gas mixing and residence time distribution. Testing of the Stamet posimetric demonstration-scale feeder (10 tph) operating at 500 psig will be completed at the PSDF; testing of a pilot-scale feeder (100 lb/hr) operating at 1300 psig will begin. Testing of the feed injector flame monitoring device will be completed at a commercial gasification site. Development of non-chromium-based high temperature refractory will continue; test samples will be installed in a commercial gasifier for testing if initial screening results are promising.

(dollars in thousands)

FY 2006	FY 2007	FY 2008

Solids transport testing of the gasification/combustion chemical looping concept in the pilot-scale unit will be completed and the results used to complete the design of a prototype facility (~1,000 lb/hr of coal) dependent upon test results. Computational Fluid Dynamic (CFD) modeling of the chemical looping processes along with cold flow experimentation for model validation will continue to support the development of the technology. Complete incorporation of ash slagging/fouling chemistry into CFD codes for entrained gasifiers; identify and simulate flyash source constituents in coal; and demonstrate validity and utility of the CFD code for slagging gasifiers. *Participants include: SCS, NETL, Alstom, GTI, and TDA.*

(b) Gas Cleaning/Conditioning: In FY 2008, continue development of advanced sorbents/catalyst and other concepts for removal of sulfur, ammonia, chlorides, mercury, arsenic, cadmium, and selenium in multi-contaminant removal processes to reduce capital cost. Pilot plant testing of an integrated warm gas multi-contaminant synthesis gas cleanup technology will begin pending successful completion of laboratory testing of the concept. Assuming a go decision is made at the completion of the Phase I bench-scale test program of the University of California Sulfur Recovery Process (UCSRP), design and construction of a larger reactor system for testing on coal-derived synthesis gas will begin. For trace metals removal, the design and construction of a semi-moving bed reactor system for TDA's multi-contaminant removal process will commence assuming successful completion of initial field testing using fixed-bed reactors. Pilot-scale testing of a novel monolith sorbent for trace metals removal from synthesis gas at high temperatures will be performed using coal-derived synthesis gas. Validate CFD model for coupled transport desulfurizer/regenerator using data obtained from the test unit at Eastman Chemical. The design of a 50 MWe equivalent scale unit to evaluate the performance of the high temperature desulfurization and direct sulfur recovery process will be completed and construction at a commercial gasification site will commence depending upon host site. *Participants include: NETL, UNDEERC, GTI, TDA, RTI, Eastman Chemical, and TBD.*

(c) Gas Separation: In FY 2008, work will continue on the development of the Ion Transport Membrane (ITM) technology for air separation. The design of the 150 tpd engineering prototype unit will be completed and equipment orders will begin to be placed for construction of the unit at a commercial gasification site. The economic impact of ITM on a carbon-capture IGCC plant, i.e., FutureGen, will be evaluated. Provide an assessment of the commercialization potential of the advance steam-iron process for coproducing hydrogen and electricity based on initial test results. Work on the novel metal alloy membrane will focus on optimizing process conditions to demonstrated long-term performance for coal-derived synthesis gas and developing low-cost methods for membrane fabrication. Preliminary design of and subscale engineering prototype (i.e., 200 lb/day of hydrogen) will be initiated. *Participants include: APCI, Eltron, and RTI.*

Activities include support of the Asia-Pacific Partnership on Clean Development and Climate (APP) ($2 million – non-add). FE's APP efforts within Gasification Systems Technology will focus on projects concerning technologies jointly applicable domestically and to APP partner nations. Topics will also include R&D on adaptation and application of existing technologies to a wider range of deployment conditions. System studies may be conducted on technologies jointly applicable domestically and to APP partner nations.

(dollars in thousands)

FY 2006	FY 2007	FY 2008

(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, and VPI.*

Activities include support of the Asia-Pacific Partnership on Clean Development and Climate (APP) ($2 million – non-add). FE's APP efforts within Gasification Systems Technology will focus on projects concerning technologies jointly applicable domestically and to APP partner nations. Topics will also include R&D on adaptation and application of existing technologies to a wider range of deployment conditions. System studies may be conducted on technologies jointly applicable domestically and to APP partner nations.

(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, and ARC.*

- **Systems Analysis/Product Integration** **4,191** **4,608** **3,000**

In FY 2008, work will continue on assessing the economics of advanced process concepts to support the development and deployment of near-zero atmospheric emissions plants, and in particular FutureGen. Specific studies will focus on updating the economic impact of the Stamet coal feed pump based upon data generated from testing of a semi-commercial pump at the PSDF,

and quantifying the economic impact of advanced hydrogen/carbon dioxide separation membranes on near-zero atmospheric emissions plants. Development of the three dimensional dynamic simulation model of an IGCC plant both with and without carbon dioxide capture will be continued to provide a means for both predicting the performance of the FutureGen plant and to provide preliminary training for plant operators and other personnel. Conduct informational workshops on gasification technologies to state economic and environmental regulators and state legislators and energy officials. Continue updating the worldwide gasification database to reflect current status.

Activities include support of the Asia-Pacific Partnership on Clean Development and Climate (APP) ($500 thousand – non-add). FE's APP efforts within Systems Analysis/Product Integration will focus on projects concerning technologies jointly applicable domestically and to APP partner nations. Topics will also include R&D on adaptation and application of existing technologies to a wider range of deployment conditions. System studies may be conducted on technologies jointly applicable domestically and to APP partner nations.

Participants include: NETL, RDS, TAMS, Mitretek, and GTC.

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.

Activities include support of the Asia-Pacific Partnership on Clean Development and Climate (APP) ($500 thousand – non-add). FE's APP efforts within Systems Analysis/Product Integration will focus on projects concerning technologies jointly applicable domestically and to APP partner nations. Topics will also include R&D on adaptation and application of existing technologies to a wider range of deployment conditions. System studies may be conducted on technologies jointly applicable domestically and to APP partner nations.

Participants include: NETL, RDS, TAMS, Mitretek, and 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

(dollars in thousands)

FY 2006	FY 2007	FY 2008

cost. Engineering support was provided as needed for the development and evaluation of the FutureGen project. *Participants included: RDS, TAMS, Mitretek, Parsons, SCS, and GTC.*

- **Vision 21** **17,035** **17,005** **0**

In FY 2008, ongoing projects are grouped into one of the three categories listed above (gasification, gas cleaning/conditioning, and gas separation).

In FY 2007, work will focus primarily on scaling up technologies for incorporation into near-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, and 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, arsenic, and mercury removal sorbents was 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

(dollars in thousands)

FY 2006	FY 2007	FY 2008

development of raw syngas shift and separation were assessed. *Participants included: APCI, GE, Nexant, RTI, NETL ORNL, ANL, LANL, Siemens, Eltron, and SCS.*

- **SBIR/STTR (non-add) — (1,490) (1,380)**

  In FY 2006, $1,290,000 and $155,000 were transferred to the SBIR and STTR programs respectively. The FY 2007 and FY 2008 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Advanced Turbines 17,411 12,801 22,000

- **Hydrogen Turbines 15,005 12,801 22,000**

  In FY 2008, 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 2005-2006 through the Hydrogen Turbines solicitation will contribute to significantly increasing combined cycle efficiency, reducing NO_x emissions and reducing the combined cycle power island capital cost. These turbines designed to operate on 100% hydrogen fuels will make possible coal-based power systems, such as FutureGen, that dramatically reduce CO_2 emissions. Additional work will be conducted on the fundamentals of hydrogen combustion for MW-scale turbines as well as advancing CO_2 compression turbo machinery to minimize the compression penalty in coal-based FutureGen plants.

  By FY 2008, both GE and Siemens Power Generation (SPG) will have completed their Research and Development Implementation Plans and limited preliminary screening testing (Phase I) of their hydrogen turbine projects. Both projects will be initiating Phase II work. Phase II work will focus on the detailed designs of components and systems required to meet the 2010 and FutureGen project objectives, and perform validation testing of combustion systems and machine components with a focus on demonstrating the ability to attain the 2010 Turbine Program performance goals. By FY 2008, the results of the concluded SPG catalytic combustion work will be incorporated into their hydrogen turbine development project.

  Work will continue in FY 2008 to develop advanced turbine based technologies for the compression of large quantities of CO_2 produced in coal-based power plants. This work has the potential to significantly reduce (20 to 40%) the parasitic power consumption penalty associated with CO_2 compression in FutureGen type power plants. In FY 2008, Phase II funding will becompleted with Southwest Research Institute to support the design and development of turbo machinery for minimizing the power consumption of CO_2 compression systems.

  In FY 2008, work on oxy-fuel based turbines (Siemens Power Generation) will be concluded at the end of Phase I work. The associated oxy-fuel combustion system (Clean Energy Systems, Inc.) for this turbine will also be concluded. Work from these two projects will have identified

plant performance and configurations for near-term and long-term systems with near-zero atmospheric emissions and carbon capture.

In FY 2008, work will continue with the NETL in-house research group, and other national laboratories to assess combustor designs and the fundamentals associated with hydrogen combustion and turbine subsystems. This work will be applicable to large frame turbines and MW-scale turbines. *Participants include: GE, Precision Combustion, Inc., Parker Hannifin, Siemens Westinghouse, SwRI, NETL, LBNL, NIST, Ames Lab.*

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 2005-2006 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 FY 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, University Turbine Systems Research (Clemson), SwRI, NETL, ORNL, Ames Lab, LBNL.*

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

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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

▪ **Congressionally Directed Activities – Advanced Turbines**	**2,406**	**0**	**0**
• **Ramgen Engine Development**	**2,406**	**0**	**0**

The Ramgen Engine Development Project was completed in FY 2006.

▪ **SBIR/STTR (non-add)**	**—**	**(353)**	**(608)**

In FY 2006, $365,000 and $44,000 were transferred to the SBIR and STTR programs respectively. The FY 2007 and FY 2008 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Carbon Sequestration	**64,714**	**73,971**	**79,077**
▪ **Greenhouse Gas Control**	**48,080**	**66,836**	**71,942**

In FY 2008, the Regional Carbon Sequestration Partnerships (CSRP) Field Validation Testing activities (Phase II) will complete and publish results for several of the 25 geologic sequestration tests involving CO_2 injection and monitoring, mitigation, and verification (MMV) operations in saline formations, depleted oil and gas fields, and unmineable coal seams. These tests are designed to assess the safety of operations, develop best management practices manuals for operations and monitoring, determine the fate of CO_2 stored in these geologic formations, refine storage capacity estimates, validate formation modeling, and determine future regional opportunities for large scale deployment of sequestration technologies, should they be needed. The high demand for oil and its rising cost has caused field service costs related to drilling and materials to rise substantially. The rising field service and commodity costs directly impact the implementation of the CSRP field tests. FY 2008 funding will also ensure that the CSRP provides coverage throughout the United States in areas that have potential storage opportunities.

Significant activity for Phase III, Deployment Phase, will be conducted at four initial sites for large volume sequestration tests. Expediting large-scale testing in high priority formations (saline formations, oil and gas bearing formations, and/or coal seams) will provide important information on the cost and feasibility of deployment of sequestration technologies. Large scale field testing (approximately 1 million tons CO_2 injected) in a variety of geologic formations across the United States (ultimately 5-7 characteristic sites) are required to determine, with confidence, the ability of this greenhouse gas mitigation option. These large scale field tests are needed to identify opportunities for FutureGen validated technologies to be deployed and

investigated throughout the United States. In FY 2008, Phase III test phase will be initiated. Phase III is a multi-year activity which will include site selection, NEPA, formation characterization and site infrastructure development for the large volume sequestration tests. More specifically, these activities will include site identification, site development, drilling wells, seismic tests, and other formation characterization measurements that are required before injection can occur. In coordination with the current partnerships, the program will determine the "highest potential" opportunities for the initial expedited round of large scale sequestration tests in saline, coal, and/or oil and gas bearing formations. Phase III work will begin with a physical characterization of the surface and subsurface, reservoir modeling, and collection of information to satisfy NEPA requirements. After characterization and NEPA review, the program will conduct an initial round of at least four large volume sequestration tests.

Carbon capture projects that will be awarded through a FY 2006 solicitation will be on-going in the areas 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 CO_2 for sequestration. The work performed by these projects will support the carbon sequestration program to meet its goals of reducing the cost of energy for sequestration of CO_2 from fossil fuel power plants.

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 helps to expedite commercialization at large scale sources. Pilot scale testing of two oxycombustion projects (Babcock and Wilcox (B&W) and BOC Group) will be conducted in FY 2008. Oxycombustion is a promising carbon capture technology that uses oxygen rather than air for combustion, thereby resulting in a highly pure CO_2 exhaust stream that can be captured at relatively low cost and sequestered.

Two sequestration field tests will continue in FY 2007 with the goals of understanding the trapping mechanisms for CO_2 storage and to develop best practice procedures for large volume sequestration tests and FutureGen. The second phase of the Weyburn Project will be underway investigating CO_2 storage, protocols, and modeling and analysis in conjunction with economic enhanced oil recovery operations expanding into an adjacent oil field operated by Apache Canada. An unmineable coal seam will continue to be investigated with a planned injection of 26,000 tons of CO_2 to verify sequestration potential in a West Virginia coal seam. This injection will be completed and results from the field test will be used to develop best management practices for future coal seam sequestration projects.

Emphasis on field scale monitoring, mitigation, and verification (MMV), and modeling will continue to provide tools and protocols to verify the permanence of CO_2 storage. Geophysical tools such as Vertical Seismic Profiling (VSP), time lapse seismic, 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. Many projects will be coordinating with the CSRP to field test new technologies and protocols for monitoring CO_2 in geologic formations.

(dollars in thousands)

FY 2006	FY 2007	FY 2008

The National Carbon Sequestration Database and Geographical Information System (NATCARB) will continue to enhance and upgrade the functionality of the Relational Database Management System covering the United States. Enhancements to NATCARB will include development of improved online tools to provide real-time display and analysis of CO_2 sequestration data. In addition, the current webpage will be enhanced to include more advanced query capabilities. Furthermore, NATCARB will add a National online water geochemical system for evaluating saline formations. Transition of the national carbon sequestration database to the NETL and University Consortium will begin to consolidate and improve the systems information, tools, and functionality.

Activities include support of the Asia-Pacific Partnership on Clean Development and Climate (APP) ($2.25 million – non-add). FE's APP efforts within Greenhouse Gas Control will focus on projects concerning technologies jointly applicable domestically and to APP partner nations. Topics will also include R&D on adaptation and application of existing technologies to a wider range of deployment conditions. System studies may be conducted on technologies jointly applicable domestically and to APP partner nations.

All FY 2008 activities will provide critical support for FutureGen, Carbon Sequestration Leadership Forum (CSLF) and the President's strategy to reduce the greenhouse gas intensity of the economy.

Participants include: Montana State University, UNDEERC, Univ. of Kansas, Battelle, Babcock and Wilcox, CMU, BOC Group, ARI, SRI, Univ. of Michigan, Univ. of Delaware, Univ. of North Carolina-Charlotte, UOP, Notre Dame, Carbozyme, BP, Kansas State, Univ. of KY, MIT, Consol, IEA, Univ. of Illinois, SSEB, New Mexico Institute of Mining and Technology, California Energy Commission, NETL, LANL, SNL, LLNL, LBNL, PNNL, ORNL, INEEL, TBD.

In FY 2007, the Phase II Regional Carbon Sequestration Partnerships (CSRP) began and 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. Sites include the acid gas injection project in Zama, Alberta; Central Valley of California depleted gas reservoir; Illinois basin coal seam; and an industrial scale enhanced oil recovery and CO_2 sequestration test in southern Utah. These sites represent a diverse geology and will prove important to validating the potential for these sinks to be used to store and mitigate greenhouse gas emissions. Formation modeling, site selection, and baseline MMV studies will have been completed at these and several other field validation sites. Best management practice manuals will be initiated from these tests to help plan and implement future sequestration tests.

Numerous technologies in the area of CO_2 capture were either continued or pilot scale testing phases were initiated to validate substantial potential for cost reduction and performance improvement. Several oxyfuel combustion technologies, including Babcock and Wilcox's (B&W) pulverized coal oxycombustion system, BOC's CAR oxycombustion systems, and Southern Research Institute's (SRI) retrofit analysis of existing pulverized coal fired power plants, were continued. In addition, during FY 2007, several new projects began from a FY 2006 solicitation aimed at funding capture and separation projects including novel concepts, system

(dollars in thousands)

FY 2006	FY 2007	FY 2008

analysis, bench-scale, and pilot-scale projects in an effort to reduce the cost associated with capturing the CO_2 for sequestration.

The University of New Mexico demonstrated a microporous silica membrane stability (e.g. reduction of CO_2 permeance of less than 25%) for at least 120 hours of continuous operation at 100-130^oC. The University of Notre Dame synthesized and tested an ionic liquid that will have a significant increase in the CO_2 carrying capacity of the benchmark ionic liquid. Modeling has been completed at the University of Texas at Austin to determine the potential for alternative solvent compositions to be used to capture CO_2 from the existing fossil fuel power generating fleet.

Initial site characterization at two field sites for the Midwest Regional Partnerships will have been completed in Ohio and Michigan (Battelle). Site characterization has been completed and CO_2 injection initiated at a depleted oil field in the Illinois basin to estimate the sequestration and enhanced oil recovery potential of the region (University of Illinois). CO_2 injection began at the Aneth depleted oil field in Southern Utah in collaboration with an industrial partner where nearly 500,000 tons of CO_2 were injected (New Mexico Institute of Mining and Technology). Baseline assessment and characterization of the Grande Ronde Basalt formation in Washington state were initiated to determine the suitability of the formation to store CO_2 in basalt formations throughout the United States (University of Montana – Bozeman). UNDEERC developed an injection plan for lignite coal tests in the Williston Basin of North Dakota to demonstrate the relatively high loading capacity of lignite coals. Los Alamos National Laboratory (LANL) developed an open path instrument capable of measuring leaks of CO_2 at the surface that have the ability to differentiate between natural sources and injected CO_2. Computer models were developed and validated to predict transport of CO_2 in the different formations and interactions with caprock materials.

Activities include support of the Asia-Pacific Partnership on Clean Development and Climate (APP) ($2.25 million – non-add). FE's APP efforts within Greenhouse Gas Control will focus on projects concerning technologies jointly applicable domestically and to APP partner nations. Topics will also include R&D on adaptation and application of existing technologies to a wider range of deployment conditions. System studies may be conducted on technologies jointly applicable domestically and to APP partner nations.

Participants include: Montana State University, UNDEERC, Univ. of Kansas, Battelle, Babcock and Wilcox, CMU, BOC Group, Carbozyme, Texas BEG, Univ. of Minnesota, UOP, Notre Dame, Harvard, Arizona State, Indiana Univ., Univ. of Georgia, Velocys, Winrock, Dakota Gasification, ARI, SRI, RTI, California Technical Institute, 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, Consol, IEA, Univ. of Illinois, SSEB, Univ. Of NM, New Mexico Institute of Mining and Technology, California Energy Commission, Univ. of Utah, NETL, 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, 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. The Weyburn project began Phase II efforts to continue development of monitoring, mitigation and 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. 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 sandstones 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, seven (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. Work on field validation tests began at several sites including depleted oil fields, coal seams, and saline formations. All FY 2006 activities provided critical support for FutureGen, Carbon Sequestration Leadership Forum (CSLF) and the 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.

- **Focus Area for Carbon Sequestration Science** **7,011** **7,135** **7,135**

In FY 2008, the Focus Area for Carbon Sequestration will conduct needed lab scale experiments and simulations to determine expected performance of new CO_2 capture approaches identified by the NETL research group in FY 2007. Depending on results from FY 2007, work on solid adsorbents will be continued toward scaleup. Pending commercial interest and viability,

ammonia-based scrubbing studies will be conducted only as needed to support deployment by commercial partners. As indicated in FY 2007, membranes for CO_2 separation will be considered for continued improvement and application to FutureGen and IGCC plants.

The Focus Area will continue to support the Regional Partnership field projects. Techniques to ensure permanent storage will continue to be applied at Regional Partnership sites for various geological formations. Reservoir simulations will be completed for at least one and possibly two Partnership field sites. The development of a site-specific Bayesian Belief Network will be completed for one of the Regional Sequestration sites, to help design and interpret data from near-surface monitoring networks. The NFFLOW code will be modified to simulate two-phase flow and incorporate coal shrinkage and swelling and applied to a Regional Sequestration Field Project in a coal seam.

By the end of FY 2008, a quantitative risk assessment will be partially constructed and populated with data that could then be applied at individual Regional Partnership field sites. This quantitative model will be able to incorporate information from the Bayesian Belief Network that is being developed for designing monitoring networks.

Participants include: NETL, West Virginia University, University of Pittsburgh, and Carnegie Mellon University.

In FY 2007, the Focus Area for Carbon Sequestration will continue to use a combination of engineering analysis and numeric models to determine the best approach to use solid adsorbents for CO_2 capture in pulverized coal power plants. The Focus Area will work to reach a decision for continued research on ammonia-based scrubbing, depending on results of lab-scale testing, and pilot-scale testing in a Cooperative Research and Development Agreement with Powerspan, Inc. An evaluation of promising membrane technology developed in FY 2006 for IGCC applications will be used to define continued developments for coal gasification applications. With participation from local universities (*see participants, below*), the Focus Area will evaluate several new approaches to further reduce the energy required for CO_2 capture, and form a group devoted to defining needed experiments and analysis of these ideas. Ideas such as electrochemical CO_2 separation, and "immobilized buffers", and chemical looping have already received consideration in FY 2006.

The Storage Assessment activities will continue to develop a scientific basis to allow successful modeling and simulation of geological sequestration field demonstrations, based on reliable information from lab-scale experiments. Simulation and experimental work will continue to support the regional partnership field projects. A plan will be developed for conducting 3-D (and 4-D) seismic surveys at one or more Regional Partnership sites, for characterization and monitoring purposes. Coal core samples obtained (if available) from regional partnership sites will undergo sorption and desorption experiments and be scanned with the new CT equipment. Work is continuing on the development and use of models for the shrinkage and swelling of coal in the presence of CO_2. The Storage Assessment Group will also continue its focus on flow

through fractured media. Simulations of flow through an actual fracture (obtained through CT scan) will be performed.

The Permanence Assessment Group plans to continue to develop and apply 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 CH_4 and Radon soil flux rates, and geophysical data. Mitigation strategies will be explored. Experiments on cement degradation under CO_2 sequestration conditions will continue with a study of commonly used additives. Under the advisement of NETL's industry partners (Chevron and Exxon Mobil), several cement formulations will be chosen which include the most commonly used additives. A series of short-term and long-term experiments will be conducted to determine the effect that these additives have on the kinetics of cement degradation.

Risk assessment activities for geologic sequestration will begin. A plan will be developed for identifying risks associated with sequestration, most likely following the features, events, processes models that have developed for risk assessment elsewhere. A key component of the risk assessment performed here will be to tie in with at least one of the regional partnerships to identify the risks associated with an individual field project. Additionally, the plan will include tying modeling and monitoring techniques to the risk assessment model as means of identifying potential events and probabilities of events. This change reflects the progression of testing, analyses and modeling efforts aimed at quantifying and reducing uncertainties and addressing issues associated with CO_2 in geologic storage formations.

