U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY

SUBCOMMITTEE ON ENERGY AND ENVIRONMENT

HEARING CHARTER

Department of Energy Budget Request for Fiscal Year 2008

Wednesday March 7, 2007
9:30 am
2318 Rayburn House Office Building

Purpose

On Wednesday, March 7, 2007 the Energy and Environment Subcommittee of the House Science and Technology Committee will hold a hearing on the Department of Energy's (DOE) fiscal year 2008 Budget Request for research and development programs.

Witnesses

- **Dr. Ray Orbach** is the Undersecretary for Science at DOE, where he has directed the Office of Science since 2002. Prior to joining the Department, Dr. Orbach served as Chancellor of the University of California at Riverside.

- **Mr. Dennis Spurgeon** is the Assistant Secretary for Nuclear Energy at DOE. Mr. Spurgeon was recently designated as the Acting Undersecretary for Energy, taking the place of David Garman.

- **Mr. Alexander Karsner** is the Assistant Secretary for Energy Efficiency and Renewable Energy at DOE. Previously, Mr. Karsner served in the private sector as an international infrastructure developer and entrepreneur in a wide range of energy technology fields.

- **Mr. Kevin Kolevar** is the Director of the Office of Electricity Delivery and Energy Reliability at DOE. Prior to his appointment Mr. Kolevar served as Chief of Staff to then-Deputy of Energy Kyle McSlarrow.

- **Mr. Thomas D. Shope** is the Principal Deputy Assistant Secretary for Fossil Energy. Mr. Shope is testifying in place of Assistant Secretary Jeffrey Jarrett who recently announced his resignation.

Fiscal Year 2006, 2007 and 2008 for DOE non-defense R&D

DOE Overview	FY06 approps	FY07 request	FY07 approps*	FY08 request	$ change from FY06 level	% increase from FY06 level
Science	$ 3,632,044	$ 4,101,710	$3,796,393	$4,397,876	$ 765,832	21.1%
EERE	$ 1,162,747	$ 1,176,421	$1,473,844	$1,236,199	$ 73,452	6.3%
EDER	$ 158,178	$ 124,928		$ 114,937	$ (43,241)	-27.3%
Nuclear Energy R&D	$ 221,068	$ 347,132		$ 567,745	$ 346,677	156.8%
Fossil Energy R&D	$ 580,669	$ 469,686		$ 566,801	$ (13,868)	-2.4%
Loan Guarantee Program	$ -	$ -	$ 7,000	$ 8,390	$	
Total	**$ 5,754,706**	**$ 6,219,877**		**$6,891,948**	**$1,137,242**	**19.8%**

* FY07 appropriations for Science, EERE, and the Loan Guarantee Program are stipulated in the Joint Funding Resolution, H.J. Res 20, passed on 2/15/07. FY07 appropriations for the other categories are unavailable.

The $7.2 billion request for DOE civilian energy R&D funding in FY08 is divided among the five offices represented at this hearing. The Office of Science (SC) funds basic research at universities and 10 national laboratories, and is the single largest federal supporter of physical sciences research. The other four offices focus on applied research and technology development in the fields of Energy Efficiency and Renewable Energy, Fossil Energy, Nuclear Energy, and Electricity Delivery. Appearing for the first time in the President's budget is the Innovative Technology Loan Guarantee Program which would provide loan guarantees for advanced technology projects that avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and have a reasonable prospect of repaying the principal and interest on their debt obligations.