Participants include: NETL, West Virginia University, University of Pittsburgh, and Carnegie Mellon University.

During FY 2006, the Focus Area for Carbon Sequestration will develop and test a new CO_2 membrane capable of achieving excellent selectivity and permanence for CO_2 in coal syngas applications. The Focus Area also will complete tests of a very-high capacity CO_2 sorbent proposed for syngas which will be compared to traditional physical solvent CO_2 separation in FY 2007.

As part of an activity supporting the Carbon Sequestration Leadership Form, the Focus Area will conduct tests with the Japanese research organization Research Institute of Innovative Technology for the Earth (RITE), evaluating a CO_2 separation membrane for flue gas applications. With Advanced Research support, the Focus Area will complete a conceptual engineering design of novel reactors that could use CO_2 sorbents in a flue gas application, and will define needed performance of sorbents. Tests of proposed flue gas sorbents developed in prior years will be demonstrated to have good thermal stability at proposed regeneration temperatures, and needed improvements in sorbent design will be identified. In a Cooperative Research and Development Agreement (CRADA) with Powerspan Inc., lab scale test data on aqueous ammonia CO_2 scrubbing will be collected to define process conditions needed for optimization for power plant CO_2 capture, and to reduce solvent loss. Powerspan is conducting an independent development of the process for pilot-scale testing at a commercial power plant.

(dollars in thousands)

FY 2006	FY 2007	FY 2008

The Focus Area will investigate a novel approach to CO_2 capture, using carbonic anhydrase to accelerate the carbonate formation with so-called "immobilized" buffers to moderate acidity; exploratory work will be carried out to define a process suitable for flue gas CO_2 capture.

The Focus Area for Carbon Sequestration initiated collaborations with the Southwest, Midwest and Southeast Regional Sequestration Partnerships in preparation for phase II field projects. The Focus Area will develop a suite of technologies that will be applied to ensure sequestered carbon is permanently stored (Permanence Assessment activity) and will develop a series of computer models and complimentary laboratory equipment to accurately estimate storage capacity and CO2 transport for various geological formations (Storage Assessment activity).

The Permanence Assessment activity will begin at the San Juan Basin enhanced coal bed methane sequestration test site; a phase II field project of the Southwest Regional Sequestration Partnership. Carbon sequestering will commence in FY 2007. After the injection well location is identified, satellite imagery of the site will be obtained and a series of background measurements (tracers, soil gas flux, and geophysical survey) will be taken and analyzed. Results from these surveys will be used to develop a monitoring grid of over 150 locations and the placement of permanent monitors at these locations will be initiated. During and after injection this grid will be used as a basis for collection of gas and water samples that will be used to ensure the permanence of the storage. Production is near completion on a prototype field-portable cavity ring-down spectrometer. This instrument will give NETL the unique capability to distinguish background CO_2 from sequestered CO_2 in the field. The technology to make these field measurements did not previously exist.

The Storage Assessment Group is developing 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. As part of this effort, NETL is developing a dynamic swelling model that will be incorporated into a simulator for coal seam sequestration modeling. The simulator will be used to interpret field data from the Burlington Resources project. The simulator with improved swelling model will assist in developing the theoretical basis for understanding field results from planned field projects, including Regional Partnership sites and the CONSOL project.

Abandoned wells represent the quickest route of escape from a sequestered site. The first two rounds of experiments on the degradation of well bore cement under CO_2 sequestration conditions will be completed. Simulations will be performed on flow through an abandoned well to help determine relationships between maximum potential leakage rate and well diameter, formation permeability, etc.

The CT scanner will be set up and operational this year. Scans will be taken of coal samples from the Illinois Basin Regional Partnership and that information shared. Scans will also be performed on sampled of coal before, during, and after gas sorption to help understand the rates of gas sorption and diffusion in coal. *Participants included: NETL, West Virginia University, University of Pittsburgh, and Carnegie Mellon University.*

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
▪ **Center for Zero Emissions Research and Technology**	**5,774**	**0**	**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 2008 and FY 2007, no funding is requested. In FY 2006, research was conducted focused on understanding the basic science of underground (geologic) carbon dioxide storage to mitigate greenhouse gases from fossil fuel use.

▪ **Congressionally Directed Activities – Carbon Sequestration**	**3,849**	**0**	**0**
• **Jupiter Oxy Fuel Technology**	**2,023**	**0**	**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**	**1,826**	**0**	**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)**	**—**	**(2,045)**	**(2,186)**

In FY 2006, $1,443,000 and $173,000 were transferred to the SBIR and STTR programs respectively. The FY 2007 and FY 2008 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Fuels	**27,913**	**22,127**	**10,000**
▪ **Hydrogen from Coal Research**	**21,036**	**22,127**	**10,000**

In FY 2008, continue research for the development of novel technology to: 1) separate hydrogen from mixed gas steams while also removing remnant impurities via improved process intensification and filter concepts prior to utilization; and 2) use high-speed computation science to provide the technical foundations for advanced system components associated with the production of hydrogen from coal. Continue to perform systems engineering studies and analyses to determine optimum strategies for maturing hydrogen from coal technologies, and to gauge technical performance in advancing the state-of-the-art.

Also, in FY 2008, activities will be initiated to progress 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 technology systems. These activities are critical toward completing the Fossil Energy goal to develop modules for installation into the FutureGen plant, as well as the Hydrogen Fuel Initiative. Research activities in hydrogen storage will be brought to a logical conclusion.

Participants include: Gas Technology Institute, Eltron Research, Inc., Argonne National Laboratory, Research Triangle Institute, NETL, Southwest Research Institute, TBD.

In FY 2007, research was performed in 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, and; 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. System engineering studies were conducted to determine optimum strategies for scale-up of advanced separation membranes. Also, in FY 2007, activities were 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: Ohio State University, Media Process & Technology, Pennsylvania Sate University, ICRC/Syntroleum, 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 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.

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.

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
▪ **Congressionally Directed Activities – Fuels**	**6,877**	**0**	**0**
• **Center for Advanced Separation Technologies**	**962**	**0**	**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**	**674**	**0**	**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**	**482**	**0**	**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**	**430**	**0**	**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**	**1,924**	**0**	**0**

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

• **National Center for Hydrogen Technology**	**2,405**	**0**	**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)**	**—**	**(613)**	**(277)**

In FY 2006, $712,000 and $85,000 were transferred to the SBIR and STTR programs respectively. The FY 2007 and FY 2008 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Fuel Cells	**59,788**	**63,352**	**62,025**
▪ **Fuel Cells Advanced Research**	**7,725**	**0**	**0**

In FY 2008 and FY 2007, no planned activities in this category.

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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

- **Innovative Systems Concepts/SECA** **41,960** **63,352** **62,025**

In FY 2008, SECA will demonstrate advances important to delivering 10 - 50 MW fuel cell capacity to FutureGen. Tests will include four fuel cell stacks demonstrating cost-reduction improvements and three fuel cell stacks demonstrating size enlargement and optimization. The cost-reduction and modular scaling activities of three SECA Fuel Cell Coal Based Teams will be fully integrated. Two teams will additionally pursue auxiliary power system development and demonstration based on stacks capable of modular deployment in FutureGen. This ensures early demonstration of reliability, performance and manufacturing capacity. SECA will continue cost-reduction activities focused on the $400/kW goal by 2010. Research and development will proceed to address the key technical issues identified by industry and government managers. Activities leading to manufacture of 50 kW for delivery to FutureGen, depending on the FutureGen plant configuration for fuel cells, will start. This includes forming teams between existing stack developers and industry capable of developing capacity and delivering hardware by 2011. The integration of manufacturer and fuel cell stack developer will be accomplished either through solicitation or through normal business practice. Research and development will proceed to address the key technical issues identified by industry and government managers. *Participants include: General Electric, Siemens Power Group, FuelCell Energy/Cummins Power Generation/Versa Power (one team), Delphi, Acumentrics, PNNL, ANL, NETL, LBNL, ORNL, SNL, universities and small businesses, TBD.*

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 work in support of coal-syngas based, 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: General Electric, Siemens Power Group, FuelCell Energy/Cummins Power Generation/Versa Power (one team), Delphi, Acumentrics, PNNL, ANL, NETL, LBNL, ORNL, SNL, universities and small business, TBD.*

In FY 2006, continued SECA Industrial Team Phase I 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

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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 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: General Electric, Siemens Power Group, FuelCell Energy, Cummins Power Generation, Delphi, Acumentrics, PNNL, ANL, NETL, LBNL, ORNL, SNL, universities and small businesses.*

▪ **Congressionally Directed Activities – Fuel Cells**	**10,103**	**0**	**0**
• **MW-Scale Oxide Fuel Cell Gas Turbine Hybrid System**	**2,405**	**0**	**0**

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

• **MW-Scale Solid Oxide Fuel Cell Stationary Power Generation**	**2,887**	**0**	**0**

Completed MW-Scale Solid Oxide Fuel Cell Stationary Power Generation Project.

• **Solid Oxide Fuel Cell Tech. Stat Power Applications Project**	**962**	**0**	**0**

Completed the Solid Oxide Fuel Cell Technology Stat Power Applications Project.

• **Solid Oxide Fuel Cells**	**3,849**	**0**	**0**

Completed the Solid Oxide Fuel Cells work in Pennsylvania.

▪ **SBIR/STTR (non-add)**	**—**	**(1,748)**	**(1,712)**

In FY 2006, $1,421,000 and $171,000 were transferred to the SBIR and STTR programs respectively. The FY 2007 and FY 2008 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

Advanced Research	**51,507**	**28,914**	**22,500**
▪ **Coal Utilization Science**	**7,755**	**9,439**	**7,580**
• **Coal Utilization Science (Core)**	**7,426**	**9,114**	**0**

In FY 2008, the Coal Utilization Science Core activity has been restructured into Sensors & Controls Innovations and Computational Systems Dynamics to address more complex operational requirements of advanced coal plants designed to integrate with carbon capture subsystems..

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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.

Activities include support of the Asia-Pacific Partnership on Clean Development and Climate (APP) ($2 million – non-add). FE's APP efforts within Coal Utilization Science will focus on projects concerning technologies jointly applicable domestically and to APP partner nations. Topics will also include R&D on adaptation and application of existing technologies to a wider range of deployment conditions. System studies may be conducted on technologies jointly applicable domestically and to APP partner nations.

Participants include: SNL, CMU, AML, Nuonics, ARC, General Electric, New Mexico Tech., REI, Texas A&M Univ., Univ. of Utah, Ames, Fluent, NETL, and 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 Broad Based Financial Assistance (BBFA) solicitation that are capable of monitoring under the harsh operating conditions of ultra-clean fossil energy systems including FutureGen. Proceeded to prototype 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,*

(dollars in thousands)

FY 2006	FY 2007	FY 2008

SNL, CMU, ARC, Ohio State U., U of Fla, MSU, Nuonics, Prime Photonics, REI, SRI, Miss. State U., SRD, TBD

- **Mercury Control** **329** **325** **0**

In FY 2008, the Coal Utilization Science Mercury Control activity will be included under the new subprogram Sensors & Controls Innovations.

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, and URS.*

- **Sensors and Controls Innovations** **0** **0** **4,580**

Sensors and Controls are an essential and enabling technology for power generation that is safe, efficient and environmentally sound.

In FY 2008, develop new classes of sensors that are capable of monitoring key parameters in harsh environment conditions of ultra clean fossil energy systems including FutureGen. Projects included are fiber gas sensor, nanocrystalline clad silica fiber gas sensor and modified sapphire fiber sensors. Design and analyze sensor networks for advanced process control of fossil energy systems and expand validation of sensor network designs. Among these are participants selected under the 2006 solicitation for sensor network design. Conduct investigations of innovations that seek to increase the utilization of coal and minimize its adverse environmental impacts.

Activities include support of the Asia-Pacific Partnership on Clean Development and Climate (APP) ($2 million – non-add). FE's APP efforts within Sensors and Controls Innovations will focus on projects concerning technologies jointly applicable domestically and to APP partner nations. Topics will also include R&D on adaptation and application of existing technologies to a wider range of deployment conditions. System studies may be conducted on technologies jointly applicable domestically and to APP partner nations.

Participants include: NETL, SNL, ARC, New Mexico Tech, Univ. of Utah, Ames Lab, GE, VPI, and TBD.

In FY 2007 and FY 2006, the activities described above were included in the Coal Utilization Science Core activity.

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
• **Computational System Dynamics**	**0**	**0**	**3,000**

Advanced simulation techniques will enable more rapid development of advanced, highly efficient, low emission power plants.

In FY 2008, conduct projects related to steady state simulations, the framework that supports the simulations, and the reduced order models to carry out the simulations for FutureGen. Integrate co-simulator models with the virtual engineering plant walk-through environment models. Conduct efforts to validate multiphase fluid flow models for simulation of FutureGen systems. Investigate basic combustion and gasification chemistry to determine mechanisms that effect emissions behavior or coal under advanced and conventional combustion/gasification. This information will be used to validate combustion/gasification models. *Participants include: SNL, CMU, Fluent, Ames Lab, and TBD.*

In FY 2007 and FY 2006, the activities described above were included in the Coal Utilization Science Core activity.

▪ **Materials**	**7,707**	**7,533**	**7,097**
• **High Temperature Materials Research**	**3,328**	**3,586**	**3,944**

In FY 2008, develop and evaluate structural alloys for improved performance of high temperature alloys and components in advanced, combined cycle and coal combustion systems, with emphasis on cycles operating at temperatures of 700^{o}C and higher. Address the materials related barriers to expediting the use of oxide dispersion-strengthened (ODS) alloys in components required to operate at temperatures higher then are possible with conventionally-strengthened alloys. Develop a detailed understanding of the behavior of ODS alloys in certain phases of their use, including fabrication, and service performance. Assess the feasibility of different material and design approaches to smart protective coatings by exploring new alloying and microstructural routes to improved high-temperature environmental resistance of metallic components. *Participants include: ANL, INEEL, ORNL, Ames Lab, and NETL.*

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, and NETL.*

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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, and Ames.*

- **Materials for Ultra Supercritical and Gas Separation Systems** **4,379** **3,947** **3,153**

In FY 2008, long term effects of fire-side and steam-side corrosion on ultra supercritical boiler materials will be investigated. Establish heat treatment conditions needed to optimize microstructural stability and mechanical properties of steam turbine materials. Initiate work on the concept of combustion in oxygen rather than in air (oxy-fuel combustion). The oxy-fuel combustion process produces CO_2 as a more concentrated stream in the flue gas that is lot easier to capture. The combination of ultra supercritical (USC) technology and oxy-fuel combustion is expected to result in a higher efficiency plant with much lower emissions.

In the area of gas separations, develop a rapid cycling system for air separation into O_2 and N_2 utilizing a molecular sieve material which can be regenerated by electrical swing adsorption (ESA). Conduct fundamental studies on characterizing the influence of thermal activation conditions with respect to O_2 and N_2 adsorption on isotropic pitch-based activated carbon fibers. ESA is key to reducing energy consumption and cost compared to conventional pressure swing adsorption. *Participants include: ORNL, PNNL, Energy Industries of Ohio, NETL, Ames Lab, and LANL.*

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, and 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

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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, and Siemens-Westinghouse.*

- **Coal Technology Export** **990** **984** **800**

In FY 2008, sustain momentum for low/near-zero atmospheric emission technology in multilateral organizations including International Energy Agency, United Nations, World Energy Council, and the Carbon Sequestration Leadership Forum and bilateral with key countries such as China and India. Identify opportunities for U.S. industry in fast growing markets such as India and China and continue to facilitate the pathways to keep the clean coal option open through U.S. technology to enhance energy security and global environmental protection. Ensure that U.S. policy is reflected in International Energy Agency support for G8 initiatives on highly-efficient coal-fired power generation and carbon capture and storage technology. Generate international support for Near-Zero Atmospheric Emissions Technology for coal in general and FutureGen in specific. Work with the World Energy Council to promote the development of new policies and business models to create self-sustaining markets for financing of clean fossil fuel system infrastructure projects. Promote accelerated development and international uptake of transformational energy technologies that are cleaner and more efficient. Continue to work with international organizations to facilitate access to U.S. climate technology and energy services in the developing world, especially China and India.

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.

- **Bioprocessing of Coal** **1,485** **1,148** **0**

In FY 2008, no funding is requested for this activity.

In FY 2007, complete bioremediation of coal to reduce mercury emissions from power plants. Evaluate processes for generating hydrogen from coal waste and fossil fuels. Complete 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, and 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, and NETL.*

- **Environmental Activities** **1,980** **1,722** **0**

In FY 2008, no activity.

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, and PNNL.*

In FY 2006, 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, and PNNL.*

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
▪ **Technical and Economic Analyses**	**990**	**787**	**800**

In FY 2008, continue 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, and TMS.*

In FY 2007, 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. 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, and TMS.*

In FY 2006, 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, and TMS.*

▪ **International Program Support**	**990**	**984**	**800**

In FY 2008, continue funding the activity of the International Energy Agency Clean Coal Center (IEACCC). This activity is a significant and highly-visible international initiative to advance coal technologies. It substantially leverages the internal fossil energy activities of DOE. 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. Enhance the expansion of cleaner energy technology power systems activities in China, India and other targeted countries. Promote the deployment of carbon capture and storage technologies worldwide. Influence opportunities for cleaner power systems and fuels from coal in selected countries, particularly China and India.

In FY 2007, continued 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-

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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.

- **Focus Area for Computational Energy Science** **3,960** **2,578** **2,210**

In FY 2008, using mathematical computational simulations and computer based models continue the development and application of next generation modeling capabilities for fossil energy applications: the capability for describing particle size distribution, typically found in fossil fuel reactors, will be developed in Multi-phase Flow with Interphase Exchanges code. A Collaboratory for Multi-phase Flow Research including collaborators from academia, national labs and industry will be conducting research and outreach activities for accelerating the development and usage of multi-phase science-based simulations for the design, operation, and troubleshooting of multiphase flow devices in fossil fuel processing plants. Continue research, development, training, and education activities in the Collaboratory for Process and Dynamic Systems Modeling, to accelerate the application of advanced process systems engineering methods and tools to better achieve the aggressive design and operational goals for next-generation fossil energy systems, including IGCC power plants and polygeneration facilities such as the near-zero atmospheric emissions FutureGen hydrogen and power production plant. Continue development and application of the Advanced Process Engineering Co-Simulator (APECS) to better understand and optimize the plant-wide performance of next-generation power generation systems, including FutureGen, with respect to coupled fluid dynamics, heat and mass transfer, and related chemical and physical phenomena.

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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.*

- **University Coal Research** **2,888** **2,755** **2,376**

In FY 2008, 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. Key research areas supported include: advanced power systems including FutureGen, the hydrogen from coal initiative, global climate change, development of advanced materials, sensors and controls, and fuel cells.

Applications will continue to be solicited from individual universities, groups of universities, or universities jointly with an industrial partner. Selected projects will be eligible for funding of

$300,000 to $1 million for a three year period. Three to five grants are anticipated to be awarded, depending on the number of meritorious proposals submitted. At least one student from each participating university will be required to receive grant support.

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 $300,000 to $1 million for a three year period. Three to five 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.

- **HBCUs, Education and Training** **963** **984** **837**

Funding is used to conduct Fossil Energy research activities with HBCU and other minority institutions (OMI) and support an HBCU/OMI annual technology transfer symposium. Participants are determined by an open financial opportunity announcement on research topics of interest to fossil energy programs. In FY 2006, six awards were made. In FY 2007 and FY 2008, five to six awards each year are expected to be made. The maximum grant value is limited to

(dollars in thousands)

FY 2006	FY 2007	FY 2008

$200,000. Participants in FY 2007 and FY 2008 will be determined by the same competitive process.

- **Congressionally Directed Activities – Advanced Research** **21,799** **0** **0**

  - **Jupiter Oxy Fuel Technology** **5,486** **0** **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** **962** **0** **0**

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

  - **Power Plant Flue Gas Cleaning/Pollution Elimination Project** **2,117** **0** **0**

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

  - **GEDAC Packaged Gas Engine-Driven Heat Pump** **2,117** **0** **0**

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

  - **Planar Solid Oxide Fuel Cell Project** **1,444** **0** **0**

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

  - **UNDEERC** **962** **0** **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** **52** **0** **0**

    Evaluated metal and polymer matrix composites for use in lightweight materials for use in heavy duty vehicles.

  - **Coal to Liquids Program – Phase II** **1,924** **0** **0**

    Characterized liquid hydrogen carriers produced by Syntrolium at Montana facility.

  - **Arctic Energy Office** **4,811** **0** **0**

    Issued competitive solicitation for fossil energy related Arctic projects.

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
• **National Biofuel Energy Laboratory**	**1,924**	**0**	**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)**	**—**	**(570)**	**(491)**

In FY 2006, $995,000 and $120,000 were transferred to the SBIR and STTR programs respectively. The FY 2007 and FY 2008 amounts shown are estimated requirements for the continuation of the SBIR and STTR program.

U.S./China Energy and Environmental Technology Center	**984**	**0**	**0**

No funding is requested for FY 2008 and FY 2007.

In FY 2006, 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.

Total, Fuels and Power Systems	**301,301**	**271,162**	**245,602**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Innovations for Existing Plants	
▪ **Fine Particulate Control/Air Toxics**	
The Innovations for Existing Plants subprogram supported technology development in anticipation of regulatory limits that are now being implemented through the Clean Air Interstate Rule and the Clean Air Mercury Rule. These rules were promulgated in 2005, giving the private sector an incentive to develop the technologies required to reduce their pollutant emissions. Because the government role in development of these technologies has shifted to the private sector, the Innovations for Existing Plants subprogram is terminated.	-14,047

	FY 2008 vs. FY 2007 ($000)
▪ **National Labs-Competitive**	
The Innovations for Existing Plants subprogram supported technology development in anticipation of regulatory limits that are now being implemented through the Clean Air Interstate Rule and the Clean Air Mercury Rule. These rules were promulgated in 2005, giving the private sector an incentive to develop the technologies required to reduce their pollutant emissions. Because the government role in development of these technologies has shifted to the private sector, the Innovations for Existing Plants subprogram is terminated.	-1,968
Total, Innovations for Existing Plants	**-16,015**
Advanced Integrated Gasification Combined Cycle	
▪ **Gasification Systems Technology**	
The increase is primarily due to restructuring of activities that resulted in the incorporation of active projects from Vision 21 to improve the coordination of the research. All work on the development of technologies for the co-production of electricity and substitute natural gas will be terminated because the program's primary objective is to develop technologies for near-zero atmospheric emissions co-production of electricity and hydrogen.	+14,631
▪ **Systems Analysis/Product Integration**	
The decrease is due to a reduced level of effort on engineering analyses and the development of the dynamic simulation model.	-1,608
▪ **Vision 21**	
The decrease is due to restructuring of the gasification program. All active projects have been moved to the Gasification Systems Technology section of this request.	-17,005
Total, Integrated Gasification Combined Cycle	**-3,982**
Advanced Turbines	
▪ **Hydrogen Turbines**	
The increase will provide the resources to focus work with GE and Siemens on high priority hydrogen turbine development for the FutureGen Project. The increase will also support advanced CO_2 compression and the determination of non-ideal gas properties applicable to heat transfer and CO_2 compression in FutureGen type plant applications.	+9,199

FY 2008 vs. FY 2007 ($000)

Carbon Sequestration

- **Greenhouse Gas Control**

The increase will provide funding for the Validation Phase 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. The high demand for oil and its rising cost has caused field service costs related to drilling and materials to rise substantially over the last year. The rising field service and commodity costs directly impact the implementation of the CSRP field tests. Increased funding will also ensure that the CSRP provides complete coverage throughout the United States. Significant activity for Phase III, Deployment Phase, will be initiated for four large volume sequestration tests, due to the need for large-scale engineering field experience. The increase will also provide for carbon capture projects selected by the FY 2006 solicitation for novel, laboratory, and pilot scale capture projects which meet the cost of electricity goals of the program. +5,106

Fuels

- **Hydrogen from Coal Research**

Research will focus on the key areas of need specific to development of the hydrogen from coal pathway; separation of hydrogen from mixed gas streams (central station hydrogen production) and computational science (atomic to component/system scale modeling and simulation). All research in high-hydrogen content liquid fuels will be terminated because these are mature but evolving technologies where the private sector has the resources and incentives to conduct R&D. All research in hydrogen utilization in mobile application will be terminated because this research is conducted by the Office of Energy Efficiency and Renewable Energy (EERE). Continue Hydrogen from Coal Research to develop improved, novel technology for the production, of hydrogen - including research in scale-up technologies which will simultaneously produce and separate coal-derived hydrogen from the other gas constituents in one membrane reactor. -12,127

Fuel Cells

- **Innovative Systems Concepts/SECA**

The decreased funding will slightly reduce the level of effort for enabling R&D supporting the SECA industry teams. Effort on large scale coal-fueled central power systems R&D will remain at current levels in the SECA Coal Based Systems area. -1,327

	FY 2008 vs. FY 2007 ($000)

Advanced Research

- **Coal Utilization Science**

  The decrease is related to the completion of funding in the prior year for the collaborative Advanced Power Research. These projects are expected to be completed with prior year funding. -1,859

- **Materials**

  The decrease reflects a shift of emphasis to related work in Advanced Metallurgical Research. -436

- **Coal Technology Export**

  Reduced level of effort in the coal technology export activity. -184

- **Bioprocessing of Coal**

  Research activities terminated since other activities are more likely to provide greater benefit. -1,148

- **Environmental Activities**

  The decrease results in the termination of the program activities since this work is not central to achievement of the Office of Fossil Energy's goals. The Office of Fossil Energy focuses on technology development, not scientific analysis of environmental impacts. -1,722

- **Technical and Economic Analyses**

  Funding is essentially level with FY 2007. +13

- **International Program Support**

  Reduced level of effort in international program support. -184

- **Focus Area for Computational Energy Science**

  The decrease reflects reduced technical support to NETL from the Supercomputing Consortium. The reduction is due to the emphasis on higher priority critical research in other Advanced Research programs. -368

	FY 2008 vs. FY 2007 ($000)
▪ **University Coal Research**	
The decrease is due to offsets in the budget to support emphasis in higher priority critical research activities.	-379
▪ **HBCUs, Education and Training**	
The decrease is due to offsets in the budget to support emphasis in higher priority critical research activities.	-147
Total, Advanced Research	**-6,414**
Total Funding Change, Fuels and Power Systems	**-25,560**

Natural Gas Technologies

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Natural Gas Technologies			
Natural Gas Technologies	31,801	0	0
Total, Natural Gas Technologies	31,801	0	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. Consistent with the 2006 and 2007 Budgets, the Natural Gas Technologies program is being terminated in FY 2008.

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 exploration and production 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 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 GPRA Unit Program Goals

The Department's Strategic Plan identifies five Strategic Themes (one each for defense, energy, science, environmental, and management aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Natural Gas Technologies program supports the following goal:

Strategic Theme 1, Energy Security - Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.1, Energy Diversity: Increase our energy options and reduce dependence on oil, thereby reducing vulnerability to disruption and increasing the flexibility of the market to meet U.S. needs.

The Natural Gas Technologies program has one program goal, which contributed to Strategic Goal 1.1 in the "goal cascade".

GPRA Unit Program Goal 1.1.09.00: 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 GPRA Unit Program Goal 1.1.09.00 Natural Gas Technologies, Abundant Affordable Gas

The GPRA Unit Program Goal was to support Strategic Goal 1.1. 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 2008.

Funding by Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Goal 1.1, Energy Diversity			
GPRA Unit Program Goal 1.1.09.00, Natural Gas Technologies, Abundant Affordable Gas			
Exploration and Production	17,329	0	0
Gas Hydrates	8,667	0	0
Effective Environmental Protection	1,444	0	0
Congressionally Directed Activities	4,361	0	0
Total, Strategic Goal 1.1 (Natural Gas Technologies)	31,801	0	0

Annual Performance Results and Targets

FY 2003 Results	FY 2004 Results	FY2005 Results	FY2006 Targets	FY 2007 Targets	FY 2008 Targets
GPRA Unit Program Goal 1.1.09.00 (Natural Gas Technologies, Abundant Affordable Gas)					
Exploration and Production					
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 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)	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 – program terminated.	No activities – program terminated.
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)	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)				
Gas Hydrates					
Exchange information and coordinate effort between government agencies. Award subprojects under Joint Industry Projects for Gulf of Mexico seafloor stability and	Hold interagency meetings to exchange hydrate information and coordinate hydrate efforts between government agencies; issue newsletters; and hold workshops to communicate				

FY 2003 Results	FY 2004 Results	FY2005 Results	FY2006 Targets	FY 2007 Targets	FY 2008 Targets
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)	program results to stakeholders. (MET GOAL)				
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)	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)				
Infrastructure					
Complete laboratory testing and begin field demonstration of an improved remedial technology for storage wells. (MET GOAL)					

FY 2003 Results	FY 2004 Results	FY2005 Results	FY2006 Targets	FY 2007 Targets	FY 2008 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)				

Means and Strategies

No activity is proposed for FY 2008.

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 through FY 2006, 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 Natural Gas Technologies 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 Oil and Natural Gas 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 2006	FY 2007	FY 2008
Natural Gas Technologies			
Exploration and Production	17,329	0	0
Gas Hydrates	8,667	0	0
Effective Environmental Protection	1,444	0	0
Congressionally Directed Activities	4,361	0	0
SBIR/STTR (non-add)	—	—	—
Total, Natural Gas Technologies	31,801	0	0

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Exploration and Production	**17,329**	**0**	**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. The program will be terminated in FY 2008.

- **Advanced Drilling, Completion and Stimulation** **8,669** **0** **0**

  No activity in FY 2008 and 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, and TBD.*

- **Advanced Diagnostics and Imaging Systems** **3,829** **0** **0**

  No activity in FY 2008 and 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, and TBD.*

- **Stripper Well Revitalization** **1,910** **0** **0**

  No activity in FY 2008 and FY 2007.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008

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

- **Storage Technology** **955** **0** **0**

No activity in FY2008 and FY 2007.

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

- **Liquefied Natural Gas** **1,966** **0** **0**

No activity in FY 2008 and FY 2007.

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

Gas Hydrates **8,667** **0** **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** **8,667** **0** **0**

No activity in FY 2008 and 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, and TBD.*

Effective Environmental Protection **1,444** **0** **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** **1,444** **0** **0**

No activity in FY 2008 and FY 2007.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008

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 discharged to the surface. *Participants included: NETL, National Labs, and TBD.*

Congressionally Directed Activities	**4,361**	**0**	**0**
▪ **Arctic Energy Office**	**1,942**	**0**	**0**

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

▪ **University of Mississippi Hydrates Research**	**971**	**0**	**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**	**1,448**	**0**	**0**

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

SBIR/STTR (non-add)	**—**	**—**	**—**

In FY 2006, $775,000 and $94,000 were transferred to the SBIR and STTR programs respectively.

Total, Natural Gas Technologies	**31,801**	**0**	**0**

Petroleum - Oil Technology

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Oil Technology			
Oil Technology	30,805	0	0
Total, Oil Technology	30,805	0	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. Consistent with the 2006 and 2007 Budgets, the Oil Technology program is being terminated in FY 2008.

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.

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 GPRA Unit Program Goals

The Department's Strategic Plan identifies five Strategic Themes (one each for defense, energy, science, environmental, and management aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Oil Technology program supports the following goal:

Strategic Theme 1, Energy Security - Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.1, Energy Diversity: Increase our energy options and reduce dependence on oil, thereby reducing vulnerability to disruption and increasing the flexibility of the market to meet U.S. needs.

The Oil Technology program has one program goal, which contributed to Strategic Goal 1.1 in the "goal cascade."

Program Goal 1.1.10.00: 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 1.1.10.00: Oil Technology, Abundant Oil

The Program Goal was to support General Goal 1. The Program's remaining benefit will be that reflected in the FY 2006 Joule submission to "Develop technologies through four 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 2008.

Funding by Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Goal 1.1, Energy Diversity			
GPRA Unit Program Goal 1.1.10.00, Oil Technology, Abundant Oil			
Exploration and Production	12,997	0	0
Reservoir Life Extension/Management	5,776	0	0
Effective Environmental Protection	9,242	0	0
Congressionally Directed Activities	1,828	0	0

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Interstate Oil and Gas Compact Commission	962	0	0
Total, Strategic Goal 1.1 (Petroleum – Oil Technology)	30,805	0	0

Annual Performance Results and Targets

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets	FY 2008 Targets
GPRA Unit Program Goal 1.1.10.00 (Oil Technology, Abundant Oil)					
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	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) 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 wetability studies as well as initiating fracture development study. (MET GOAL)	Develop technologies through 4 projects which will contribute to increasing domestic oil supplies in an environmentally friendly manner. MET GOAL.	Develop technologies through up to 4 programs which will contribute to increasing domestic oil supplies in an environmentally friendly manner.	No activities – program terminated.	No activities – program terminated.

Annual Performance Results and Targets

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Targets	FY 2007 Targets	FY 2008 Targets
reservoirs at sites ranging from Alaska to Utah. Initiate full-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 2008.

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 Oil and Natural Gas 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 2006	FY 2007	FY 2008
Oil Technology			
Exploration and Production	12,997	0	0
Reservoir Life Extension/ Management	5,776	0	0
Effective Environmental Protection	9,242	0	0
Congressionally Directed Activities	1,828	0	0
Interstate Oil and Gas Compact Commission	962	0	0
SBIR/STTR (non-add)	—	—	—
Total, Oil Technology	30,805	0	0

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Exploration and Production	**12,997**	**0**	**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** **3,960** **0** **0**

  No activity in FY 2008 and 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.*

- **Advanced Drilling, Completion and Stimulation** **3,592** **0** **0**

  No activity in FY 2008 and FY 2007.

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

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

  No activity in FY 2008 and FY 2007.

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

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
▪ **Reservoir Efficiency Processes**	**2,475**	**0**	**0**
No activity in FY 2008 and 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.*			
Reservoir Life Extension/Management	**5,776**	**0**	**0**
▪ **Domestic Resource Conservation**	**5,776**	**0**	**0**
No activity in FY 2008 and 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.*			
Effective Environmental Protection	**9,242**	**0**	**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**	**9,242**	**0**	**0**
No activity in FY 2008 and 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.*			
Congressionally Directed Activities	**1,828**	**0**	**0**
▪ **Risk Based Data Management System**	**385**	**0**	**0**
Conducted risk-based data management.			
▪ **Utah Center for Heavy Oil Research**	**1,443**	**0**	**0**
Conducted heavy oil research at the Utah Center.			

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Interstate Oil and Gas Compact Commission	**962**	**0**	**0**

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

SBIR/STTR (non-add)	**—**	**—**	**—**

In FY 2006, $781,000 and $94,000 was transferred to the SBIR and STTR programs respectively.

Total, Oil Technology	**30,805**	**0**	**0**

Program Direction

Funding Profile by Category

(dollars in thousands/whole FTEs)

	FY 2006	FY 2007	FY 2008
Indirect Program Direction			
Headquarters Indirect			
Salaries and Benefits	17,077	17,154	17,154
Travel	792	822	813
Support Services	8,827	10,421	10,120
Total, Headquarters Indirect	26,696	28,397	28,087
Full Time Equivalents	127	122	122
NETL Indirect			
Salaries and Benefits	46,445	47,597	38,874
Travel	1,601	1,617	1,425
Support Services	31,130	22,698	27,880
Total, NETL Indirect	79,176	71,912	68,179
Full Time Equivalents	377	369	311
Total Indirect Program Direction			
Salaries and Benefits	63,522	64,751	56,028
Travel	2,393	2,439	2,238
Support Services	39,957	33,119	38,000
Total, Indirect Program Direction	105,872	100,309	96,266
Full Time Equivalents	504	491	433
NETL Coal Research and Development Direct Program Direction			
Salaries and Benefits	0	14,068	16,336
Travel	0	469	515
Support Services	0	0	4,352
Total, NETL Coal Research and Development Direct Program Direction	0	14,537	21,203
Full Time Equivalents	0	138	154
Alaska Natural Gas Transportation Project			
Office of the Federal Coordinator			
Salaries and Benefits	0	750	0
Travel	0	100	0
Support Services	0	1,400	0
Total, Office of the Federal Coordinator	0	2,250	0
Full Time Equivalents	0	6	0

(dollars in thousands/whole FTEs)

	FY 2006	FY 2007	FY 2008
Loan Guarantee for Alaska Natural Gas			
Salaries and Benefits	0	800	728
Travel	0	100	100
Support Services	0	1,400	1,504
Total, Loan Guarantee for Alaska Natural Gas	0	2,300	2,332
Full Time Equivalents	0	5	5
Total, Alaska Natural Gas Transportation Project			
Salaries and Benefits	0	1,550	728
Travel	0	200	100
Support Services	0	2,800	1,504
Total, Alaska Natural Gas Transportation Project	0	4,550	2,332[a]
Total, Full Time Equivalents	0	11	5
Import/Export Authorization			
Salaries and Benefits	0	1,280	1,322
Travel	0	20	20
Support Services	0	500	523
Total, Imports/Exports	0	1,800	1,865
Full Time Equivalents	0	14	14
Advanced Metallurgical Research – Albany Research Center			
Salaries and Benefits	0	7,010	7,241
Travel	0	90	117
Support Services	0	900	949
Total, Advanced Metallurgical Research – Albany Research Center		8,000	8,307
Full Time Equivalents	0	77	77
Total Program Direction			
Salaries and Benefits	63,522	88,659	81,655
Travel	2,393	3,218	2,990
Support Services	39,957	37,319	45,328
Total, Program Direction	105,872	129,196	129,973
Total, Full Time Equivalents	731[b]	731	683

a The Office of the Federal Coordinator for Alaska Natural Gas Transportation Project was transferred from the Department of Energy to an independent agency.

b 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 functions that 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 - 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 Coal Research and Development - 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 Research and Development (In-House Research and Development) and the NETL Albany site. Activities of the staff include in-house research in support of the following program areas: Integrated Gasification Combined Cycle $2.6 million; Advanced Turbines $3.2 million; Carbon Sequestration $7.0 million; Fuels $2.5 million; Fuel Cells $1 million; and Advanced Research $4.9 million

- 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 Office of the Federal Coordinator for Alaska Natural Gas Transportation Project was transferred from the Department of Energy to an independent agency. 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. The Loan Guarantee Program remains within the Fossil Energy Research and Development account.

- 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 - 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 Research and Development (In-House Research and Development) located at the NETL Albany site. Activities of the staff include in-house research in support of the following program areas: Integrated Gasification Combined Cycle, Turbines, Carbon Sequestration, Fuels, Fuel Cells, and Advanced Research. The Advanced Metallurgical Research expertise will continue research contributions to increase component service life through the development of affordable materials and processes, carbon dioxide containment through enhancement of natural geologic formation seals, and support to the Solid State Energy Conversion Alliance (SECA) through material development, fabrication, and performance evaluation for solid oxide fuel cell applications.

Detailed Justification

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Indirect Program Direction	**105,872**	**100,309**	**96,266**
Headquarters Indirect	**26,696**	**28,397**	**28,087**
Salaries and Benefits	**17,077**	**17,154**	**17,154**

Provide funds for 122 FTEs in FY 2008, 122 FTEs in FY 2007, and 127 FTEs in FY 2006 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 2008.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Travel	**792**	**822**	**813**

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

Support Services	**8,827**	**10,421**	**10,120**
▪ **Technical and Management Support Services**	**3,232**	**4,171**	**4,180**

Provide for contractual services that are generic to the entire FE program. Activities in 2007 and 2008 include support of the Asia-Pacific Partnership on Clean Development and Climate (APP) ($750 thousand – non-add).

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

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**	**495**	**500**	**500**

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

▪ **Working Capital Fund**	**4,060**	**4,200**	**4,400**

In FY 2008, FY 2007, and FY 2006 provides funding for the Department's working capital fund. This funding will support administrative services such as rent, postage, copying, and supplies.

NETL Indirect	**79,176**	**71,912**	**68,179**
Salaries and Benefits	**46,445**	**47,597**	**38,874**

Provide funds for 311 FTEs in FY 2008, 369 in FY 2007, and 377 in FY 2006 at NETL. Savings are achieved due to the lower level of effort required to conduct termination of the Oil and Gas programs versus the level of effort required to manage ongoing activities in the Oil and Gas programs. Improved efficiency in program management will allow savings that are transferred to Direct Program Direction (R&D activities). 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 70 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 2008.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Travel	**1,601**	**1,617**	**1,425**

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	**31,130**	**22,698**	**27,880**

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. This budget line also includes all costs associated with site support contractors that assist in the operation and maintenance of the Lab.

NETL Coal Research and Development	**0**	**14,537**	**21,203**
Salaries and Benefits	**0**	**14,068**	**16,336**

Provide funds for 138 FTEs in FY 2007 and 154 FTEs in FY 2008 such as Technicians, Engineers and Scientists in support of the NETL Office of Science and Engineering Research (In-House Research and Development) and the NETL Albany site. Activities of the staff include in-house research in support of the following program areas: Integrated Gasification Combined Cycle, Turbines, Carbon Sequestration, Fuels, Fuel Cells, and Advanced Research.

Travel	**0**	**469**	**515**

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

Support Services	**0**	**0**	**4,352**

Provide funding for supplies/materials and contractor support for the in-house research and development functions which support the program areas.

Alaska Natural Gas Transportation Project	**0**	**4,550**	**2,332**
Salaries and Benefits	**0**	**1,550**	**728**

Provide funds for 5 FTEs for the Loan Guarantee Program Office to administer Loan Guarantee authorities for the Alaska Natural Gas Transportation Project.

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

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

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Support Services	**0**	**2,800**	**1,504**
The FY 2008 request will enable the Office of Loan Guarantee for Alaska Natural Gas Transportation Projects to carryout all statutory authorities.			
Import/Export Authorization	**0**	**1,800**	**1,865**
Salaries and Benefits	**0**	**1,280**	**1,322**
Provides for 14 FTEs in the Office of Import/Export Authorization (OIEA).			
Travel	**0**	**20**	**20**
Provide funds for both domestic and international travel in support of the activities that support the mission of the Department.			
Support Services	**0**	**500**	**523**
Provide funds for contractual services in support of the OIEA.			
Advanced Metallurgical Research	**0**	**8,000**	**8,307**
Salaries and Benefits	**0**	**7,010**	**7,241**
Provide funds for 77 FTEs in FY 2007 and FY 2008 for research conducted at the NETL Albany site associated with corrosion performance in existing and advanced power generation systems, carbon capture and sequestration research, and to support the development of solid oxide fuel cell materials through development, fabrication, and performance evaluation. Research projects are conducted 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**	**90**	**117**
Provide funds for both domestic and international travel in support of the activities that support the mission of the Department.			
Support Services	**0**	**900**	**949**
Provide technical contractual services that are generic to the entire program above and operation/maintenance of the Albany, Oregon site.			
Total, Program Direction	**105,872**	**129,196**	**129,973**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Indirect Program Direction	
Headquarters Indirect	
Travel	
Essentially level with FY 2007.	-9
Support Services	
▪ **Technical and Management Support Services**	
The increase is inflationary.	+9
▪ **Computer Systems and Support**	
The change reflects a decrease in computer systems and support services costs.	-510
▪ **Working Capital Fund**	
This increase is inflationary.	+200
Total, Support Services	-301
Total, Headquarters Indirect	**-310**
NETL Indirect	
Salaries and Benefits	
The net decrease reflects a reduction of 58 FTEs (42 FTEs primarily associated with the Oil and Gas programs and 16 FTEs redistributed to NETL Coal R&D Direct). Savings are achieved due to the lower level of effort required to conduct termination of the Oil and Gas programs versus the level of effort required to manage ongoing activities in the Oil and Gas programs. Improved efficiency in program management will allow savings that are transferred to the Direct Program Direction (R&D activities).	-8,723
Travel	
The reduction is associated with the reduction in FTEs.	-192

	FY 2008 vs. FY 2007 ($000)
Support Services	
The change reflects an increased support for facility, operations, maintenance, finance, information automation, administrative, management and technical support and shifts some work from FTEs to contracted support services to achieve greater flexibility and efficiency.	+5,182
Total, NETL Indirect Program Direction	**-3,733**
Total, Indirect Program Direction	**-4,043**
NETL Coal Research and Development	
Salaries and Benefits	
The increase is a result of increased R&D by the Federal workforce, including the addition of 16 FTEs, plus increases in pay and benefit costs which include: statutory increases, promotions and with-in grades, performance awards, and health costs.	+2,268
Travel	
The increase is attributable to 16 additional FTEs in FY 2008.	+46
Support Services	
Funding will support a significant increase in R&D effort by services contracts for NETL Program Specific activities. These costs were previously funded within each program element. In FY 2007 NETL Program Specific activities were conducted only by FTEs.	+4,352
Total, NETL Coal Research and Development Direct Program Direction	**+6,666**
Alaska Natural Gas Transportation Project	
Salaries and Benefits	
The decrease is a result of the transfer of 6 FTEs from the Office of Federal Coordinator for the Alaska Natural Gas Transportation Project to an independent agency.	-822

	FY 2008 vs. FY 2007 ($000)
Travel	
The decrease is a result of the transfer of 6 FTEs from the Office of Federal Coordinator for the Alaska Natural Gas Transportation Project to an independent agency.	-100
Support Services	
The decrease is a result of the transfer of 6 FTEs from the Office of Federal Coordinator for the Alaska Natural Gas Transportation Project to an independent agency.	-1,296
Total, Alaska Natural Gas Transportation Project	**-2,218**
Import/Export Authorization	
Salaries and Benefits	
The increase is inflationary.	+42
Support Services	
The increase is inflationary.	+23
Total, Import/Export Authorization	**+65**
Advanced Metallurgical Research	
Salaries and Benefits	
The increase is a result of increases in pay and benefits costs which include; statutory increases, promotions and with-in grade increases, performance awards, and health benefit costs.	+231
Travel	
The increase is attributable to projected escalation in travel costs per trip.	+27
Support Services	
The increase is inflationary.	+49
Total, Advanced Metallurgical Research	**+307**
Total Funding Changes, Program Direction	**+777**

Plant and Capital Equipment

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Plant and Capital Equipment			
GPP at NETL and ARC	1,980	0	0
NETL Office/Lab Building	17,820	0	0
Total, Plant and Capital Equipment	19,800	0	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 the Albany Research Center (ARC).