Office of Science	FY06 approps	FY07 request*	FY08 request	$ change from FY06 level	% increase from FY06 level
HEP	$ 698,238	$ 775,099	$782,238	$ 84,000	12.0%
NP	$ 357,756	$ 454,060	$ 471,319	$ 113,563	31.7%
BER	$ 564,077	$ 510,263	$ 531,897	$ (32,180)	-5.7%
BES	$ 1,110,148	$ 1,420,980	$1,498,497	$ 388,349	35.0%
ASCR	$ 228,382	$ 318,654	$ 340,198	$ 111,816	49.0%
Lab Infrastructure	$ 41,684	$ 50,888	$ 78,956	$ 37,272	89.4%
FES	$ 280,683	$ 318,950	$ 427,850	$ 147,167	52.4%
Subtotal	**$ 3,280,968**	**$ 3,848,894**	**$4,130,955**	**$ 849,987**	**25.9%**
Other	$ 351,076	$ 252,816	$ 266,921	$ (84,155)	-24.0%
Total	**$ 3,632,044**	**$ 4,101,710**	**$4,397,876**	**$ 765,832**	**21.1%**

*The Joint Funding Resolution, H.J. Res 20, passed on February 15, 2007, appropriated a total of $3,796,393,000 for the Office of Science in FY07, but did not stipulate how that amount should be allocated.

Abbreviations: HEP=High Energy Physics; NP=Nuclear Physics; BER=Biological and Environmental Research; BES=Basic Energy Sciences; ASCR=Advanced Scientific Computing Research; FES=Fusion Energy Science

OFFICE OF SCIENCE (Witness: Dr. Ray Orbach)

As part of the President's American Competitiveness Initiative (ACI), the FY2008 budget request for the DOE Office of Science is $4.4 billion. This represents an increase of approximately $600 million, or 16 percent over the FY2007 enacted level. However, this falls $189 million short of the funding levels authorized in Title IX of Energy Policy Act of 2005. It is important to note that the FY2007 Joint Funding Resolution (H.J. Res 20) appropriated $3.8 billion for the Office of Science, roughly $200 million more than the 2006 enacted amount, but far short of the $4.1 billion requested for 2007. The resolution requires that DOE report back to the Congress within 30 days on how the additional $200 million will be spent within the Office of Science. Otherwise no direction is given as to increases or decreases for specific programs, making program comparisons between years difficult for the purposes of this analysis.

The FY2008 request for **Basic Energy Sciences (BES)** is $1.5 billion, an increase of $388 million, or 35 percent above the FY06 enacted**.** As the largest program with within the Office of Science, BES conducts research primarily in the areas of materials sciences and engineering. In FY 2008 BES will support approximately 10,000 researchers in synchrotron light source and neutron scattering facilities, as well as $279 million for the construction and operation of five Nanoscale Science Research Centers.

The budget would provide $340 million for the **Advanced Scientific and Computing Research (ASCR)**, an increase of $112 million, or 49 percent over the FY06 appropriations. This includes funding to continue upgrading the Leadership Class Facility (LCF) at Oak Ridge National Lab to peta-scale operations, making it the world's largest civilian high performance computing system.

Biological and Environmental Research (BER) would receive $532 million, a decrease of approximately $32 million from FY06 enacted levels. This decrease reflects the omission of several congressionally directed projects in the BER budget. In addition to the role of BER in areas such as genomics and climate change research, the FY08 request supports the startup of three bioenergy research centers to investigate biological processes for developing and deploying large scale, environmentally sound biotechnologies to produce ethanol from cellulosic biomass (plant materials).

The FY08 funding request for **High Energy Physics (HEP)** is $ 782.2 million, which is $84 million or 12 percent more than the FY2006 enacted level, but only a 1 percent increase over the FY2007 request. This program funds fundamental research in elementary particle physics and accelerator science and technology. Approximately $80 million is requested for R&D leading to the International Linear Collider (ILC), a project which could cost over $7 billion and may be sited in the U.S.