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
GPP at NETL and ARC	**1,980**	**0**	**0**

Provides no funding in FY 2008 and FY 2007 for General Plant Projects (GPP) at the National Energy Technology Laboratory and the Albany Research Center.

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

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

In FY 2008 and 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.

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

Fossil Energy Environmental Restoration

Funding Profile by Subprogram

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Fossil Energy Environmental Restoration			
CERCLA Remedial Actions	1,163	1,155	1,135
RCRA Remedial Actions	1,884	3,120	3,000
Other ES&H Actions	6,457	5,440	5,435
Total, Fossil Energy Environmental Restoration	9,504	9,715	9,570

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; Fairbanks, Alaska; and Albany (ARC), Oregon sites.

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 with 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.

- Maintain ES&H risk management programs and Federal, state, and local permit compliance status at NETL.
- Conduct NETL's remediation activities at Rock Springs and Hoe Creek, WY sites.
- Conduct NETL'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 according to job hazard analyses.
- Conduct lead and asbestos abatement actions at NETL as required by maintenance and construction activities.
- Conduct limited on-site infrastructure fixes at NETL related to resolving ES&H issues (e.g., ventilation).
- Implement continuity of operations programs at NETL.

- Conduct pollution prevention and energy efficiency activities in support of maintaining ISO-14001 certification at NETL.
- Remove hazardous materials at ARC.
- Maintain emergency response and security program capabilities at NETL.
- Continue with ES&H-related equipment/facility upgrades and infrastructure repairs, including facility evaluations at ARC.
- Conduct soil and groundwater monitoring and remediation activities at ARC.
- Implement activities to meet waste minimization and energy efficiency goals.
- Maintain programs for purchasing environmentally preferable products and services.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
CERCLA Remedial Actions	**1,163**	**1,155**	**1,135**
▪ **Rock Springs Sites**	**495**	**575**	**530**

In FY 2008, operate and maintain the *in-situ* aerobic bioremediation systems at Rock Springs Sites 4, 6, 7, and 12 to remove benzene, toluene, and xylene (BTEX) compounds from the Tipton aquifer ground water, as required by the Wyoming Department of Environmental Quality. Initiate a 1 year stability period at Site 9 to assess contaminant rebound potential and conduct microbial enumeration evaluations at Site 12 to determine the effectiveness of aerobic bacteria in degrading organic contaminants. Conduct periodic ground water sampling events to determine progress in degrading organic contaminants. Plug and abandon approximately ten ground water monitor wells that are no longer required in the monitoring systems. *Participants include: U.S. Army Corps of Engineers, HydroGeoLogic Consultants, and RDS (NETL site support contractor).*

In FY 2007, operated (full scale operation) and maintained the *in-situ* aerobic bioremediation systems at Rock Springs Sites 4, 6, 7, 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. Plug and abandon approximately 9 groundwater wells that are no longer required in the monitoring system. Finalized plans to initiate a 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.*

▪ **Hoe Creek Site**	**247**	**275**	**250**

In FY 2008, continue aerobic bioremediation systems operation at the Hoe Creek III site on selected air sparge wells and conduct a shut-down period for 12 months to evaluate contaminant rebound in the Felix 1 aquifer. The semi-annual ground water monitoring results in October 2006

(in addition to a six well sampling event in August to check recalcitrant areas in the well field) indicated three monitor wells had benzene levels above target values required by the regulatory agency. The semi-annual sampling event in April 2007 will measure contaminant values and if values are reduced sufficiently, a 12 month shutdown period will be initiated. However, if values remain in excess of the targeted values, additional air sparging efforts may be necessary. Monitor the Hoe Creek II reclamation success and reseed areas where necessary. Plug and abandon approximately 18 ground water monitoring wells that are no longer required in the monitoring system. Perform periodic ground water sampling events to evaluate ground water contaminant removal. *Participants include: U.S. Army Corps of Engineers, Cape Environmental Associates.*

In FY 2007, plugged and abandoned 90 monitoring wells and reclaimed the Hoe Creek II site surface. Continued the shut-down mode at the Hoe Creek III site, which included conducting limited sparging operations at six well locations. Performed 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 included 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.*

- **Hanna Site Revegetation** **25** **40** **40**

In FY 2008, the Hanna DOE Site evaluation will be complete and will receive final liability and reclamation performance bond release from the Wyoming Department of Environmental Quality (WDEQ). R&D License # 1 1/222 will be terminated. If statistical cover and production sampling results are inconclusive in determining if reclaimed vegetation exceeds that prior to disturbance, additional samples may have to be taken. This effort would be initiated in July 2007 and completed in FY 2008. The requested funding will cover the cost of additional sampling.

In FY 2007, evaluate revegetation success at DOE Hanna Site and initiated closeout activities that included submitting bond release documentation to WDEQ, providing information to the general public and obtaining land owner final approval of reclamation results. Received final release of liability and reclamation performance bond release for the Rocky Mountain Underground Coal Gasification Site at Hanna, Wyoming from the WDEQ. License # R&D 15 is now terminated.

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

- **NETL Preliminary Site Investigations** **149** **40** **80**

In FY 2008, continue to investigate/support two sites where NETL may have current and future environmental liability (e.g., typically associated with property disposition issues due to

environmental contamination at an off-site contractor location) as determined through EPA and state environmental agency interactions.

In FY 2007, continued to investigate/support Foster Wheeler's former R&D site in Livingston, NJ, where NETL may have current and future environmental liability (e.g., typically associated with property disposition issues due to environmental contamination at an off-site contractor location) as determined through EPA and state environmental agency interactions.

In FY 2006, continued to investigate/support Foster Wheeler's former R&D site in Livingston, NJ, and the Air Products former gasification project in LaPorte, TX, where 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.

- **NETL Site Remediation** **0** **0** **10**

In FY 2008, perform on-site building and soil type remediation assessments at NETL (reassessment).

There was no activity in FY 2007 and FY 2006.

- **CERCLA PRP Response Activities** **247** **225** **225**

In FY 2008, 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 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 addressed environmental claims for two sites found to be contaminated and requiring cleanup under Federal CERCLA and state cleanup standards.

RCRA Remedial Actions **1,884** **3,120** **3,000**

- **NETL On-Site Remediation** **1,364** **1,605** **1,600**

In FY 2008, 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

RCRA-related risk management and maintenance activities. Continue retrofit of heating and cooling systems with acceptable refrigerants to meet Federal requirements by 2010.

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 and 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.

▪ **Albany Research Center (ARC) RCRA**	**520**	**1,515**	**1,400**

In FY 2008, continue ARC RCRA cleanup actions including abating lead and asbestos exposures; resolving chemical storage and labeling issues; monitoring soil and ground water; upgrading ventilation and air pollution systems; and improving air emission management, materials handling, and waste disposal activities. Continue regulatory ground water monitoring activities in conjunction with the Oregon Department of Environmental Quality. Continue investigation and risk assessment activities for the specific trichloroethylene (TCE) ground water contamination issue and identify the most appropriate path forward for remediation. Continue activities associated with beryllium removal. This will primarily involve continuing the cleanup of beryllium-contaminated areas at ARC which began in FY 2007.

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 Department 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.

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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

Other ES&H Actions	**6,457**	**5,440**	**5,435**
▪ **Other ES&H Actions at NETL**	**3,738**	**3,750**	**3,770**

In FY 2008, implement and improve baseline regulatory compliance, integrated safety management, and ISO 14001 programs (i.e., emergency management, occupational medicine and health, industrial hygiene, safety, environmental management, ergonomics, training, and fire protection). Implement actions in support of correcting ES&H deficiencies associated with infrastructure (e.g., ventilation systems, waste pads, and gas cylinder storage areas). Implement actions in support of achieving DOE's pollution prevention and energy management goals.

In FY 2007, implement and improve baseline regulatory compliance, integrated safety management, and ISO 14001 programs (i.e., emergency management, occupational medicine and health, industrial hygiene, safety, environmental management, ergonomics, training, and fire protection). Implement limited actions in support of correcting ES&H deficiencies associated with infrastructure (e.g., ventilation systems, waste pads, and 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 (i.e., emergency management, occupational medicine and health, industrial hygiene, safety, environmental management, ergonomics, training, and fire protection). 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, and gas cylinder storage areas). Implemented non-CERCLA related corrective actions that may occur at off-site locations.

▪ **ES&H Corrective Action at NETL Tulsa Site**	**15**	**15**	**15**

In FY 2008, FY 2007, and FY 2006, implement ergonomics corrective actions, provide site-specific ES&H training, conduct emergency drills, and perform infrastructure inspections.

▪ **ES&H Corrective Action at ARC**	**2,624**	**1,600**	**1,575**

In FY 2008, continue ARC safety and health programs and corrective actions including industrial hygiene monitoring and surveillance efforts, an occupational medicine program, emergency preparedness and drills, ergonomics, training, fire protection, and security improvements. Maintain indoor air quality and ventilations systems, walking/working surfaces, personal

(dollars in thousands)

FY 2006	FY 2007	FY 2008

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 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 included contracted security, integrated safety management system and environmental management systems support.

▪ **Program Support**	**80**	**75**	**75**
Fund technical and program management support.			
Total, Fossil Energy Environmental Restoration	**9,504**	**9,715**	**9,570**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
CERCLA Remedial Actions	
The decrease continues to reflect the successful incremental implementation of remediation strategies at NETL's offsite responsibilities in Wyoming.	-20
RCRA Remedial Actions	
The decrease will result in delays of one year in the following actions: the schedule to repair large infrastructure fixes required to deal with wastewater treatment plant improvements, indoor air quality fixes, and chemical inventory improvements..	-120

	FY 2008 vs. FY 2007 ($000)
Other ES&H Actions	
The overall decrease reflects a slight increase in general ES&H activities at NETL, which is offset by a decrease in general ES&H activities at ARC.	-5
Total Funding Change, Fossil Energy Environmental Restoration	**-145**

Import/Export Authorization

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Import/Export Authorization			
Import/Export Authorization	1,781	0	0
Total, Import/Export Authorization	1,781	0	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 2006	FY 2007	FY 2008
Import/Export Authorization	**1,781**	**0**	**0**

In FY 2008 and 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 with U.S. trading partners. Provide regulatory compliance and industry monitoring. Provide petroleum policy support for ASFE.

Total, Import/Export Authorization	**1,781**	**0**	**0**

Advanced Metallurgical Research

Funding Profile by Subprogram

(collars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Advanced Metallurgical Research			
Advanced Metallurgical Research	7,920	0	0
Total, Advanced Metallurgical Research	7,920	0	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 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.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Advanced Metallurgical Research	**7,920**	**0**	**0**

In FY 2008 and 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.

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.*

Total, Advanced Metallurgical Research	**7,920**	**0**	**0**

Special Recruitment Programs

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Special Recruitment Programs			
Special Recruitment Programs	649	656	656
Total, Special Recruitment Programs	649	656	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 ten 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.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Special Recruitment Programs	**649**	**656**	**656**
In FY 2008, FY 2007, and FY 2006, 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	**649**	**656**	**656**

Cooperative Research and Development

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Cooperative Research and Development			
Cooperative Research and Development	5,775	0	0
Total, Cooperative Research and Development	5,775	0	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 2006	FY 2007	FY 2008
Cooperative Research and Development	**5,775**	**0**	**0**

In FY 2008 and FY 2007, the Department anticipates that these centers can compete successfully for Fossil Energy funding through the competitive solicitation process.

In FY 2006, 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.

SBIR/STTR (non-add)	**—**	**—**	**—**

In FY 2006, $147,000 and $18,000 were transferred to the SBIR and STTR programs respectively.

Total, Cooperative Research and Development	**5,775**	**0**	**0**

Naval Petroleum & Oil Shale Reserves

Naval Petroleum & Oil Shale Reserves

Naval Petroleum And Oil Shale Reserves

Appropriation Language

For expenses necessary to carry out naval petroleum and oil shale reserve activities, including the hire of passenger motor vehicles, $17,301,000, to remain available until expended: Provided, That, notwithstanding any other provision of law, unobligated funds remaining from prior years shall be available for all naval petroleum and oil shale reserve activities.

Naval Petroleum and Oil Shale Reserves
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2007 CR	FY 2008 Request
Naval Petroleum and Oil Shale Reserves				
Naval Petroleum and Oil Shale Reserves	21,285	18,810	18,275	17,301
Total, Naval Petroleum and Oil Shale Reserves	21,285	18,810	18,275	17,301

Preface

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 No. 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 No. 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. The President must authorize continued production every three years, with production currently authorized through April 2009. Favorable oil prices and the application of new oil field strategies and technologies have temporarily arrested the steep decline in production. Although, it is expected that profitable operations at NPR-3 will continue, limited well work and facility maintenance will be performed and, as equipment failures are experienced or producing wells go down, facilities will be shut-down. Co-located with NPR-3, the Rocky Mountain Oilfield Testing Center (RMOTC) provides opportunities for field testing and demonstration of upstream and environmental products.

Mission

The NPOSR mission has evolved to complete environmental remediation activities and complete equity finalization at NPR-1 and while operating NPR-3, provide RMOTC as a field demonstration facility.

Benefits

The Department continues activities to finalize the Elk Hills equity interests of the Government and with ChevronTexaco, co-owner of Elk Hills. The final equity determinations will be based on all four of the NPR-1 commercially producing zones. Financial adjustments will occur after final decisions. Revenues from production at Wyoming's Naval Petroleum Reserve No. 3 (Teapot Dome field) are estimated to be $4.4 million in FY 2008.

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.

Strategic Themes and Goals and GPRA Unit Program Goals
The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, management and environmental aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Naval Petroleum and Oil Shale appropriation supports the following goal:

Strategic Theme 1, Energy Security: Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.1, Energy Diversity: Increase our energy options and reduce dependence on oil, thereby reducing vulnerability to disruptions and increasing the flexibility of the market to meet U.S. needs.

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

GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves: Expand the SPR to drawdown at a sustained rate of 5.9 million barrels for 90 days within 11-15 days notice by the President consistent with the expansion cost, schedule and performance baseline. Maintain a 2 million barrel reserve of home heating oil in the U.S. Northeast. Continue closeout and equity finalization activities related to NPR-1, including completion of any obligation of the United States relating to its Settlement Agreement with the State of California with respect to its claims to "school lands."

Contribution to Strategic Goal
The programs within the NPOSR appropriation contribute to Strategic Goal 1.1 by: 1) Ensuring completion of environmental remediation, cultural resource activities, equity finalization, and school lands Settlement Agreement payments.

Funding by Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Goal 1.1, Energy Diversity			
GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves	21,285	18,810	17,301
Total, Strategic Goal 1.1 (Naval Petroleum and Oil Shale Reserves)	21,285	18,810	17,301

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). NPR-3 will be operated in a cost–effective manner.

Validation and Verification
NPOSR manages 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.

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 2006	FY 2007	FY 2008
Naval Petroleum and Oil Shale Reserves			
NPOSR – Colorado, Utah, Wyoming	400	550	50
Total, Direct-Funded Maintenance and Repair	400	550	50

Naval Petroleum and Oil Shale Reserves
Office of Fossil Energy

Funding by Site by Program

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Naval Petroleum and Oil Shale Reserves			
NPOSR – Colorado, Utah, Wyoming	11,885	10,258	10,110
NPR California	6,450	5,976	0
Washington Headquarters	2,950	2,576	7,191
Total, Naval Petroleum and Oil Shale Reserves	21,285	18,810	17,301

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 (Teapot Dome Oilfield) to its economic limit. The Rocky Mountain Oilfield Testing Center (RMOTC) - a testing and demonstration facility is located at NPR-3.

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, management of the program moved from Bakersfield, California to Washington, DC.

Washington Headquarters
The headquarters office located in Washington, DC supports NPR-1 closeout as well as Elk Hills equity finalization activities. 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 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Naval Petroleum and Oil Shale Reserves			
Production and Operations	13,079	10,514	10,545
Management	8,206	8,296	6,756
Total, Naval Petroleum and Oil Shale Reserves	21,285	18,810	17,301

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

Mission

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

Production and Operations

Funding Schedule by Activity

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Production and Operations			
NPR-1 Closeout	4,438	3,704	3,735
NPR-3 Operations	4,513	3,810	3,710
NPR-3 Environmental Remediation	0	0	100
Rocky Mountain Oilfield Testing Center	4,128	3,000	3,000
Total, Production and Operations	13,079	10,514	10,545

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. The commitments were formalized in several legal agreements between DOE, Occidental, Chevron, and the State of California. Activities include completing environmental and archaeological work and assessing sites.

- Ongoing conventional oil field management and operations at NPR-3. The program's primary focus has been to operate NPR-3 in Wyoming to its economic limit. In October 2005, the President authorized continued production through April 5, 2009. Favorable oil prices and application of new oil field strategies and technologies have temporarily arrested the steep decline in production at this marginally economic field. Although, it is expected that profitable operations at NPR-3 will continue, limited well work and facility maintenance will be performed, and as equipment failures are experienced or producing wells go down, facilities will be shut-down temporarily shutting-in some production.

- While NPR-3 is in operations, field testing and demonstration of oil and gas technologies will continue at the Rocky Mountain Oilfield Testing Center (RMOTC).

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
NPR-1 Closeout	**4,438**	**3,704**	**3,735**

Continue Elk Hills environmental and archeological closeout activities. Following completion of Risk Assessments, complete appropriate Corrective Action Studies to determine cleanup in the field. Completion of Risk Assessments and Corrective Action Studies is scheduled for FY 2009. Continue negotiations with ChevronTexaco on the disposition of sites listed on Exhibit H of the Unit Plan Contract Termination Agreement.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008

FY 2007 continues human health and ecological Risk Assessments on the 131 California Department of Toxic Substances Control (DTSC) areas of concern. 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.

NPR-3 Operations	**4,513**	**3,810**	**3,710**

Continue to maintain and produce 730 wells. Production in FY 2008 is expected to average 230 barrels of oil per day resulting in $4.4 million of revenues deposited to the U.S. Treasury. Limited well work and facility maintenance will be performed.

FY 2007 funding supports maintenance and production of 730 wells (wells will begun to be shut-in in late FY 2007), resulting in expected revenues of $5.4 million deposited to the U.S. Treasury. Maintenance of rolling stock and equipment to support field operations and RMOTC will be minimal and only as required for safety and environmental risks. Maintain approximately 100 miles of road throughout the field. FY 2006 supports continued maintenance and production of 730 wells, 150 miles of pipelines, and 100 miles of road.

NPR-3 Environmental Remediation	**0**	**0**	**100**

FY 2008 includes funding to plug and abandon dormant wells and conduct other restoration activities.

Rocky Mountain Oilfield Testing Center	**4,128**	**3,000**	**3,000**

Supports testing partners seeking to use the facility for development and demonstration of new technologies. Focus areas include: oil and gas exploration/production; drilling and well completions.

FY 2006 and FY 2007 funding supports testing partners seeking to use the facility for development and demonstration of new technologies. With the sharing of field staff the number of testing partners that will be supported is contingent upon the funding levels for field operations.

Total, Production and Operations	**13,079**	**10,514**	**10,545**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Production & Operations	
▪ **NPR-1 Closeout**	
Increase supports site sampling activities at NPR-1.	+31
▪ **NPR-3 Operations**	
The decrease reflects a reduction in facility and equipment maintenance.	-100
▪ **NPR-3 Environmental Restoration**	
The increase reflects the addition of activities to plug and abandon dormant wells as well as other restoration activities.	+100
Total, Production and Operations	**+31**

Management

Funding Schedule by Activity

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Management			
Program Direction	5,025	4,949	3,938
Equity	1,487	1,026	865
Business Management & Support	1,694	2,321	1,953
Total, Management	8,206	8,296	6,756

Description

Management supports all business management activities associated with NPR-1 closeout, as well as supporting the finalization of equity of the Government and ChevronTexaco, the other owner of Elk Hills. Program Direction for 28 full time equivalents (FTEs) is reflected, including the federal staff at NPR-3/RMOTC who provide guidance and program planning to support service personnel. Contractor personnel provide analytical support for policy decisions, ensure that the DOE safety programs are administered in accordance with OSHA policy, and provide information technology support by maintaining servers, hardware and software.

Benefits

The finalization of equity will involve all four of the NPR-1 commercially producing zones. Financial adjustments will occur after the final decisions have been made.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Program Direction	**5,025**	**4,949**	**3,938**

Provides salaries, travel, contractor support services and other related expenses to support the management and execution of the NPOSR program.

- **Salaries and Benefits** **3,777** **3,632** **3,057**
  Staff of 28 FTEs performs policy and planning, equity determination, petroleum engineering, financial management, procurement, environment and safety, and administration of reimbursable work programs.

- **Travel** **212** **211** **198**
  Provides travel for resolution of equity issues, western energy issues, and to assure the accomplishment of NPR-1 closeout activities.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
▪ **Support Services**	**199**	**204**	**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**	**837**	**902**	**479**
Major elements are communications, utilities, building leases, reproduction services, supplies, equipment and materials.			
Equity	**1,487**	**1,026**	**865**
Of the four applicable zones, the Dry Gas Zone and Carneros Zone are finalized. The Stevens Zone is expected to be completed in 2007. A final recommendation for the Shallow Oil Zone is pending.			
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 & Support	**1,694**	**2,321**	**1,953**
Continue payments for post-employment medical and dental benefits to former Management and Operating (M&O) contractor employees. Continue environmental, safety, and administrative support at the field sites.			
Total, Management	**8,206**	**8,296**	**6,756**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Program Direction	
The decrease reflects a reduction in HQ staffing (-4 FTEs) and decreases in printing, reproduction, supplies and materials.	-1,011
Equity	
The decrease reflects fewer support activities as the final equity determination is completed.	-161
Business Management & Support	
The decrease reflects closeout of records storage contracts and administrative service support for the Bakersfield field site.	-368
Total, Management	**-1,540**

Funding Profile by Category

(dollars in thousands/whole FTEs)

	FY 2006	FY 2007	FY 2008
NPR California			
Salaries and Benefits	770	0	0
Travel	25	0	0
Other Related Expenses	249	0	0
Total, NPR California	1,044	0	0
Full Time Equivalents	4	0	0
NPOSR – Colorado, Utah, Wyoming (CUW)			
Salaries and Benefits	1,950	1,995	1,950
Travel	141	144	150
Other Related Expenses	437	439	247
Total, NPOSR – Colorado, Utah, Wyoming (CUW)	2,528	2,578	2,347
Full Time Equivalents	17	17	17
Washington Headquarters			
Salaries and Benefits	1,057	1,637	1,107
Travel	46	67	48
Support Services	199	204	204
Other Related Expenses	151	463	232
Total, Washington Headquarters	1,453	2,371	1,591
Full Time Equivalents	11	15	11
Total Program Direction			
Salaries and Benefits	3,777	3,632	3,057
Travel	212	211	198
Support Services	199	204	204
Other Related Expenses	837	902	479
Total, Program Direction	5,025	4,949	3,938
Total, Full Time Equivalents	32	32	28

Other Related Expenses by Category

	FY 2006	FY 2007	FY 2008
Other Related Expenses			
Rent to GSA	15	15	15
Rent to Others	227	235	120
Communications, Utilities, Misc	100	100	80
Printing and Reproduction	30	25	15
Other Services	233	324	152
Purchases from Gov. Accounts	64	46	30
Operation and Maintenance of Equip	5	7	7
Supplies and Materials	135	130	60
Equipment	28	20	0
Total, Other Related Expenses	837	902	479

Naval Petroleum and Oil Shale Reserves
Projected Federal Revenues

(dollars in thousands)

	FY 2006		
	Production	Price	Revenues
Crude Oil (BOPD)	360	58.74	$7,709
Liquid Products (GPD)	850	1.25	$388
Total, NPR-3			$8,097

	FY 2007		
	Production	Price	Revenues
Crude Oil (BOPD)	300	48.87	$5,351
Liquid Products (GPD)	35	1.09	$14
Total, NPR-3			$5,365

	FY 2008		
	Production	Price	Revenues
Crude Oil (BOPD)	230	52.24	$4,386
Liquid Products (GPD)	0	1.00	$0
Total, NPR-3			$4,386

	FY 2009		
	Production	Price	Revenues
Crude Oil (BOPD)	196	52.75	$3,774
Liquid Products (GPD)	0	1.00	$0
Total, NPR-3			$3,774

	FY 2010		
	Production	Price	Revenues
Crude Oil (BOPD)	167	52.14	$3,178
Liquid Products (GPD)	0	1.00	$0
Total, NPR-3			$3,178

	FY 2011		
	Production	Price	Revenues
Crude Oil (BOPD)	142	51.61	$2,675
Liquid Products (GPD)	0	1.00	$0
Total, NPR-3			$2,675

	FY 2012		
	Production	Price	Revenues
Crude Oil (BOPD)	121	51.10	$2,257
Liquid Products (GPD)	0	1.00	$0
Total, NPR-3			$2,257

Elk Hills School Lands Fund

Elk Hills School Lands Fund

Elk Hills School Lands Fund
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2007 CR	FY 2008 Request
Elk Hills School Lands Fund				
California Teachers' Pension Fund Payment	47,520	0	2,000	0
Advance Appropriation	36,000	0	0	
Total, Elk Hills School Lands Fund	83,520	0	2,000	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.

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 Themes and GPRA Unit Program Goals
The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, management and environmental aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Elk Hills School Lands Fund appropriation supports the following goal:

Strategic Theme 1, Energy Security: Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.1, Energy Diversity: Increase our energy options and reduce dependence on oil, thereby reducing vulnerability to disruptions and increasing the flexibility of the market to meet U.S. needs.

The programs funded within the Elk Hills School Lands Fund appropriation have one GPRA Unit Program Goal that contributes to the Strategic Goals in the "goal cascade". This goal is:

GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves: Expand the SPR to drawdown at a sustained rate of 5.9 million barrels per day for 90 days within 11 - 15 days notice by the President consistent with the expansion cost, schedule, and performance baseline. Maintain a 2 million barrel reserve of home heating oil in the U.S. Northeast. Continue closeout and equity finalization activities related to NPR-1, including completion of any obligations of the United States relating to its Settlement Agreement with the State of California with respect to its claims to "school lands."

Contribution to Strategic Goal

The Elk Hills School Lands Fund appropriation contribute to Strategic Goal 1.1 by: fulfilling the settlement agreement between DOE and the State of California with respect to its longstanding claims to two parcels of land within NPR-1.

Funding by Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Goal 1.1, Energy Diversity			
GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves	83,520	0	0
Total Strategic Goal 1.1, Elk Hills School Lands Fund	83,520	0	0

Elk Hills School Lands Fund

Funding by Site by Program

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Elk Hills School Lands Fund			
California Teachers' Pension Fund Payment	47,520	0	0
Advance Appropriation	36,000	0	0
Total, Elk Hills School Lands Fund	83,520	0	0

Major Changes or Shifts by Site

Elk Hills School Lands Fund

There is no request for funding in 2008. 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 Schedule by Activity

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Elk Hills School Lands Fund			
California Teachers' Pension Fund Payment	47,520	0	0
Advance Appropriation	36,000	0	0
Total, Elk Hills School Lands Fund	83,520	0	0

Description

A total of $300 million has been paid to-date. 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 Interior and Related Agencies 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 $83.52 million reflects the seventh installment payment. The amount of the final payment cannot be determined until the equity determination process is completed and all associated costs are known.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Elk Hills School Lands Fund	**83,520**	**0**	**0**

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	**83,520**	**0**	**0**

Strategic Petroleum Reserve

Strategic Petroleum Reserve

Strategic Petroleum Reserve

Proposed Appropriation Language

For necessary expenses for Strategic Petroleum 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 $331,609,000 to remain available until expended. Of this amount, $168,137,000 is provided for expansion of the Reserve to 1.5 billion barrels.

Strategic Petroleum Reserve
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY2006 Current Appropriation	FY 2007 Request	FY 2007 CR	FY 2008 Request
Strategic Petroleum Reserve				
Strategic Petroleum Reserve	207,340	155,430	155,430	331,609
Total, Strategic Petroleum Reserve	207,340	155,430	155,430	331,609

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
  - Operations
  - Expansion
- Expansion

Mission

The mission of the Strategic Petroleum Reserve (SPR) is to store petroleum to mitigate a major petroleum supply interruption to the U.S. and to carry out obligations under the international energy program. The Reserve's current inventory of 690.3 million barrels provides 56 days of net import protection. The Energy Policy Act of 2005 directs DOE to acquire oil to increase the SPR to one billion barrels, its authorized level, as expeditiously as practical, without incurring excessive cost or appreciably affecting the price of petroleum products to consumers. The 2008 Budget proposes to expand the Reserve to 1.5 billion barrels, thereby doubling the protection the SPR provides. Legislative authority will be requested at a later date. This request includes funding for the National Energy Policy Act (NEPA) process to expand from 1.0 billion barrels to 1.5 billion barrels.

Benefits

Expansion of the Reserve will double the nation's protection from interruption of oil import supplies. 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 Themes and Goals and GPRA Unit Program Goals

The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, management and environmental aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Strategic Petroleum Reserve appropriation supports the following goal:

Strategic Theme 1, Energy Security: Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.1, Energy Diversity: Increase our energy options and reduce dependence on oil, thereby reducing vulnerability to disruptions and increasing the flexibility of the market to meet U.S. needs.

The programs funded within the Strategic Petroleum Reserve appropriation have one GPRA Unit Program Goal that contributes to the Strategic Goals in the "goal cascade". This goal is:

GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves: Expand the SPR to drawdown at a sustained rate of 5.9 million barrels per day for 90 days within 11 - 15 days notice by the President consistent with the expansion cost, schedule, and performance baseline. Maintain a 2 million barrel reserve of home heating oil in the U.S. Northeast. Continue closeout and equity finalization activities related to NPR-1, including completion of any obligations of the United States relating to its Settlement Agreement with the State of California with respect to its claims to "school lands."

Contribution to Strategic Goal

The programs within the SPR appropriation contribute to Strategic Goal 1.1 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 11-15 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. Expansion funds all activities to increase the size of the Reserve beyond 727 million barrels of storage and 691 million barrels of oil to address vulnerabilities with import dependence.

Funding by Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Goal 1.1, Energy Diversity			
GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves	207,340	155,430	331,609
Total, Strategic Goal 1.1, Strategic Petroleum Reserve	207,340	155,430	331,609

Annual Performance Results and Targets

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Results	FY 2007 Targets	FY 2008 Targets
Strategic Petroleum Reserve					
Increase 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.)	Increase crude oil inventory to 656 million barrels. (EXCEEDED GOAL: End of year inventory was 670 million barrels.)	Increase crude oil inventory to 690 million barrels. (GOAL EXCEEDED: Inventory of 700 million barrels was reached in August 2005).			
Complete the Degas Plant design. (MET GOAL)	Commence 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. (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 $\geq$ 95% of monthly maintenance and accessibility goals. (MET GOAL)	Achieve $\geq$ 95% of monthly maintenance and accessibility goals.	Achieve $\geq$ 95% of monthly maintenance and accessibility goals.
			Achieve operating cost per barrel of capacity of $0.204. (EXCEEDED GOAL: End of year operating costs were $0.186)	Achieve operating cost per barrel of capacity of $0.203	Achieve operating cost per barrel of capacity of $0.203
					Approve alternative selection and cost ranges (Critical Decision 1) for billion barrel expansion.

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 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. The Energy Policy Act of 2005 directs DOE to acquire oil to increase the SPR to one billion barrels as expeditiously as practical, without incurring excessive cost or appreciably affecting the price of petroleum products to consumers. The 2008 Budget proposes expansion of the Reserve to 1.5 billion barrels as further insurance against petroleum supply disruptions.

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 volatile organic compounds (VOCs) above safe levels during oil movements through commercial distribution points. Inventory processing at Big Hill was completed in FY 2006 and the self-contained plant will be relocated to Bryan Mound in FY 2007.

Performance can be affected by several external factors including:

- Petroleum consumption and import dependence levels
- 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 energy security, and improved environmental conditions.

The PART for the SPR was conducted in FY 2005 and found the program to be effective - 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%.

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 2006	FY 2007	FY 2008
Strategic Petroleum Reserve	30,287	36,984	32,768
Total, Direct-Funded Maintenance and Repair	30,287	36,984	32,768

Strategic Petroleum Reserve
Office of Fossil Energy

Funding by Site by Program

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Petroleum Reserve			
SPR Project Management Office- New Orleans, LA	89,598	76,581	88,021
Big Hill Site, TX	25,763	24,064	17,421
Big Hill, TX (Expansion)	0	0	53,133
Bryan Mound Site, TX	28,083	19,404	21,076
West Hackberry Site, LA	34,958	17,382	17,052
West Hackberry, LA (Expansion)	0	0	36,529
Bayou Choctaw Site, LA	15,371	9,233	10,953
Bayou Choctaw, LA (Expansion)	0	0	30,700
Richton, MS (Expansion)	0	0	34,673
SPR Program Office, Washington, DC	6,633	4,739	4,825
Washington, DC (Expansion)	0	0	13,102
Sandia National Laboratory	5,696	2,780	2,838
National Energy Technology Laboratory	888	897	936
Oak Ridge National Laboratory	350	350	350
Total, Strategic Petroleum Reserve	207,340	155,430	331,609

Major Changes or Shifts by Site

Big Hill Site, TX
- In December 2006, complete vapor pressure mitigation operations.

Bryan Mound Site, TX
- Physical move of degas plant from Big Hill to Bryan Mound occurs September 2007.
- Degas operations begins January 2008 and finishes January 2011.

West Hackberry Site, LA
- Completed replacement of the raw water intake pipeline. Pipeline operational in February 2007.

Site Description

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.

Big Hill Site, TX
The Big Hill storage facility is 26 miles southwest of Beaumont Texas. The site has storage capacity of 170 million barrels.

Bryan Mound Site, TX
The Bryan Mound storage facility is three miles southwest of Freeport, Texas. The site has storage capacity of 251 million barrels.

West Hackberry Site, LA
The West Hackberry storage facility is 25 miles southwest of Lake Charles, LA. The site has storage capacity of 230 million barrels.

Bayou Choctaw Site, LA
The Bayou Choctaw storage facility is 12 miles southwest of Baton Rouge, LA. The site has storage capacity of 76 million barrels.

Richton, MS Site (New)
The proposed Richton storage facility will be 18 miles east of Hattiesburg, MS in Perry County, MS. The site is expected to have storage capacity of 160 million barrels.

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.

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.

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.

Strategic Petroleum Reserve

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Strategic Petroleum Reserve			
Facilities Development and Operations	190,510	138,040	145,303
Management for Operations	16,830	17,390	18,169
Management for Expansion	0	0	1,641
Expansion	0	0	166,496
Total, Strategic Petroleum Reserve	207,340	155,430	331,609

Public Law Authorizations:

Public Law 94-163, "Energy Policy and Conservation Act" (FY 2003) As Amended

Mission

The mission of the Facilities Development and Operations subprogram is to provide for all requirements associated with developing and maintaining facilities for the storage of petroleum, operations associated with placing petroleum into storage, and operational readiness activities. 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. Expansion funds all activities to increase the size of the Reserve to address vulnerabilities with growing U.S. consumption and increased import dependence.

Benefits

The U.S. reliance on oil 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.

Facilities Development and Operations

Funding Schedule by Activity

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Facilities Development and Operations			
Security	19,025	19,296	19,593
Power	4,890	4,988	5,353
Operations and Maintenance	154,973	111,079	117,624
Support Services	2,622	2,677	2,733
Environmental Review for Expansion	9,000	0	0
Total, Facilities Development and Operations	190,510	138,040	145,303

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.

Benefits

This subprogram provides funding for protection from supply disruptions. The U.S. reliance on oil 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 2006	FY 2007	FY 2008
Security	**19,025**	**19,296**	**19,593**

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.

FY 2006 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.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Power	**4,890**	**4,988**	**5,353**

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.

FY 2006 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	**154,973**	**111,079**	**117,624**

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.

FY 2006 includes the replacement of the Raw Water Intake Pipeline at West Hackberry; elevation of the perimeter security fence and upgrade of the Fiber Optic Intrusion Detection System at Bayou Choctaw; and repair of tanks at 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.

Support Services	**2,622**	**2,677**	**2,733**

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. Funding supports subcontractor headcount (23 FTEs) to support these activities.

Environmental Review for Expansion	**9,000**	**0**	**0**

The Energy Policy Act of 2005 required the Secretary of Energy to select sites for expansion of the SPR to one billion barrels. Funding in FY 2006 supported preparation of an Environmental Impact Statement (EIS) under the National Energy Policy Act. The final EIS was completed and issued in December 2006.

Total, Facilities Development and Operations	**190,510**	**138,040**	**145,303**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Facilities Development & Operations	
▪ **Security**	
The increase is due to escalation (+523) offset by the one-time replacement of the badging system and canines (-226) in FY 2007.	+297
▪ **Power**	
The increase reflects a full year of degas plant operations (versus one month in FY 2007). The plant was relocated from Big Hill to Bryan Mound.	+365
▪ **Operations and Maintenance**	
The increase reflects full funding of the Seaway terminalling contract at Bryan Mound; the scheduled biennial recovery test exercise; and renewal of the non-emergency water service contract at Big Hill.	+6,545
▪ **Support Services**	
The increase is due to escalation.	+56
Total, Facilities Development and Operations	**+7,263**

Capital Operating Expenses and Construction Summary

Capital Operating Expenses

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Site Wide Card Access Systems (All Sites)	1,000	0	0
Raw Water Small Craft Intrusion Barriers (All Sites)	619	0	0
Bryan Mound Access Roads (MM-574)	0	584	0
Site Perimeter Security Access Roads (MM-591)	0	600	0
West Hackberry Cavern Lighting (MM-617)	0	0	1,039
Flood Protection Upgrades at Bayou Choctaw (MM-637)	0	0	750
Capital Equipment	10,021	10,628	3,531
Total, Capital Operating Expenses	11,640	11,812	5,320

Construction Projects

	Total Estimated Cost (TEC)	Prior-Year Appro-priations	FY 2006	FY 2007	FY2008	Unappropriated Balance
Site Facility Upgrades (Big Hill, Bryan Mound & West Hackberry)	1,207	0	0	850	0	0
Site Facility Upgrades (Bayou Choctaw, Bryan Mound & West Hackberry)	1,157	0	0	0	815	0
Total, Construction Projects		0		850	815	

Major Items of Equipment *(TEC $2 million or greater)*

	Total Project Cost (TPC)	Total Estimated Cost (TEC)	Prior-Year Appro-priations	FY 2006	FY 2007	FY 2008	Completion Date
West Hackberry Raw Water Intake Pipeline (MM-463) *		26,586	24,080	0	0	0	FY 2007
Protective Shelters for Raw Water Pumps (MM-263)		2,624	0	0	1,848	0	FY 2007

* Utilized prior-year contractor savings.

	Total Project Cost (TPC)	Total Estimated Cost (TEC)	Prior-Year Appro-priations	FY 2006	FY 2007	FY 2008	Completion Date
Protective Shelters for Crude Oil Pumps (MM-610)		4,050	0	0	1,500	0	FY 2007
Big Hill Wilbur Road Repairs (MM-293)		2,242	0	0	0	1,579	FY 2008
Total, Major Items of Equipment				0	3,348	1,579	

Management

Funding Schedule by Activity

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Management			
Management for Operations	16,830	17,390	18,169
Management for Expansion	0	0	1,641
Subtotal, Management	16,830	17,390	19,810

Mission

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. Funding for contract services required to support management and the technical analysis of program issues is included. Beginning in FY 2008, funding is provided for an additional 12 full-time equivalent employees to support expansion efforts.

Benefits

Management provides funding for federal staff and contract support services to ensure protection from oil supply disruptions. Reliance on oil 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.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Salaries and Benefits	**13,507**	**13,818**	**15,534**

Funds salaries and benefits for 134 full time equivalent employees (FTEs) to assure achievement of Level 1 Performance criteria for drawdown and distribution. The total includes 12 FTEs for expansion activities. Provides for support and oversight of M&O contractor and subcontractor activities and program operations.

Travel	**517**	**548**	**608**

Provides travel to assure capability to achieve Level 1 Performance criteria for drawdown and distribution and planned expansion of the Reserve.

Support Services	**1,111**	**924**	**942**

Provide analytic support for SPR development, fill and distribution policy decisions. Includes distribution modeling maintenance.

Other Related Expenses	**1,695**	**2,100**	**2,726**

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008

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	**16,830**	**17,390**	**19,810**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Salaries and Benefits	
Increase is due to escalation and will also support 12 additional FTEs for expansion.	+1,716
Travel	
Increase is required to support 12 additional FTEs for expansion.	+60
Support Services	
Increase is due to escalation.	+18
Other Related Expenses	
Increase reflects escalation; scheduled upgrade of computer hardware; and addition of supplies, materials, training and equipment for 12 additional FTEs that will support expansion.	+626
Total Funding Change, Management	**+2,420**

Management
Funding Profile by Category

(dollars in thousands/whole FTEs)

	FY 2006	FY 2007	FY 2008
Washington Headquarters			
Salaries and Benefits	3,174	3,247	3,347
Travel	163	166	169
Support Services	1,111	924	942
Other Related Expenses	685	752	717
Total, Washington Headquarters	5,133	5,089	5,175
Full Time Equivalents	27	27	27
Strategic Petroleum Reserve (SPR) Project Management Office			
Salaries and Benefits	10,333	10,571	10,820
Travel	354	382	390
Other Related Expenses	1,010	1,348	1,784
Total, SPR Project Management Office	11,697	12,301	12,994
Full Time Equivalents	95	95	95
Expansion			
Salaries and Benefits	0	0	1,367
Travel	0	0	49
Other Related Expenses	0	0	225
Total, Expansion	0	0	1,641
Full Time Equivalents	0	0	12
Total Management			
Salaries and Benefits	13,507	13,818	15,534
Travel	517	548	608
Support Services	1,111	924	942
Other Related Expenses	1,695	2,100	2,726
Total, Management	16,830	17,390	19,810
Total, Full Time Equivalents	122	122	134

Support Services by Category

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Technical Support			
Economic and Environmental Analyses	1,111	924	942
Total, Support Services	1,111	924	942

Other Related Expenses by Category

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Other Related Expenses			
Rent to Others	469	478	497
Communications, Utilities, Misc	35	35	40
Other Services	973	1,339	1,826
Supplies and Materials	123	123	148
Equipment	95	125	215
Total, Other Related Expenses	1,695	2,100	2,726

Expansion

Funding Schedule by Activity

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Expansion			
Bayou Choctaw, LA	0	0	30,290
West Hackberry, LA	0	0	36,119
Big Hill, TX	0	0	52,723
Richton, MS	0	0	34,227
Expansion to 1.5 Billion Barrels	0	0	13,137
Total, Expansion	0	0	166,496

Description

The Energy Policy Act of 2005 directs DOE to acquire oil to increase the SPR to one billion barrels, its authorized level, as expeditiously as practical, without incurring excessive cost or appreciably affecting the price of petroleum products to consumers. In order to increase the inventory to one billion barrels, DOE must expand three existing sites and add one new site. A final environmental impact statement on all of the proposed expansion sites was completed and issued in December 2006. Concurrently, the Department announced the selection of the Richton, MS site for a new 160 million barrel facility. A Record of Decision will be issued in January 2007.

The 2008 Budget proposes to expand the Reserve to 1.5 billion barrels, doubling the nation's protection from oil import disruptions. This request includes funding for the National Energy Policy Act (NEPA) process for expansion from 1 billion barrels to 1.5 billion barrels.

Benefits

This subprogram provides funding for protection from supply disruptions. The U.S. reliance on oil 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 2006	FY 2007	FY 2008
Bayou Choctaw, LA	**0**	**0**	**30,290**
The request supports expansion of the existing site by 20 million barrels. FY 2008 activities include engineering design and permit applications, acquisition of real estate for new brine disposal wells and procurement of long lead drilling casings.			
West Hackberry, LA	**0**	**0**	**36,119**
The request supports expansion of the existing site by 15 million barrels. FY 2008 activities include engineering design and permit applications, acquisition of three existing caverns, and procurement of long lead materials.			
Big Hill, TX	**0**	**0**	**52,723**
The request supports expansion of the existing site by 80 million barrels. FY 2008 activities include engineering design and permit applications, acquisition of real estate for proposed storage caverns and procurement of long lead drilling casings.			
Richton, MS	**0**	**0**	**34,227**
The request supports development of a new 160 million barrel site. FY 2008 activities include geotechnical seismic of salt domes, engineering design and permit applications, and acquisition of real estate for proposed new facility.			
Expansion to 1.5 billion barrels	**0**	**0**	**13,137**
The request provides for the National Energy Policy Act (NEPA) environmental review process, conceptual designs of candidate sites, and geotechnical site investigations to expand the Reserve from one billion barrels to 1.5 billion barrels.			
Total, Expansion	**0**	**0**	**166,496**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Expansion	
▪ **Bayou Choctaw, LA**	
The increase reflects start of 20 million barrel expansion	+30,290
▪ **West Hackberry, LA**	
The increase reflects start of 15 million barrel expansion.	+36,119
▪ **Big Hill, TX**	
The increase reflects start of 80 million barrel expansion.	+52,723
▪ **Richton, MS**	
The increase reflects start of 160 million barrel site development.	+34,227
▪ **Expansion to 1.5 billion barrels**	
The increase supports NEPA activities for expansion from 1 billion barrels to 1.5 billion barrels.	+13,137
Total, Expansion	**+166,496**

Capital Operating Expenses and Construction Summary

Major Items of Equipment *(TEC $2 million or greater)*

	Total Project Cost (TPC)	Total Estimated Cost (TEC)	Prior-Year Appro-priations	FY 2006	FY 2007	FY 2008	Completion Date
Bayou Choctaw, LA Expansion		177,159	0	0	0	30,290	FY 2013
West Hackberry, LA Expansion		42,812	0	0	0	36,119	FY 2010
Big Hill, TX Expansion		493,432	0	0	0	52,723	FY 2014
Richton, MS Site Development		2,951,671	0	0	0	34,227	FY 2019
Expansion to 1.5 BBL		6,400,226	0	0	0	13,137	FY 2027
Total, Major Items of Equipment		10,065,300	0	0	0	166,496	

SPR Petroleum Account
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY2006 Current Appropriation[a]	FY 2007 Request	FY 2007 CR	FY 2008 Request
SPR Petroleum Account				
SPR Oil Acquisition	-43,000	0	0	0
Total, SPR Petroleum Account	-43,000	0	0	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.