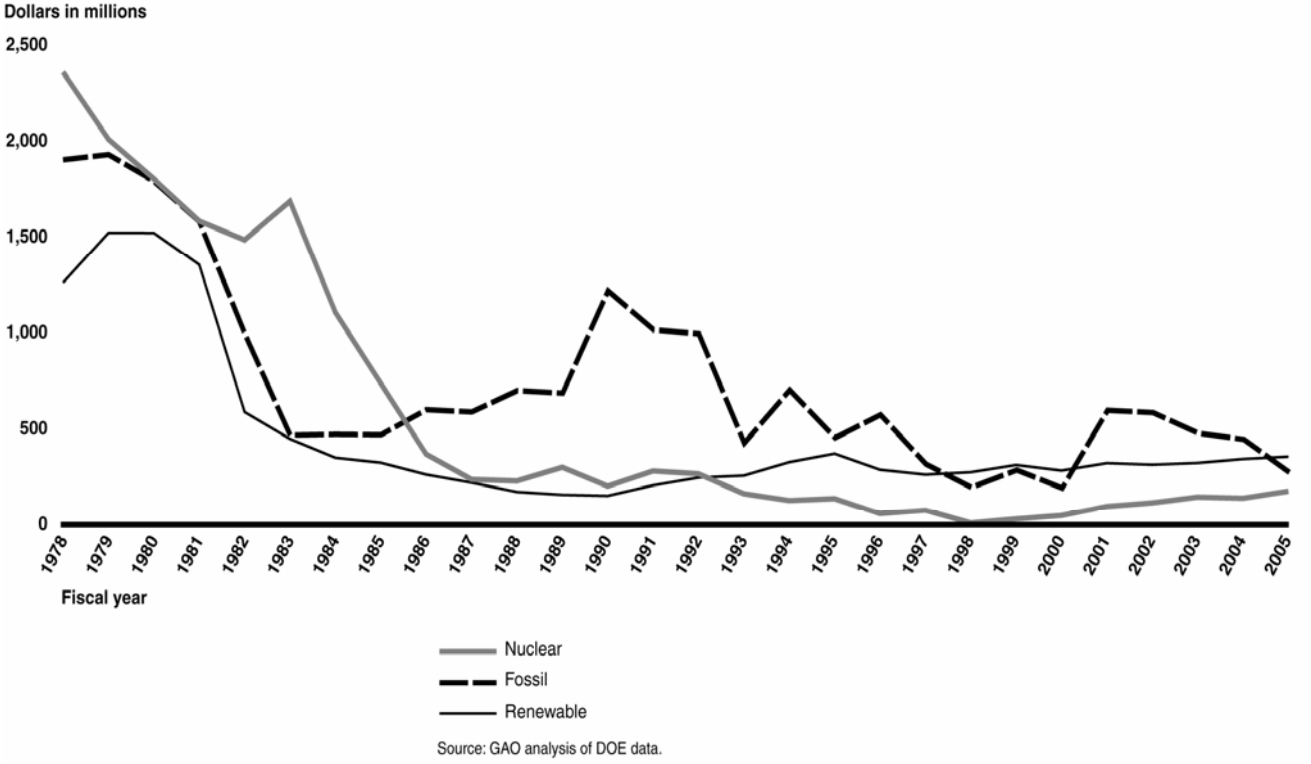
Fusion Energy Sciences (FES) receives $428 million, a substantial increase of $147 million, or 52 percent above the FY 2006 enacted. Of this amount, $160 million would be dedicated to support the U.S. role in the International Thermonuclear Experimental Reactor (ITER).

Also of note, **Nuclear Physics (NP)** receives $ 471.3 million, an increase of $113.5 million, or 31.7 percent, over the FY06 enacted amount. The request for **Science Laboratories Infrastructure** is approximately $80 million.

APPLIED ENERGY TECHNOLOGY PROGRAMS

While the total budget for energy R&D has risen in recent years it is still a fraction of the robust levels seen when the nation responded to the energy crisis of the late 1970's. According to the U.S. Government Accountability Office the Department of Energy's budget authority for energy R&D fell 85 percent from 1978 to 2005 (inflation adjusted). Within the applied programs funding varied greatly according to Administration and Congressional priorities as the chart below indicates.

DOE's Budget for Renewable, Fossil and Nuclear R&D, Fiscal Years 1978-2005



Despite heavy investments in wind, solar and geothermal energy, the large bulk of the nation's renewable energy portfolio comes from hydropower and still comprises only 6% of total electricity generation. The Energy Information Administration (EIA) projects that U.S. electricity generation will grow from 3,900 billion kilowatt-hours in 2005 to 5,500 billion kilowatt hours in 2030. Coal will make up most of this growth and continue to provide the largest part of U.S. electricity generation for the foreseeable future. It is expected that, short of a very aggressive resurgence in nuclear capacity, new nuclear plants will only serve to replace aging existing plants in terms of overall electricity market share.