The SPR Petroleum Account funds all SPR petroleum inventory acquisitions, associated transportation and customs duties, and incremental drawdown expenses. 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. The process of expansion will begin immediately in FY 2007 with the Department using balances of $584 million primarily from the receipts from the Hurricane Katrina emergency sale, to acquire oil. The Department of the Interior will also provide royalty-in-kind oil in FY 2007 and FY 2008 to fill the Reserve's current storage capacity of 727 million barrels. Capacity expansion from 727 million barrels to 1.5 billion barrels will begin in FY 2008 at existing and new sites.

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 U.S. and to carry out obligations under the international energy program.

Benefits

The U.S. reliance on oil 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 funds transferred from & returned to the SPR Facilities Account to finance the Hurricane Katrina Drawdown.

Strategic Themes and GPRA Unit Program Goals
The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, management and environmental aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The SPR Petroleum Account appropriation supports the following goal:

Strategic Theme 1, Energy Security: Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.1, Energy Diversity: Increase our energy options and reduce dependence on oil, thereby reducing vulnerability to disruptions and increasing the flexibility of the market to meet U.S. needs.

The programs funded within the SPR Petroleum Account appropriation have one GPRA Unit Program Goal that contributes to the Strategic Goals in the "goal cascade". This goal is:

GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves: Expand the SPR to drawdown at a sustained rate of 5.9 million barrels per day for 90 days within 11 - 15 days notice by the President consistent with the expansion cost, schedule, and performance baseline. Maintain a 2 million barrel reserve of home heating oil in the U.S. Northeast. Continue closeout and equity finalization activities related to NPR-1, including completion of any obligations of the United States relating to its Settlement Agreement with the State of California with respect to its claims to "school lands."

Contribution to Strategic Goal
The SPR Petroleum Account appropriation contribute to Strategic Goal 1.1 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 Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Goal 1.1, Energy Diversity			
GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves	-43,000	0	0
Total, Strategic Goal 1.1, SPR Petroleum Account	-43,000	0	0

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 (DOI) to use Federal Royalty Oil to fill the SPR to 700 million barrels. During FY 2007, the Department will use balances primarily from receipts from the Hurricane Katrina emergency sale to replace the oil sold. Additionally, the Department of the Interior will provide royalty in-kind oil for placement into the Reserve.

Performance can be affected by several external factors including:

- 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 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%.

SPR Petroleum Account
Office of Fossil Energy

Funding by Site by Program

(dollars in thousands)

	FY 2006[a]	FY 2007	FY 2008
SPR Petroleum Account			
SPR Project Management Office, New Orleans, LA	-43,000	0	0
Total, SPR Petroleum Account	-43,000	0	0

Site Description

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.

[a] Reflects the return of financing to SPR Facilities Account for planned 30 million barrel drawdown (actual drawdown was 11 million barrels).

SPR Petroleum Account

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
SPR Petroleum Account			
SPR Oil Acquisition	-43,000	0	0
Total, SPR Petroleum Account	-43,000	0	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. During FY 2007, the Department will use balances primarily from the Hurricane Katrina emergency sale to replace the oil sold. Additionally, the Department of the Interior will provide royalty in-kind oil for placement into the Reserve.

SPR Oil Acquisition

Funding Schedule by Activity

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
SPR Petroleum Account			
SPR Oil Acquisition	-43,000	0	0
Total, SPR Petroleum Account	-43,000	0	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. During FY 2007, the Department will use balances primarily from Hurricane Katrina sale receipts to replace the oil sold. Additionally, DOI will provide royalty oil in kind.

Detailed Justification

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Oil Acquisition and Drawdown Operations	**-43,000**	**0**	**0**

No FY 2008 activity.

During FY 2007, the Department will use balances primarily from Hurricane Katrina emergency sale receipts to replace the oil sold. Additionally, DOI will provide royalty in-kind oil.

FY 2006 reflects the transfer and 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.

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, $5,325,000 to remain available until expended.

Northeast Home Heating Oil Reserve
Office of Fossil Energy

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2007 CR	FY 2008 Request
Northeast Home Heating Oil Reserve	5,325	4,950	4,950	5,325
Use of Prior-Year Balances	-5,325	0	0	0
Total, Northeast Home Heating Oil Reserve	0	4,950	4,950	5,325

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 severe energy supply interruption.

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 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 Themes and Goals and GPRA Unit Program Goals

The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, management and environmental aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Northeast Home Heating Oil Reserve appropriation supports the following goals:

Strategic Theme 1, Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.1, Energy Diversity: Improve our energy options and reduce dependence on oil, thereby reducing vulnerability to disruptions and increasing the flexibility of the market to meet U. S. needs.

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:

GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves: Expand the SPR to drawdown at a sustained rate of 5.9 million barrels per day for 90 days within 11 - 15 days notice by the President consistent with the expansion cost, schedule, and performance baseline. Maintain a 2 million barrel reserve of home heating oil in the U.S. Northeast. Continue closeout and equity finalization activities related to NPR-1, including completion of any obligations of the United States relating to its Settlement Agreement with the State of California with respect to its claims to "school lands."

Contribution to Strategic Goal

The Northeast Home Heating Oil Reserve contributes to Strategic Goal 1.1 by assuring that it is maintained in a high state of readiness and capable of completing a drawdown of the heating oil inventory in 12 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 Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006[a]	FY 2007	FY 2008
Strategic Goal 1.1, Energy Diversity			
GPRA Unit Program Goal 1.1.11.00, Petroleum Reserves	0	4,950	5,325
Total, Strategic Goal 1.1, Northeast Home Heating Oil Reserve	0	4,950	5,325

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 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 2006	FY 2007	FY 2008
Northeast Home Heating Oil Reserve			
Amerada Hess (Woodbridge NJ)	2,400	2,400	0
Motiva (New Haven , CT)	600	600	0
Morgan Stanley (New Haven, CT)	1,200	1,200	0
Motiva (Providence, RI)	600	600	0
Washington Headquarters	525	150	5,325
Subtotal, Northeast Home Heating Oil Reserve	5,325	4,950	5,325
Use of prior year balances	-5,325	0	0
Total, Northeast Home Heating Oil Reserve	0	4,950	5,325

Major Changes or Shifts by Site

Northeast Home Heating Oil Reserve

- The Northeast Home Heating Oil Reserve (NEHHOR) contracts expire on September 30, 2007. New terminal contracts and locations will be determined by competition.

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.

Motiva (New Haven, CT)

The Motiva Terminal is located in New Haven, CT and currently holds 250,000 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 (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 Schedule by Activity

(dollars in thousands)

	FY 2006 [a]	FY 2007	FY 2008
Northeast Home Heating Oil Reserve			
Commercial Storage Leases	0	4,800	5,175
Information Technology Support	0	125	125
Quality Control & Analysis	0	25	25
Total, Northeast Home Heating Oil Reserve	0	4,950	5,325

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.

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 2006	FY 2007	FY 2008
Commercial Storage Leases	**0**	**4,800**	**5,175**

Continues operation of the Reserve, including lease of commercial storage space.

Information Technology Support	**0**	**125**	**125**

Provides computer support. Conducts mock sales with industry participation to test and evaluate the sales process, procedures and on-line computer system.

Quality Control & Analysis	**0**	**25**	**25**

Provides administrative support from Defense Energy Support Center to conduct monthly quality surveillance of four commercial storage sites.

Total, Northeast Home Heating Oil Reserve	**0**	**4,950**	**5,325**

[a] FY 2006 was funded by use of prior-year balances

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Northeast Home Heating Oil Reserve	
▪ **Commercial Storage Leases:**	
Contracts expire on September 30, 2007. Bids for storage services are expected to increase as a result of a shortage of storage capacity in the Northeast.	
	+375
Total Funding Change, Northeast Home Heating Oil Reserve	**+375**

Clean Coal Technology

Clean Coal Technology

Clean Coal Technology

Proposed Appropriation Language

Of the funds made available under this heading for obligation in prior years, $149,000,000 are cancelled.

Clean Coal Technology

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2007 CR	FY 2008 Request
Clean Coal Technology				
Deferral of Unobligated Balances, FY 2005	257,000	0	0	0
Deferral of Unobligated Balances, FY 2007	-257,000	257,000	257,000	0
Deferral of Unobligated Balances, FY 2008	0	0	-257,000	257,000
Rescission Request	0	-203,000	0	0
Appropriation	0	0	15,000	0
Rescission Uncommitted Balances	-20,000	0	-20,000	-149,000
Transfer to Fossil Energy R&D (FutureGen)	0	-54,000	0	-108,000
Transfer to Fossil Energy R&D (Clean Coal Power Initiative)	0	0	0	-58,000
Total, Clean Coal Technology	-20,000	0	-5,000	-58,000

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 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 proposed 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 proposed to cancel $203 million in prior-year balances and requests an advanced appropriation of $203 million for the FutureGen project in FY 2008. However, a regular FY 2007 appropriation for this account had not been enacted at the time the budget was prepared; therefore, this account is operating under a continuing resolution (P.L. 109-289, Division B, as amended). Under the continuing resolution, $20 million is rescinded, an appropriation of $15 million in new budget authority is provided, and the availability of $257 million is deferred to FY 2008. As a result of these actions, $71 million in unobligated balances is carried forward at the start of FY 2007 and $66 million in unobligated balances is carried forward at the end of FY 2007.

For FY 2008, all project funding commitments have been fulfilled and only project closeout activities remain. Funds for the administration of the program are specifically requested under the Fossil Energy Research and Development Program Direction account. The amounts included for FY 2008 in this budget assume the deferral of $257 million into FY 2008 from FY 2007 provided by the continuing resolution and the $66 million in unobligated balances is carried forward at the end of FY 2007. For FY 2008, the Department proposes to transfer $108 million of the $257 million deferral to the FutureGen project, and cancel the remaining $149 million from the deferral. Of the $66 million in unobligated balances carried forward at the start of FY 2008, $58 million is transferred to the Clean Coal Power Initiative (CCPI), leaving $8 million in balances for closeout activities.

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 has established 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 Themes and Goals and GPRA Unit Program Goals

The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, and environmental aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Clean Coal Technology appropriation supports the following goals:

Strategic Theme 1, Energy Security: Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.2, Environmental Impacts of Energy: Improve the quality of the environment by reducing greenhouse gas emissions and environmental impacts to land, water, and air from energy production and use.

Contribution to Strategic Goal

Clean Coal Technology contributes to Strategic Goal 1.2 by creating public/private partnerships to develop technology capable of addressing air emissions concerns associated with coal use while providing domestically secure, cost-efficient electricity generation, including the development of near-zero atmospheric emissions technologies and, by 2012, completion of a prototype near-zero atmospheric emissions plant (including carbon) that is coal fuel-flexible, and capable of multi-product output and ultimately, by 2015, leading to an advanced class of power plants capable of achieving efficiencies over 60 percent (exclusive of energy consumption for carbon capture) with coal.

Funding by Strategic and GPRA Unit Program Goal

	FY 2006	FY 2007	FY 2007 CR	FY 2008
Strategic Goal 1.2, Environmental Impacts of Energy				
Clean Coal Technology	-20,000	0	-5,000	-58,000
Total, Strategic Goal 1.2 (Clean Coal Technology)	-20,000	0	-5,000	-58,000

Clean Coal Technology

Funding Profile by Subprogram

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2007 CR	FY 2008 Request
Clean Coal Technology				
Clean Coal Technology	-20,000	0	-5,000	-58,000
Total, Clean Coal Technology	-20,000	0	-5,000	-58,000

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 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 proposed 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 proposed to cancel $203 million in prior-year balances and requests an advanced appropriation of $203 million for the FutureGen project in FY 2008. However, a regular FY 2007 appropriation for this account had not been enacted at the time the budget was prepared; therefore, this account is operating under a continuing resolution (P.L. 109–289, Division B, as amended). Under the continuing resolution, $20 million is rescinded, an appropriation of $15 million in new budget authority is provided, and the availability of $257 million is deferred to FY 2008. As a result of these actions, $71 million in unobligated balances is carried forward at the start of FY 2007 and $66 million in unobligated balances is carried forward at the end of FY 2007.

For FY 2008, all project funding commitments have been fulfilled and only project closeout activities remain. Funds for the administration of the program are specifically requested under the Fossil Energy Research and Development Program Direction account. The amounts included for FY 2008 in this budget assume the deferral of $257million into FY 2008 from FY 2007 provided by the continuing resolution and the $66 million in unobligated balances is carried forward at the end of FY 2007. For FY 2008, the Department proposes to transfer $108 million of the $257 million deferral to the FutureGen project and cancel the remaining $149 million from the deferral. Of the $66 million in unobligated balances carried forward at the start of FY 2008, $58 million is transferred to the Clean Coal Power Initiative (CCPI), leaving $8 million in balances for closeout activities.

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 has established 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.

Detailed Justification

(dollars in thousands)

	FY 2006	FY 2007	FY 2007 CR	FY 2008
Clean Coal Technology	**-20,000**	**0**	**-5,000**	**-58,000**
▪ **Cooperative Agreements**	**-20,000**	**0**	**-5,000**	**-58,000**

For FY 2008, all project funding commitments have been fulfilled and only project closeout activities remain. Funds for the administration of the program are specifically requested under the Program Direction account. The amounts included for FY 2008 in this budget assume the deferral of $257million into FY 2008 from FY 2007 provided by the continuing resolution and the $66 million in unobligated balances is carried forward at the end of FY 2007. For FY 2008, the Department proposes to transfer $108 million of the $257 million deferral to the FutureGen project, transfer $58 million to the Clean Coal Power Initiative (CCPI), and cancel the remaining $149 million from the deferral. Of the $66 million in unobligated balances carried forward at the start of 2008, $58 million is transferred to the Clean Coal Power Initiative (CCPI), leaving $8 million in balances for closeout activities. from prior year balances. All project funding commitments have been fulfilled and only project closeout activities remain. Funds for the administration of the program are specifically requested under the Program Direction account. For FY 2007, the completion and acceptance of the Final Report for the Clean Coal Diesel project and final closeout activities for completed and withdrawn projects are the only activities remaining for the Clean Coal Technology Demonstration Program. For FY 2007, the Budget proposed 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 proposed to cancel $203 million in prior-year balances and requests an advanced appropriation of $203 million for the FutureGen project in FY 2008. However, a regular 2007 appropriation for this account had not been enacted at the time the budget was prepared; therefore, this account is operating under a continuing resolution (P.L. 109–289, Division B, as amended). Under the continuing resolution, $20 million is rescinded, an appropriation of $15 million in new budget authority is provided, and the availability of $257 million is deferred to FY 2008. As a result of these actions, $71 million in unobligated balances is carried forward at the start of FY 2007 and $66 million in unobligated balances is carried forward at the end of FY 2007.

(dollars in thousands)

FY 2006	FY 2007	FY 2007 CR	FY 2008

For FY 2006, $20 million was rescinded and the availability of $257 million was deferred to FY 2007. The Department accepted the participant's request to withdraw the Clean Coal Diesel project prior to full completion of proposed activities. The participant is preparing a report of activities that were performed prior to withdrawal. *Participants include: TIAX LLC and Kentucky Pioneer Energy, Ltd. with FuelCell Energy and Global Energy.*

Total, Clean Coal Technology	**-20,000**	**0**	**-5,000**	**-58,000**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 Budget ($000)
Clean Coal Technology	
▪ **CCT** CCT funding commitments are fulfilled. Prior year balances are rescinded or transferred to Fossil Energy R&D.	-58,000
Total Funding Change, Clean Coal Technology	**-58,000**

	FY 2008 vs. FY 2007 Continuing Resolution (P.L.109–289) Division B, as amended) ($000)
Clean Coal Technology	
▪ **CCT** CCT funding commitments are fulfilled. Prior year balances are rescinded or transferred to Fossil Energy R&D.	-53,000
Total Funding Change, Clean Coal Technology	**-53,000**

Ultra-Deepwater Unconventional Natural Gas

Ultra-Deepwater Unconventional Natural Gas

Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2006 Current Appropriation	FY 2007 Request	FY 2008 Request
Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund			
Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	50,000	50,000
Receipts Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	-50,000	-50,000
Repeal Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	-50,000	-50,000
Repeal Receipts Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	0	50,000	50,000
Total, Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Research Fund	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 is being funded from Federal revenues from oil and gas leases in FY 2007. The FY 2008 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, $105,095,000, to remain available until expended.

Energy Information Administration

Overview

Appropriation Summary by Program

(dollars in thousands)

	FY 2006 Current Appropriation [a]	FY 2007 Request	FY 2007 CR	FY 2008 Request
Energy Information Administration	85,314	89,769	85,185	105,095
Total, Energy Information Administration	85,314	89,769	85,185	105,095

Preface

EIA strives to be the Nation's premier source of unbiased energy information, analysis, and forecasting. In many situations, such as the 2005 hurricanes and the transition from methyl tertiary butyl ether (MTBE) to ethanol in gasoline markets in spring 2006, the Administration and the Congress have relied on EIA as their trusted source of energy information and analysis. With this budget request, EIA seeks to improve its capabilities to respond to the Nation's need for reliable energy information, especially to close growing energy information gaps that challenge the agency's ability to maintain the quality of the information it provides.

More and more, EIA is being called upon to provide timely energy information and analysis on critical energy issues to assist the Administration, the Executive Branch, and the Congress in their deliberations on national and international energy policy. Because energy is key to the U.S. economy, the Nation's leaders, policymakers, energy markets, news media, and citizens need reliable and timely information and analyses when an energy disruption occurs, when debates on competing national energy development and utilization strategies are discussed and when business and personal energy investment decisions are made. EIA's activities have generated countless compliments from customers, including Congressional committee chairmen and senior officials in the Executive Branch.

As the energy industry restructures, expands, and becomes increasingly more complex and interdependent, EIA must revise and update its energy data collection and analysis programs to reflect the current industry composition and operation so it can continue to provide the most comprehensive picture of energy markets and industry. It is essential that EIA report and assess current trends in energy demand and end use, changes in the U.S. energy supply sector, and challenges due to international events since they all affect the Nation's ability to provide safe, affordable energy for a growing economy. 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.

[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).

Within the Energy Information Administration appropriation, EIA has one program: Energy Information Administration, with no subprograms.

Mission
The Energy Information Administration provides high-quality, policy-neutral energy information to meet the requirements of the Congress, the Executive Branch, the private sector, 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 produce credible and reliable analyses 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. Congress and Administrations turn to EIA for 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.

Strategic Themes and Goals and GPRA Unit Program Goals
The Department's Strategic Plan identifies five Strategic Themes (one each for nuclear, energy, science, management, and environmental aspects of the mission) plus 16 Strategic Goals that tie to the Strategic Themes. The Energy Information Administration supports the following goal:

Strategic Theme 1, Energy Security: Promoting America's energy security through reliable, clean, and affordable energy.

Strategic Goal 1.1, Energy Diversity: Increase our energy options and reduce dependence on oil, thereby reducing vulnerability to disruptions and increasing the flexibility of the market to meet U.S. needs.

The program funded within the Energy Information Administration appropriation has one GPRA Unit Program Goal that contributes to the Strategic Goals in the "goal cascade". This goal is:

GPRA Unit Program Goal 1.1.12.00, 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 GPRA Unit Program Goal 1.1.12.00, Energy Information Administration
EIA contributes to this goal by providing national and international energy data, analysis, and forecasts to meet the needs of the Administration, the Department, policymakers and the public. EIA's energy data collection, analysis, and dissemination activities 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, forecasting models, and various information collection and dissemination techniques, most notably the Internet. EIA also will continue investing in resources to assure the long-term accuracy and security of energy data and analyses, which reflect changes in energy sectors resulting from a variety of factors, including the restructuring of energy industries, demographic changes, the need for increased security of market sensitive data, new fuel standards, the increasing use of renewable fuels, and new legislative mandates.

Funding by Strategic and GPRA Unit Program Goal

(dollars in thousands)

	FY 2006	FY 2007	FY 2008
Strategic Goal 1.1, Energy Diversity			
GPRA Unit Program Goal 1.1.12.00 (Energy Information Administration)	85,314	89,769	105,095
Total, Strategic Goal 1.1 (Energy Information Administration)	85,314	89,769	105,095

Annual Performance Results and Targets

FY 2003 Results	FY 2004 Results	FY 2005 Results	FY 2006 Results	FY 2007 Targets	FY 2008 Targets
Strategic Goal 1.1, Energy Diversity					
Increase 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 FY 2003 EIA had an increase of over 2 million users of EIA's Web site. (Met Goal)	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 FY 2004 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). Results: In FY 2006, 94 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: 95 percent of selected EIA recurring products meet their release date targets (all product types).
Conduct informational briefings for high-level energy policy-makers in the Admin-istration and Congress to provide timely information and analyses on topical energy issues and situations. Results: In FY 2003, EIA provided 96 in-formational briefings for high-level policymakers. (Met Goal)	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 them-selves in customer surveys as satisfied or very satisfied with the quality of EIA information. Results: In FY 2005, 90 percent 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. Results: In FY 2006, 93 percent 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.
			Cost savings realized from a subset of surveys, released on schedule. Target: Actual cost will be less than the baseline adjusted for inflation. Results: The costs in nominal dollars for FY 2006 for the subset of surveys was 2.4% less than the FY 2004 baseline costs. (Met Goal)	Cost savings realized from a subset of surveys, released on schedule. Target: Actual cost will be less than the baseline adjusted for inflation.	Cost savings realized from a subset of surveys, released on schedule. Target: Actual cost will be less than the baseline adjusted for inflation.

Means and Strategies

EIA will use various means and strategies to achieve its GPRA Unit Program goal. EIA's FY 2008 program will consist of data collection activities to fulfill statutory requirements to maintain a comprehensive energy information system, publish reports and analyses used by a wide variety of customers in the public and private sectors, maintain the National Energy Modeling System for long-term analyses, and maintain the Short-Term Integrated Forecasting System for near-term energy market analysis and forecasting.