Energy Efficiency & Renewable Energy (EERE)	FY06 approps	FY07 request*	FY08 request	$ change from FY06 level	% increase from FY06 level
Hydrogen technology	$ 153,451	$ 195,801	$ 213,000	$ 59,549	38.8%
Biomass and biorefinery systems R&D	$ 89,776	$ 149,687	$ 179,263	$ 89,487	99.7%
Solar	$ 81,791	$ 148,372	$ 148,304	$ 66,513	81.3%
Wind	$ 38,333	$ 43,819	$ 40,069	$ 1,736	4.5%
Geothermal technology	$ 22,762	$ -	$ -	$ (22,762)	-100.0%
Hydropower	$ 495	$ -	$ -	$ (495)	-100.0%
Vehicle technologies	$ 178,351	$ 166,024	$ 176,138	$ (2,213)	-1.2%
Building technologies	$ 68,190	$ 77,329	$ 86,456	$ 18,266	26.8%
Industrial technologies	$ 55,856	$ 45,563	$ 45,998	$ (9,858)	-17.6%
Federal energy management program	$ 18,974	$ 16,906	$ 16,791	$ (2,183)	-11.5%
Facilities and infrastructure	$ 26,052	$ 5,935	$ 6,982	$ (19,070)	-73.2%
Weatherization	$ 316,886	$ 225,031	$ 204,904	$ (111,982)	-35.3%
Subtotal	**$ 1,050,917**	**$ 1,074,467**	**$1,117,905**	**$ 66,988**	**6.4%**
Other	$ 111,830	$ 101,954	$ 118,294	$ 6,464	5.8%
Total EERE	**$ 1,162,747**	**$ 1,176,421**	**$1,236,199**	**$ 73,452**	**6.3%**

*The Joint Funding Resolution, H. J. Res. 20, passed on February 15, 2007, appropriated a total of $1,473,844,000 for EERE in FY07, but did not stipulate how that amount should be allocated.

Energy Efficiency and Renewable Energy (EERE) (Witness – Alexander Karsner)

EERE is requesting $1.2 billion for FY08, a 6.3 percent increase over the FY06 appropriated level. However, the request is significantly less than the amount appropriated for FY07 in the joint funding resolution passed on February 15, 2007, which increased appropriate funds more than $300 million over the FY06 level to approximately $1.5 billion. As a result, the FY08 request actually represents a $237 million cut from the FY07 appropriated amount. As with the Office of Science, it is not yet known how the Assistant Secretary for EERE will allocate the additional $300 million. These allocations must be determined no later than 30 days after the date of passage of the joint funding resolution. Since these allocations are yet to be determined, the rest of this analysis is based on a comparison of the FY08 request and the FY06 appropriated amount.

Funding for priority programs continues to come at the expense of other lower-profile programs where significant technological gains can still be made. The FY08 request contains large cuts for **Weatherization Programs, the Industrial Technologies Program, and the Federal Energy Management Program (FEMP),** despite a Presidential call for increasing efficiency in all three of these areas. The Vehicle Technologies Program also suffers a slight decrease. The FY 2008 request also proposes to eliminate two important renewable energy R&D programs - Geothermal Technologies and Hydropower Technologies.

Biomass and Biorefinery Systems would receive $179 million, almost a 100% increase over FY06 funding. This large increase is intended to address the President's goal of making cellulosic ethanol cost-competitive with corn-derived ethanol by 2012, and also

enabling a supply of 35 billion gallons of alternative fuels annually in accordance with the Twenty in Ten initiative – a reduction of US gasoline usage by 20 percent in the next ten years – as outlined in the 2007 State of the Union address. While the general goal of increasing the nation's supply of alternative fuels is widely supported, there is some concern, expressed both by parties within DOE and in the renewable fuels community, that the level of commercial scale investment is too much too soon, given that the science of unlocking cellulosic ethanol is still uncertain. Some argue that some of that funding would be better spent in the short-term investments to decrease our overall energy demand, such as technologies to increase vehicle fuel efficiency.