In FY 2008, EIA will employ the following means and strategies:

- Continue implementing selected findings and recommendations from the May 2006 External Study Team report, "Challenges, Choices and Changes: An External Study of the Energy Information Administration." The External Study Team, led by Massachusetts Institute of Technology (MIT) professor A. Denny Ellerman, conducted an independent evaluation of EIA's activities and performance. The External Study Team was specifically asked to consider whether EIA is doing the "right things" and to identify challenges that EIA will face over the next five years.
- Conduct customer forums and surveys to assess customer needs and to maintain an up-to-date product and service mix.
- Conduct survey frames[a] analysis, maintenance, and development for the petroleum and natural gas surveys to maintain the quality of survey frames that are reaching the end of their life-cycle. Frames analysis 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 relevance. The challenges in this area are particularly pressing given the rapid growth in the use of renewable transportation fuels, which has resulted in a shift in the location of considerable amounts of final gasoline blending from the refinery to the distribution terminals, requiring parallel changes in EIA's data collection programs.
- Redesign and rebuild petroleum survey systems due to age, cost and complexity of the legacy systems and the variety of platforms and languages, and add features such as the requirement for data editing at the respondent level during data submission, which will greatly improve accuracy and increase cybersecurity.
- Develop a unified, EIA-wide internet data collection tool for surveys. The corporate system will serve as EIA's primary data-collection mechanism for obtaining respondent data and will improve the efficiency of data collection and editing, and improve data quality.
- Complete the redesign of and begin replacing the aging National Energy Modeling System (NEMS) to create a better National Energy Model (NEM) that will meet the needs of the Administration, the Congress, and other customers for relevant, reliable, timely, consistent, accurate, and high quality energy analyses.
- Develop a central repository of international petroleum data to support analytic and forecasting programs within EIA, and support expanded modeling capability for contingency analysis and medium-term oil market forecasting. The effort will result in a publicly available unified data

[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.

system to produce more timely and accurate international oil statistics for all countries, and will upgrade EIA's forecasts for global petroleum markets.

These strategies will result in improved data quality, analysis, and forecasts; cost savings; increased cybersecurity; and a reduction in the time needed to publish data.

Over the next several years, many external factors will increase the criticality and visibility of EIA's data and analyses and its ability to achieve its goals. Important external factors include:

- Increased energy prices 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 high energy prices, and proposed 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), International Petroleum Exchange (IPE), and Chicago Board of Trade (CBOT)-cleared derivatives based directly on EIA inventory numbers.

EIA's data and analysis are 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 faces a challenge in maintaining the quality of its data due to the increasing amount of work needed to maintain high survey response rates. Similarly, there is a need for updated procedures to capture energy consumption and expenditures data, 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 also has conducted satisfaction surveys of its most important analytical products and conducts surveys of participants at EIA's annual Energy Modeling and Forecasting Conference, which presents information from EIA's *Annual Energy Outlook* and *Short-Term Energy Outlook*, to guide future conferences. EIA's senior management reviews the results of the customer surveys, and uses the information to adjust available resources to improve EIA outcomes, such as enhancing the quality of EIA's Web site, improving customer services, reengineering electronic products, and adjusting 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 the Administration and the Congress 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.

The development of EIA's statistical data and forecasts, 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 of information and methods to improve understanding and to facilitate reproducibility of the information and results of analytical investigations on critical energy issues and topics (i.e., clear and concise information on such topics as information sources, survey and analytical methods, accuracy, and reliability). High quality survey frames are a crucial component of data quality. EIA has recently completed an extensive evaluation of its survey frames and noted challenges that affect their maintenance, such as the rapid growth in the use of

renewable transportation fuels. For additional information about EIA's quality program see: http://www.eia.doe.gov/smg/EIA-IQ-Guidelines.html.

EIA's performance measures results are presented to senior management on a regular basis. Measures include the percent of recurring products that meet their release dates, the number of monthly user sessions 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 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 energy security and improved environmental conditions.

A PART evaluation of EIA was conducted in 2004 in conjunction with the FY 2006 budget process, for which 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. At the time of the PART assessment, EIA had not fully established these measures, baselines, and targets, but in mid-FY 2004, EIA developed a new long-range plan and associated performance measures, baselines, and targets. EIA subsequently initiated an independent, external expert review of EIA's programs. The external expert review, conducted by a team led by Professor Denny Ellerman of MIT, was completed in May 2006. As appropriate, EIA is adopting recommendations from their report, "Challenges, Choices, and Changes".

Energy Information Administration

Funding by Site by Program

(dollars in thousands)

	FY 2006[a]	FY 2007	FY 2008
Washington Headquarters	85,314	89,769	105,095
Total, Energy Information Administration	85,314	89,769	105,095

Major Changes or Shifts by Site

Washington Headquarters

EIA will operate 67 surveys in FY 2008, four more than FY 2007, including three new surveys. In FY 2008, EIA will focus special attention on several areas: addressing significant quality problems in key energy data, improving international oil and gas markets data and analysis, developing surveys to collect ethanol and biodiesel data, replacing EIA's U.S. energy model, and improving cybersecurity. These efforts are needed to improve energy data coverage, analysis, and modeling to support the needs of the Congress, Administration, States, the private sector, and the public for reliable, accurate, and secure energy information and analyses.

- Our **Energy Data Quality Improvements** efforts will focus on improving petroleum and natural gas data reliability and statistical accuracy. Accurate data drive energy analyses, investment and trade decisions, improve market function, and lead to efficient pricing. EIA has deferred or canceled many petroleum data quality activities over the past decade. Recent changes in the industry have exposed major gaps in EIA's most important petroleum data, due to inability to fully track gasoline blending activity, missing gasoline and missing imports, significant discrepancies between marketing and supply survey volumes, outdated frames, and antiquated survey systems. These issues are increasingly noted in the trade press, and action is required to sustain the confidence of market participants in EIA key data as markets remain tight. This task encompasses activities to improve data quality. We will reinstitute the petroleum supply frame survey and redesign key petroleum and natural gas surveys. To better reflect the changing energy industry and maintain data relevance and reliability critical to the Congress, the Administration, the private sector, and other customers, it is essential to upgrade petroleum survey samples, improve statistical methods, and resolve data discrepancies.

- Our efforts to improve **International Oil and Gas Markets Data and Analysis** will promote efficient energy markets and build upon the small start made in this area in FY 2007. This effort supports the recent Group of Eight (G-8) industrialized nations' commitments to improve energy data quality and transparency.

[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).

- Our **Data Coverage** efforts include initiating monthly ethanol and biofuels data collections on a national and regional basis as mandated in Section 1508 of the *Energy Policy Act of 2005* (*EPAct* 2005), collecting weekly ethanol data, and enhancing the State Energy Profiles.

- We will complete scoping activities for design requirements for the **next generation National Energy Model** and begin replacing the existing National Energy Modeling System (NEMS). These activities will improve our ability to assess and forecast supply, demand, and technology trends impacting U.S. and world energy markets. To meet the needs of DOE programs and other customers for relevant, reliable, timely, consistent, accurate, and high quality energy analyses, and execute policy analyses requested by the Administration and Congress, a reliable and maintainable mid-term energy model is needed through which EIA can develop credible baseline energy projections.

- We will invest in **Cybersecurity improvements** to comply with new OMB and National Institute of Standards and Technology (NIST) cybersecurity requirements.

- 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 selected individual surveys to reduce respondent burdens and data reconciliation costs without losing information; (3) consolidating contract requirements, where possible, into less costly support services contracts employing the most cost efficient pricing formula; (4) implementing, as appropriate, recommendations of an independent, external, EIA study team to improve the value of EIA's energy data, analyses and forecasting; (5) absorbing salary and benefit costs; and (6) conducting requirements 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 Executive Branch, the Congress, other national and international leaders, energy policymakers world-wide, energy markets, news media, and citizens.

Program Direction

Funding Profile by Category

(dollars in thousands/whole FTEs)

	FY 2006[a]	FY 2007	FY 2008
Headquarters			
Salaries and Benefits	42,800	45,076	46,921
Travel	324	370	370
Support Services	26,376	27,973	42,957
Other Related Expenses	15,814	16,350	14,847
Total, Headquarters	85,314	89,769	105,095
Total, Full Time Equivalents[b]	349	375	374

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.

EIA performs critical functions that directly support the mission of the Department. These functions include developing and maintaining a comprehensive energy database, disseminating energy data and analyses to a wide variety of customers in the public and private sectors, and preparing special requests and reports. Among other tasks, statutes require EIA 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 range 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. 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. In FY 2006, EIA Web site usage exceeded 29 million user sessions. EIA will continue to print only three multi-fuel publications: the *Annual*

[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).

[b] Excludes one (1) FTE funded by the Nuclear Waste Disposal Fund.

Energy Outlook, the *Annual Energy Review*, and the *International Energy Outlook*[a]. With its focus on customer satisfaction**,** EIA will continue to offer its customers a limited print-on-demand service.

In FY 2008, EIA intends to continue earning 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 that are geared towards skills to 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 reduced Federal IT staff and increased the use of small businesses.

In the area of Small Business Support:
In FY 2008, EIA plans to remain a Departmental leader in the use of small businesses. EIA met its goal of 47 percent of its contract funding to small businesses in FY 2005 and FY 2006. EIA will continue to build on the best practices for increasing small business participation and projects that it will continue to award 47 percent of all contract funds to small businesses in FY 2007 and FY 2008.

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. EIA collects data via the Internet using 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. Sixty-three percent of FY 2005 annual coal survey forms were received through IDC, and this increased to 81 percent in FY 2006. In addition, ninety percent of monthly electricity respondents used the IDC to report May 2006 data, compared to 54 percent two years earlier.

Accomplishments
The following time line provides a perspective of significant events in the energy markets and examples of EIA's responses 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, the White House, other government agencies, and members of Congress and their staff. Nor does it

[a] The *International Energy Outlook* presents an outlook for international energy markets through 2030, including individual fuel projections for 16 regions. Projections are developed using the System for the Analysis of Global Energy Markets (SAGE), which is an integrated set of regional computer models that provide a technology-rich basis for estimating regional energy consumption.

include the myriad telephone and e-mail requests for data and analysis from the Administration and Congress that are received and answered every quarter.

1st Q FY 2006

Energy Event	EIA Response
High natural gas and heating oil prices raise concerns over winter heating costs.	EIA issues 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.
Hurricanes Katrina and Rita strike the U.S. Gulf Coast, impacting oil and gas production, refinery operations, and operations at natural gas processing plants.	EIA issues its last special report summarizing hurricane impacts with the December 2005 report, *Hurricane Impacts on the U.S. Oil and Natural Gas Markets*.
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 EIA Administrator and Deputy Administrator testify four times in October/November on various aspects of the winter fuels outlook and energy market impacts of the hurricanes. Several briefings for congressional staff occur as well.
Several refiners announce plans to eliminate MTBE from their gasolines effective with the start of the 2006 summer driving season.	EIA initiates consultations with individual refiners and pipelines to gather information regarding their product and logistical plans.

2nd Q FY 2006

Energy Event	EIA Response
Very mild January weather gives consumers a break on winter heating bills by contributing to lower consumption and prices.	EIA adjusts its projections for heating fuel expenditures and natural gas prices in successive monthly editions of the *Short-Term Energy Outlook.* EIA continually tracks the growing surplus of in storage over seasonal norms through its *Weekly Natural Gas Storage Survey*.
Concerns persist regarding the prospects for the 2006 summer gasoline season, particularly regarding the MTBE-to-ethanol transition.	EIA shares preliminary findings from its external consultations and internal analyses with the Department, and provides a public discussion of the issue in the January 5, 2006 edition of *This Week in Petroleum*. On February 22, *Eliminating MTBE in Gasoline in 2006*, which provides our analysis and forms the basis of subsequent EIA testimony on the subject, is posted on EIA's Web site.
There is a continuing threat of oil supply disruptions from Iran, Nigeria and other unstable oil exporters.	The Administration asks EIA to provide several updated assessments regarding the potential impact of hypothetical supply disruptions of varying magnitude, duration, and location. Our analyses estimate both effects on oil prices and impacts on economic growth.

3rd Q FY 2006

Energy Event	EIA Response
Interest in projected gasoline prices over the summer driving season.	EIA issues its *Summer Fuels Outlook*, which projects substantial year-over-year increases in summer fuel prices.
Oil prices continue to hover in the $70 per barrel range, leading to questions about the role of speculators.	In response to a request from Secretary Bodman, EIA examines the role of fundamentals and speculation in oil markets for the Secretary and Administration. The Secretary

	shares our May 2006 analysis with senior congressional figures and it is subsequently posted on our Web site.
Questions arise regarding the potential impact of the 2006 hurricane season on oil, gasoline, and natural gas markets.	In June, EIA provides a special assessment of potential 2006 hurricane impacts on oil and natural gas production and refining based on an analysis of historical data. The experiences of 2005 are demonstrated to reflect unusually large impacts even when taking account of the high level of hurricane activity.
Congress closely tracks developing challenges in energy markets.	In CY 2006, EIA prepared and delivered 10 testimonies and 29 briefings on a wide range of topics, including: Oil Markets, Gasoline Markets, Refinery Issues, Coal Reliability and Transportation Issues, Effects of Energy Prices on Older Americans, Short and Long-term Energy Outlook, Impacts of High Natural Gas Prices on Small Businesses, and Energy Prices and Agriculture.

4th Q FY 2006

Energy Event	EIA Response
On August 6th BP America announces a shutdown of about 400,000 bbl/d of crude oil production from the North Slope Prudhoe Bay field due to corrosion discovered in the pipelines that gather crude oil from the producing wells for delivery to the Trans-Alaska Pipeline.	On August 10th EIA issues a special *Report on Alaska Prudhoe Bay Crude Oil Shut-in.*
Congressional interest in energy-related greenhouse gases and strategies to reduce emissions continue.	Responding to Congressional requests, EIA issues several greenhouse gas emissions service reports in FY 2006, including: *Energy Market Impacts of Alternative Greenhouse Gas Intensity Reduction Goals*, which analyzes the impacts of implementing alternative variants of an emissions cap-and-trade program for greenhouse gases. *Energy Market Impacts of a Clean Energy Portfolio Standard*, which assesses the impact of a draft legislative proposal on utility emissions. *Energy and Economic Impacts of H.R.5049, the Keep America Competitive Global Warming Policy Act*, which analyzes the impacts of the legislation implementing a market-based allowance program to cap greenhouse gas emissions at 2009 levels.

1st Q FY 2007

Energy Event	EIA Response
	In December, EIA releases projections of U.S. energy supply, demand, and prices to 2030 in the reference case forecasts from the *Annual Energy Outlook 2007*. The new EIA *Outlook* reflects energy market shift towards nuclear, biofuels, coal-to-liquids, and accelerated efficiency improvements.

Accomplishments in Energy Data Programs

- Data and Information Releases are Timelier due to Improvements in Data Collection and Processing.
  - The *Annual Energy Review* was released in July 2006, one month earlier than the previous year's edition and 4 months earlier than the 2003 release.
  - The *Electric Power Annual 2005* was released on October 4, 2006, 272 days after the reporting year and 200 days earlier than the 2002 edition.
  - EIA is providing early releases of national level electricity data through the monthly Electric Power Flash Estimates. Preliminary electricity sales and generation and power plant coal stocks data are released just 45-50 days after the reference month--30 days earlier than initial data are available in the *Electric Power Monthly*.

- Expanded Internet Data Collection (IDC) Improves Timeliness and Data Quality.
  - The Quarterly Coal Report is now being released within about 80 days of the close of the quarter, compared to 140 days under the previous paper-based system.
  - The *Electric Power Monthly* is now being released two months earlier compared to its schedule prior to initiation of IDC.
  - IDC for the electricity surveys increased substantially with almost 90 percent of monthly electricity respondents using IDC to report May 2006 data, compared to 54 percent two years earlier. Also, 80 percent of all annual data filers used the IDC, compared to just 28 percent three years ago.
  - Altogether, 86 percent (almost 30,000) of over 36,000 electric survey forms used IDC in 2006, compared to just 46 percent three years ago. This has:
    - reduced the resources needed to collect and process the information, as the data is entered into the database by the respondents;
    - increased the accuracy of the data, as built-in edits require the respondents to correct their data before it is submitted; and
    - reduced the amount of time needed to release the information to the public—the October 2006 edition of the *Electric Power Monthly* was released 63 days after the end of the reporting month, a savings of almost 100 days compared to January 2002.

- Expanded Internet Data Collection Improves Efficiency.
  - During 2006, about 81 percent of coal survey forms, or 3,564 out of 4,402 forms, were submitted via IDC. With the series of edit checks in the coal survey IDC systems, the respondent is required to correct data or explain why the data fall outside a range of check values. This allows most errors to be corrected in real time by respondents, which reduces costs and increases timeliness.
  - In 2006, self-editing and electronic processing of coal surveys reduced Federal and contractor handling time to less than 1 hour per quarterly survey form and to about 2 hours per annual coal production survey form. This is about one-third less time than previous paper-based systems.
  - In its first year using an IDC system, all uranium marketing survey respondents submitted data via the IDC system, a 100 percent response rate, helping to make the processing and dissemination of the data faster and more efficient.

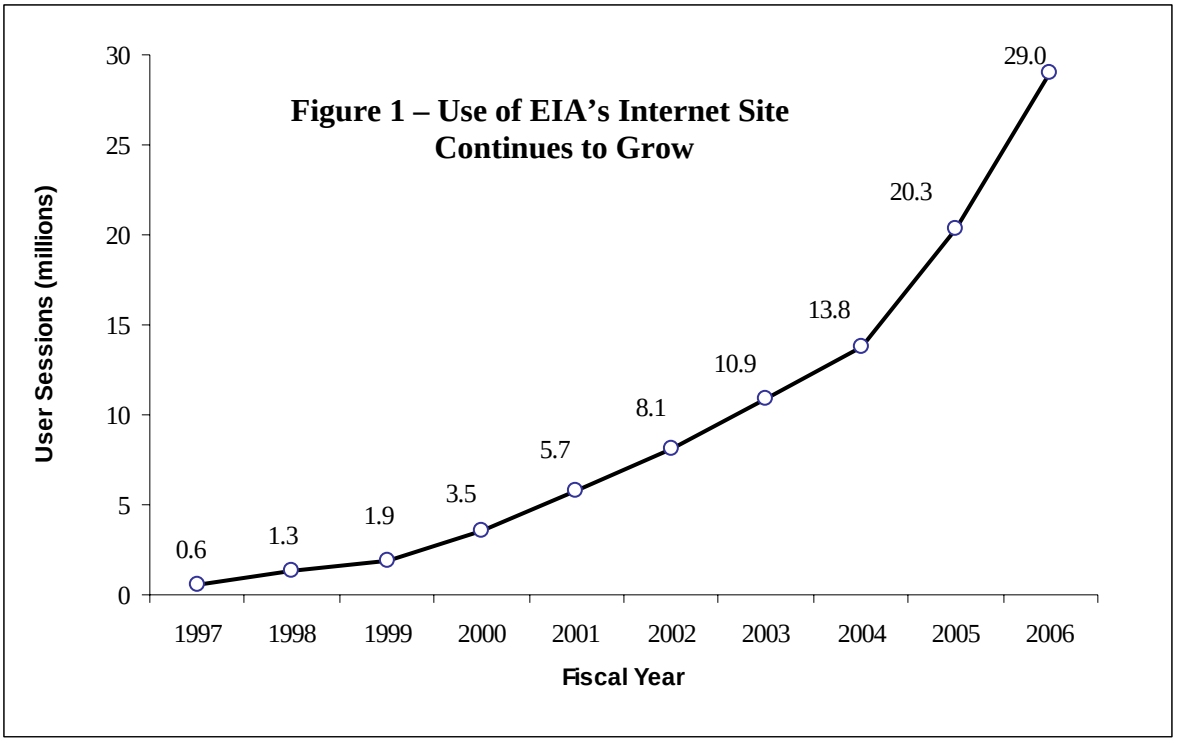
- More Regional and State Data Available.
  - EIA's *Short-Term Energy Outlook*, a monthly forecast of national energy demand, supply, and prices that looks out 12 to 24 months, was expanded to include regional forecasts for electricity,

natural gas, motor gasoline, heating oil, propane, and macroeconomic activity. The regional forecasts produced in FY 2006 for the first time included prices and demands by Census division (electricity and natural gas), Census region (heating oil and propane), and Petroleum Administration for Defense District (motor gasoline).

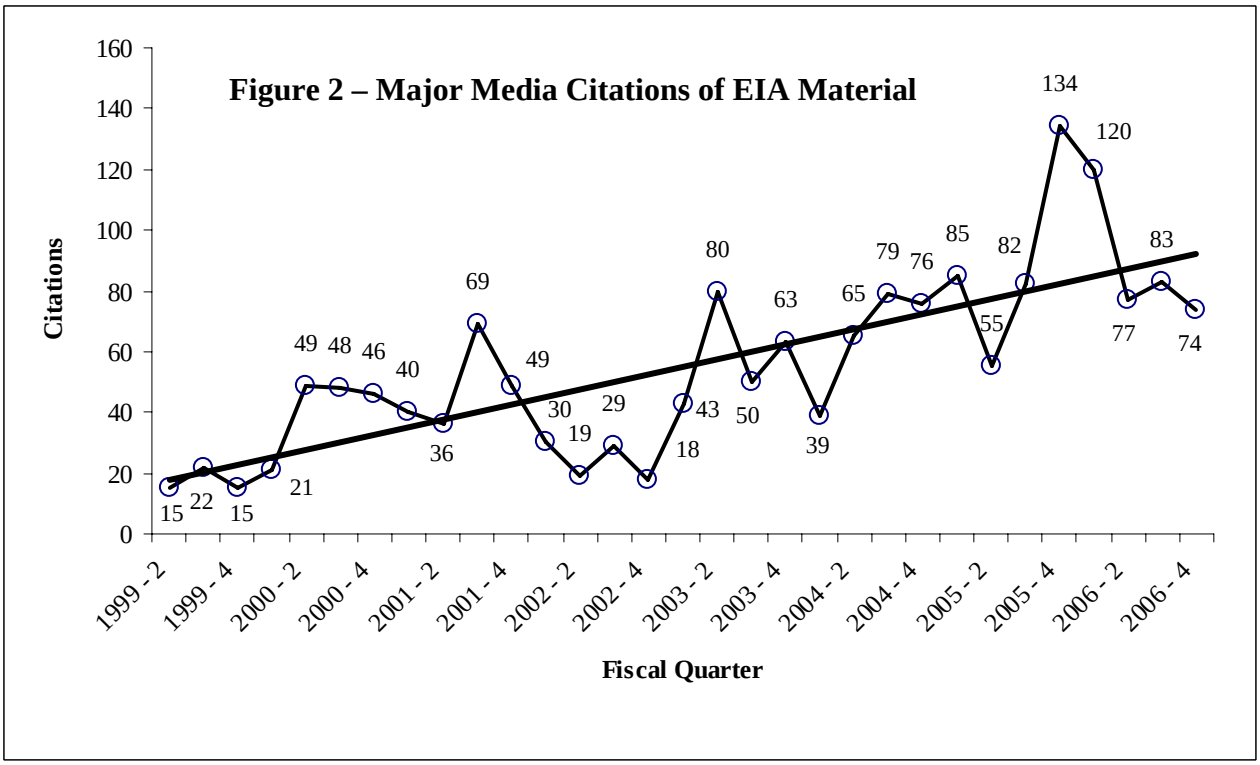
- In December 2006, EIA released State Energy Profiles, a new gateway to EIA's State energy data, which present key facts and statistics about State energy markets and industries. Many of the statistics in the Profiles will be updated simultaneously with data updates on other parts of the EIA Web site.

- Redesigned EIA Web Site Launched in FY 2006.
  - EIA's redesigned Web site offers a new look and feel with standard navigation scheme and layout for principal entry pages and an improved customer success rate for finding information. Information was structured in ways that make more sense to the agency's key customers and new navigation themes on the home page and more intuitive topic names were employed, resulting in better access to EIA's wide range of information and data.
  - EIA implemented a new search engine through FirstGov Search and its private sector partners. The new search engine returns relevant results using state-of-the-art algorithm, and uses clustering technology to organize thousands of search results into categories that help users zero in on important topics of interest.

- 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 (see **Figure 1**) as well as to an increase in the breadth of information distributed.
  - 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.



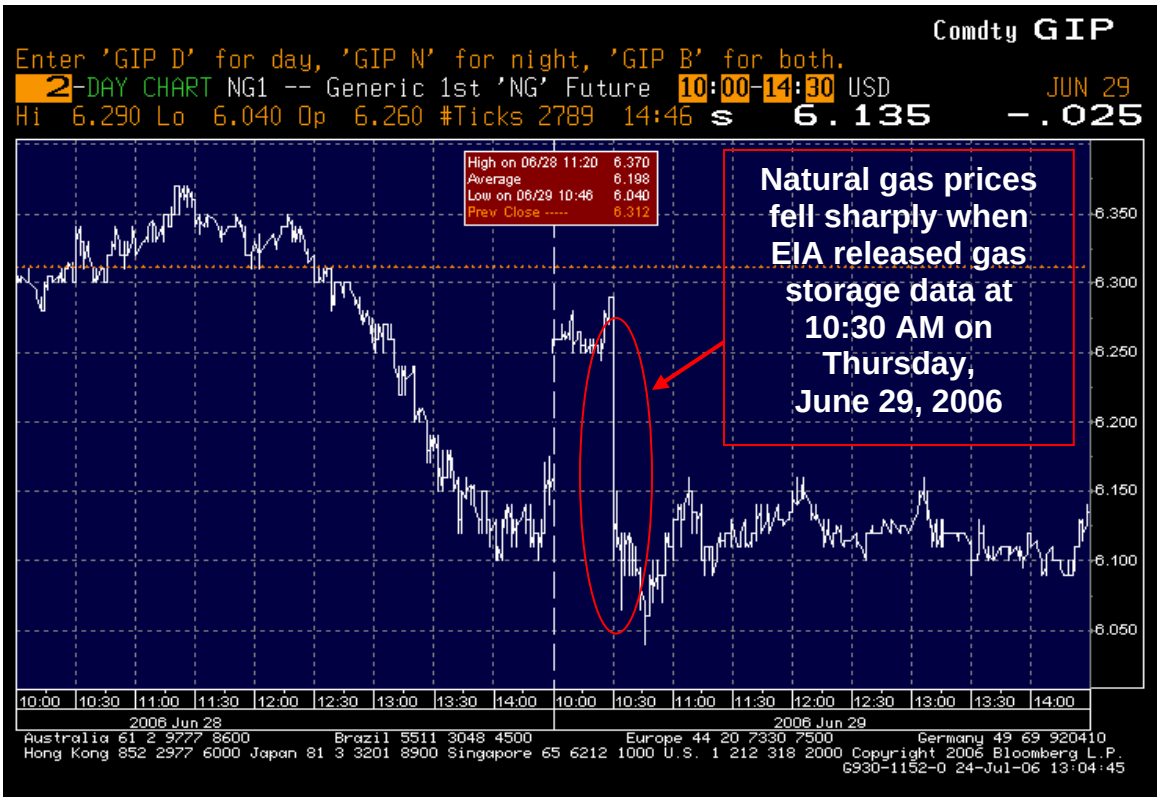
- EIA has increased dramatically the distribution of its information by becoming the dependable source of objective energy information for the major news media, including the *New York Times*, *Washington Post*, *Wall Street Journal*, *USA Today*, and *Los Angeles Times* (see **Figure 2**). This achievement 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 appropriate private sources for these data are available. 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. **Figure 3** illustrates the impact on the natural gas market after EIA releases its natural gas storage data on June 29, 2006, while **Figure 4** illustrates the impact of our petroleum inventory data on the crude oil market.

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 Natural Gas Storage Data.



Source: NYMEX Henry Hub Natural Gas Near-Month Futures Contract June 28 - 29, 2006; Bloomberg data 7/24/06

Figure 4: Oil Markets Rely Heavily on EIA Weekly Data

Note the impact on oil markets immediately following the release of EIA's Oil Inventory Data.

Source: NYMEX Light, Sweet Crude Oil (WTI) Near-Month Futures Contract, June 28 - 29, 2006 Bloomberg's data 7/24/06

- 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 . . . ."

Detailed Justification

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Salaries and Benefits	**42,800**	**45,076**	**46,921**

In FY 2008, fund salaries and benefits for 374 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 2008, 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*, among other publications; 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 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, transition out of MTBE in gasoline, 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; 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.

Travel	**324**	**370**	**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 the EIA mission.

Support Services	**26,376**	**27,973**	**42,957**

Fund contractual support for EIA's energy data collection, analysis, forecasting activities, and energy information dissemination. Support includes survey development and processing, and the automated tools and equipment to collect, store, maintain, protect, and disseminate energy information.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008

- **Oil and Gas** **10,678** **11,906** **18,977**

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, quality control, 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 natural 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 2008, the Oil and Gas activity will operate 41 petroleum and natural gas surveys, three more than in FY 2007. This activity supports the Comprehensive Data Collection efforts by beginning new weekly and monthly ethanol surveys program. A monthly renewable fuel survey is mandated under Section 1508 of EPAct 2005.

The activity also supports EIA's Energy Data Quality Improvements by reviewing and maintaining those petroleum and natural gas survey frames that are reaching the end of their life and by reinstituting the *Petroleum Facility Operator Identification Survey*, EIA-825, necessary to update the survey frames for petroleum supply surveys. 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 2008, operate 26 petroleum and 2 ethanol surveys on weekly, monthly, annual and quadrennial cycles, and process and disseminate the survey data. EIA will 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, EIA will conduct 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 2008, begin a new, monthly ethanol survey program mandated by Section 1508 of EPAct 2005. Ethanol data and analysis improvements are critical given the increasing volume and role of ethanol in gasoline blending. In addition, collect weekly ethanol balances by Petroleum Allocation for Defense District (PADD), which are critical to gasoline supply situation analyses and decisions regarding possible policy actions to address shortages. Development of the survey will continue in FY 2009.

In FY 2008, conduct petroleum frames analysis, maintenance, and development to address deteriorating survey frames. Frames analysis to identify new terminal operators, importers, inter-PADD transporters and underreporting is essential for selecting statistical samples and methodology to produce accurate statistics, and is needed to resolve data discrepancies, keep abreast of changes in the energy industry, and maintain data relevance. 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 2008, operate 8 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 collects the only weekly gas storage data in the United States and is critical to decisions made by supply planners in industry and at utilities, as well as to policy 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 natural gas production and wellhead prices by State.

  In FY 2008, 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 less than 60 days after the producing month, which would significantly improve the previous 120-day lag time.

- Conduct Reserves Surveys and Analyses
  During FY 2008, operate 5 oil and gas reserves surveys, including the *Annual Survey of Domestic Oil and Gas Reserves* and the *Annual Report of the Origin of Natural Gas Liquids Production.* Analytical activities include the operation 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 2008, make improvements to the survey frames and operations to reduce errors and increase weighted response rates.

  During FY 2008, 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 by the Department of Health and Human Services Low-Income Home Energy Assistance Program (LIHEAP) to allocate funds for heating cost assistance.

- Energy Data Quality Improvements
  EIA's Energy Data Quality Improvements efforts will focus on improving data reliability and statistical accuracy. Accurate data drive analyses and forecasting, investment and trade

decisions, improve market function, and lead to efficient pricing. EIA has deferred or cancelled petroleum data quality activities over the past decade. Recent changes in the industry have exposed major gaps in EIA's most important petroleum data (due to inability to track blending activity, missing gasoline, missing imports, significant discrepancies between marketing and supply survey volumes, outdated frames, antiquated survey systems). These gaps are increasingly noted in the trade press, and market participants are increasingly concerned about the quality of key data at a time of tight markets. For example, *The Economist*, June 3, 2006, reported on U.S. gasoline demand: "The API reckons that America's consumption fell by 0.7 percent in the first four months of the year. The Department of Energy calculates that it has risen, but at a fraction of the normal pace."

Gasoline is representative of the petroleum data quality issues. Gasoline production is moving from the refinery to blending terminals, but blenders are numerous and not easily identified. To take this into account, EIA must calculate an adjustment for the missing information on blenders in its weekly and monthly gasoline surveys. This estimated portion grew from 3.6% in January 2006 to 15.6% in May 2006.

This task encompasses activities to prevent further deterioration of petroleum and natural gas data and to improve data in future years. In FY 2008, redesign key petroleum and natural gas surveys that are outdated and reinstitute the petroleum supply frame survey, EIA-825, *Petroleum Facility Operator Identification Survey*. 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 Administration, the Congress, industry and other customers. EIA will analyze the statistical design of selected petroleum 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.

Redesign and rebuild monthly petroleum supply and marketing survey processing systems due to age, cost and complexity of legacy systems, and the variety of platforms and languages. Expand 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 reductions and quality improvements, and increased cybersecurity 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 in understanding a variety of geopolitical crises that affects oil supplies. Major oil companies and analysts from key producing countries, consult the data when making their own supply and demand forecasts.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008

- **Coal, Nuclear, Electric and Alternate Fuels** **3,815** **3,055** **4,005**

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, renewable fuels, and electric power; and support for short-term forecasting systems.

In FY 2008, the Coal, Nuclear, Electric and Alternate Fuels activity will operate 20 data collection surveys, one more than FY 2007. This activity supports the Comprehensive Data Collection efforts by developing a new monthly biodiesel frame and survey mandated under Section 1508 of EPAct 2005.

- Conduct Electric Power Surveys
  In FY 2008, operate 8 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*, 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 of 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.

- Conduct Coal Surveys
  Operate 4 coal data collection surveys, and, through an interagency agreement, validate and use 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, prices, and coal distribution by State-of-origin to State-of-destination, including the 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 4 renewable and alternative fuel surveys including annual surveys of manufacturers of solar thermal collectors, photovoltaic cells, and geothermal heat pump equipment and a new monthly biodiesel survey mandated under Section 1508 of EPAct 2005. Together with data

from the electric power industry, this information is used by policy makers in evaluating policy proposals 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-fueled vehicles and the amount of fuel consumed, and 2) auto manufacturers on the number of alternative-fueled vehicles that have been made available each year.

- Conduct Uranium Surveys
  Process 3 uranium production and marketing surveys, including 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 (EPAct 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.

- **Energy Markets and End Use** **4,835** **4,923** **6,415**

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 3 surveys on energy consumption and 1 survey on the financial condition of major energy companies, and performs data integration functions to provide comprehensive databases used extensively by EIA's customers.

With current projections suggesting U.S. net oil imports could increase 30% by 2030 (from 12.57 million barrels per day in 2005 to 16.37 million barrels per day in 2030), timely and accurate international oil data and data on world oil market developments are essential to supporting the DOE international outreach program. This activity supports Energy Data Quality Improvements and EIA's International Oil and Gas Markets Data and Analysis efforts by enabling the Department to do a better job in delivering data and analysis needed for understanding global energy markets, developing sound policy, and promoting efficient energy markets.

- 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; operate the *Financial Reporting System* (EIA-28), 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 2008, improve the short-term energy markets demand analysis program, which estimates and publishes official EIA regional forecasts (up to 24 months) of petroleum, natural gas and electricity supply, demand and prices. Update and maintain the extensive data needs of EIA's Regional Short-Term Energy Model (RSTEM) and develop diagnostics and performance metrics to gauge the model's forecasting accuracy. Revise the petroleum supply

model, which is used for EIA's *Short-Term Energy Outlook.* Produce graphical user database interface for evaluating model forecast results since current procedures for reviewing the forecasts of our 1,000+ variables are very limited and ad hoc. Conduct economic analysis of short-term trends in domestic and global energy markets to improve and expand the short-term forecast.

- International Petroleum Data and Analysis

  Monitor, analyze, and produce data and analysis on world oil market developments and assess the impacts of disruptions to world oil markets. Provide world oil prices and international oil demand and supply balances for EIA's monthly *Short-Term Energy Outlook*.

  In FY 2008, develop a central database of international petroleum data to support analytic and forecasting programs, and support an expanded modeling system for contingency analysis and medium-term oil market forecasting. Improve EIA's analytic capability to assess the economics impacts of oil market disruptions, and improve international forecasts for the Regional Short-Term Energy Model.

  These efforts will give EIA a single, integrated set of international petroleum information for historical data, result in a publicly available unified data system to produce more timely and accurate international oil statistics for all countries, expand EIA's ability to assess developments in international petroleum and natural gas markets, and upgrade EIA's forecasts for global petroleum markets.

- Conduct Consumption Surveys

  The FY 2008 budget funds three Energy Consumption Surveys on a quadrennial (formerly triennial) 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 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. 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 *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), 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 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.

- **Integrated Analysis and Forecasting** **2,786** **3,766** **6,127**

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 2008, complete work on redesigning and scoping the requirements for a next-generation energy model to replace NEMS and begin building the new National Energy Model (NEM). A reliable and maintainable mid-term energy model is needed for EIA to develop baseline energy projections, meet the needs of DOE programs and other customers for relevant, reliable, timely, consistent, accurate, and high quality energy analyses, and execute policy analyses requested by the Administration and the Congress.

In addition, this activity supports EIA's International Oil and Gas Markets Analysis efforts by assessing the global market for liquefied natural gas (LNG) and its interaction with oil markets, which are 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.

- 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, nuclear 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

  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. FY 2008 is a propitious time to improve our understanding of energy use in China and India and to incorporate that enhanced understanding in the existing System for the Analysis of Global Energy Markets (SAGE) model.

  In support of EIA's International Oil and Gas Markets Analysis efforts, begin creating an enhanced, integrated global energy model, focusing primarily on the development of the oil and gas supply module in FY 2008. License the Global Insight model, which, in combination with work being carried out in support of the NEM project, will greatly increase capability to analyze and forecast global energy markets, including more accurate conventional and unconventional oil and gas supply, integration of macroeconomic effects, explicit representation of cross-border energy trade, and a technology-rich model of end-use energy markets.

- Voluntary Reporting of Greenhouse Gases Program

  In FY 2008, EIA will operate EIA-1605 to collect and disseminate 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 EPAct 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, the Congress, and the public for policy making purposes. The enhanced Program will use the revised guidelines published on April 21, 2006.

- U.S. National Energy Model Replacement

  During FY 2008, complete scoping the requirements of a next-generation National Energy Model (NEM) and begin replacing the existing NEMS. A reliable and maintainable mid-term energy model is needed for EIA to develop baseline energy projections; improve the representation of energy markets; add flexibility and regionality to address new policies and technologies to meet the needs of DOE programs and other customers for reliable, timely,

consistent, accurate energy analyses; and execute policy analyses requested by the Congress and the Administration.

The redesign will: 1) Develop an LNG market module to capture both the international aspects of LNG supply and the detailed regional representations needed for domestic market analysis. The current NEMS LNG model assumptions are of questionable validity due to changes in the world energy market. Specifically, the effects of global competition for natural gas through pipelines, LNG, and gas-to-liquids are increasingly complex and uncertain, particularly in an environment of sustained high oil prices. 2) Leverage advances in computing technology to improve processing speed, expand data storage, and increase capability through the use of advanced 64-bit architecture and upgrading software for existing modules to be used in NEM to maintain platform compatibility. The improved model performance will address computing constraints in the existing NEMS model and allow for an increase in number of alternative scenarios that can be analyzed. 3) Review the coal supply curves under development by the U.S. Geological Survey and assess their usefulness in the NEM coal model formulation. The existing NEMS coal model does not explicitly represent the development, opening and closing of new mines to meet growing coal needs in the power generation sector. 4) Implement the methodology and database design described in the October 2005 Onshore Lower 48 Oil and Gas Supply Component Design Report to develop a play-level representation of conventional and unconventional oil and gas supply. 5) Develop a new NEM transportation module with regional detail. The existing NEMS transportation model has limited capability with respect to analyzing the impacts of regional-specific travel, fuel economy, and emission policy. The redesign will add mode-specific travel flows by region and capture vehicle-specific ownership and usage characteristics by model. Incorporating this capability will provide the modeling structure necessary to evaluate the impact of regional-specific policy as it relates to travel demand, energy demand, and emission of air pollutants. 6) Develop a New Refinery and Fuel Infrastructure Model. The new NEM must include a revamped refinery model that more fully accounts for the role of biofuels in the U.S. transportation energy system. Constraints related to the distribution of alternative fuels must be explicitly represented. Initial efforts will investigate data availability and requirements; later stages of the project will be developed after consideration of program office requirements.

- **Information Technology** **2,942** **2,966** **4,903**

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. 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 2008, 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.

In FY 2008, make investments to comply with new OMB and NIST cybersecurity requirements for Certification and Accreditation (C&A), which is required every three years and is mandatory for the National Energy Information System in FY 2008. Upgrade EIA's infrastructure to make the network compliant with DOE's CIO mandate and cyber security initiatives HSPD-12 (Smart Card) and Internet Protocol.

Support development of a unified, EIA-wide data collection methodology for surveys, which will serve as EIA's primary mechanism for obtaining respondent data. This effort will improve the efficiency of data collection and editing, and increase the accuracy and improve timeliness of all energy data collected by EIA.

- **National Energy Information Center** **520** **441** **842**

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. The NEIC responds to public inquiries and disseminates EIA products and energy information.

In FY 2008, 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 manage and maintain 10 Web site channels, including the popular Energy Kid's Page, and conduct user assessment activities, such as customer surveys and Web site usability tests, that will allow EIA to pro-actively research and document the needs and interests of its customers and use these insights to substantially improve and enhance its information and data services. It also will conduct the Energy Industry Study Program, which is offered to EIA employees.

In FY 2008, NEIC will begin developing a central data library/warehouse of EIA's final publication level data, both public and non-public, for long-term access and use. Over time, it is expected to subsume and centralize a multiplicity of systems that reside on multiple servers and result in more uniform and consistent creation, maintenance, and preservation of EIA knowledge assets.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008

- **Statistics and Methods** **432** **481** **949**

  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, including issues relating to confidentiality and disclosure. This activity also provides workshops for improving knowledge and skills of EIA staff; independent expert reviews of EIA products and methods; coordination with the American Statistical Association Committee on Energy Statistics to discuss statistical issues pertaining to energy data, analysis, or forecasting; improvement of statistical procedures used within EIA survey systems; and development and oversight of performance measures of EIA's operations and products.

  In FY 2008, to increase interaction with the broader energy research community, which was one of the recommendations of the May 2006 External Study Team report, EIA will establish a program to bring academics to EIA for one or two year research projects to provide high quality technical advice on issues of current importance to EIA. EIA also will establish working groups of outside experts to provide on-going advice during the development of major modeling systems or during major survey redesigns.

  As a follow-up to the independent External Study Team, EIA will have an assessment conducted of three of its individual programs (families of surveys, forecasting programs, or analysis) to determine whether they are "doing the right things", as well as whether they are "doing things right."

- **Resource Management** **368** **435** **739**

  The Resource Management activity includes overall management, analysis, and administrative support, 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.

  In FY 2008 1) continue to implement processes to improve the efficiency and the timeliness of EIA's human resource, contracting, and financial execution/analysis efforts; 2) expand support for recruiting initiatives to ensure EIA has a viable pool of highly qualified/diverse candidates to fill expected vacancies from significant retirement attrition; 3) provide classification and staffing support to the Department's Office of Human Resource Services to reduce the hiring timeframe for replacement staff; 4) implement interfaces with Departmental information systems to reduce or eliminate error-prone data entry and processing steps; 5) consolidate contract requirements, where possible, into less costly support services contracts employing the most cost-efficient pricing formula; 6) develop/execute a replacement contract vehicle/strategy for the EOP II multi-award contract which expires in early FY 2009; 7) continue to seek cost avoidance opportunities through the Department's Working Capital Fund; and 8) continue EIA's support for the President's Management Agenda.

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Other Related Expenses	**15,814**	**16,350**	**14,847**
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; and funding for Historical Black Colleges and Universities, Hispanic Serving Institutions, Tribal Colleges and Universities, and commemorative programs.			
Total, Program Direction	**85,314**	**89,769**	**105,095**

Explanation of Funding Changes

	FY 2008 vs. FY 2007 ($000)
Salaries and Benefits	
Increase is for general pay increases, promotions, and within-grade increases.	+1,845
Support Services	
With both opportunities and risks magnified by the current spotlight on energy issues, the increase improves capabilities to close energy information gaps and address growing energy data quality issues resulting from changes in the petroleum and natural gas industries. Provides additional support for Energy Data Quality Improvements (+$6,004), initiates Ethanol and Biofuels Data Collection (+$2,798), increases International Oil and Gas Markets Data and Analysis (+$1,895), enhances Energy Data Coverage and State Energy Profiles (+$1,765), provides for the U.S. Energy Model Replacement (+$1,225), and increases Cybersecurity activities (+$1,297).	+14,984
Other Related Expenses	
Net decrease is due to space consolidation initiative in FY 2007, which more than offsets other inflationary increases in Working Capital Fund and overhead costs.	-1,503
Total Funding Change, Program Direction	**+15,326**

Support Services by Category

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Technical Support			
Survey Operations and Analyses	18,785	19,433	29,100
Economic and Short-Term Energy Analyses and Forecasting	3,872	4,112	5,403
Energy Analyses, Forecasting, and Modeling	3,156	3,828	6,832
Total, Technical Support	25,813	27,373	41,335
Management Support			
Analyses, Studies, and Evaluations	563	600	1,622
Total, Management Support	563	600	1,622
Total, Support Services	26,376	27,973	42,957

Other Related Expenses by Category

	(dollars in thousands)		
	FY 2006	FY 2007	FY 2008
Other Related Expenses			
Working Capital Fund	7,563	8,256	6,800
Training	366	250	420
Operation and Maintenance of Facilities	169	180	180
Supplies and Materials, and Equipment	7,484	7,326	7,207
Grants, Subsidies, and Contributions	232	338	240
Total, Other Related Expenses	15,814	16,350	14,847