Solar energy would receive $148 million, an increase of 81% over FY06 appropriations. This funding supports the President's Solar America Initiative (SAI), which seeks to make electricity from photovoltaic cells cost competitive by 2015. **Wind energy** is slated for $40 million, essentially even with FY06 levels.

As in the 2007 budget request, the Administration would eliminate R&D in **Geothermal Power** technologies. However, a comprehensive study released in January by the Massachusetts Institute of Technology found that the large amounts of heat stored in the Earth's crust could supply a substantial portion of the United States' future electricity requirements with minimal environmental impact and probably at competitive prices. The primary obstacle to commercial development of this resource was identified as lack of federal R&D support.

Hydropower R&D would also be eliminated, a category that includes funding for ocean energy R&D (e.g wave, tides, currents, etc.) despite explicit authorization in EPACT 2005 for R&D in these technologies. According to the Office of EERE, in the Pacific Northwest alone, it is feasible that wave energy could produce 40–70 kilowatts (kW) per meter (3.3 feet) of coastline, yet the President's budget requests no funds for R&D into this vast, clean, and renewable resource.

The Administration continues the inconsistent treatment of Energy Efficiency programs. In addition to the Federal Energy Management Program and the Weatherization program several cuts are made throughout the budget. Despite mounting concerns about the role vehicles play in the country's reliance on foreign oil the FY08 request for **Vehicle Technologies R&D** would be reduced by $2.2 million over FY06, which includes funding for technologies for plug-in hybrid vehicles, lightweight vehicle materials, and engine technologies. The **Industrial Technologies** program, which aims to reduce the energy intensity of the U.S. economy by improving the energy efficiency of the nation's industrial sector, would decrease by $9.9 million, a decrease of almost 18 percent. However, **Building Technologies** would rise by $18.3 million compared to the FY06 level, a 27 percent increase. While attempting to pursue a balanced approach to developing clean energy technologies, the EERE budget seems to exhibit a pattern of defunding valuable programs to fund a few presidential priority projects, often with long-time horizons and uncertain payoffs.

Nuclear Energy	FY06 approps	FY07 request	FY08 request	$ change from FY06 level	% increase from FY06 level
Research & Development					
Nuclear Power 2010	$ 65,340	$ 54,031	$ 114,000	$ 48,660	74.5%
Generation IV Nuclear Energy Systems Initiative	$ 53,263	$ 31,436	$ 36,145	$ -17,118	-32.1%
Nuclear Hydrogen Initiative	$ 24,057	$ 18,665	$ 22,600	$ -1,457	-6.1%
Advanced Fuel Cycle Initiative (GNEP)	$ 78,408	$ 243,000	$ 395,000	$ 316,592	403.8%
Total Nuclear Energy R&D	**$ 221,068**	**$ 347,132**	**$ 567,745**	**$ 346,677**	**156.8%**

Office of Nuclear Energy (Witness – Dennis Spurgeon)

Nuclear Energy (NE) receives $568 million for research and development, with a large portion of that dedicated to the Global Nuclear Energy Partnership (GNEP). For the Nuclear office, this represents an increase of $347 million (157 percent) above the FY2006 Congressionally appropriated amount.

The Administration unveiled the Global Nuclear Energy Partnership (GNEP) in 2006 as a plan to develop advanced, proliferation-resistant nuclear fuel cycle technologies that would maximize the energy extracted from nuclear fuels and minimize nuclear waste. GNEP has been very controversial in Congress, with little support in the House where only token funding has been approved. For instance, the Administration requested approximately $250 million in FY2007 for GNEP (through the Advanced Fuel Cycle Initiative – AFCI) but GNEP will likely only receive roughly $80 million for FY2007 under the joint funding resolution. Nonetheless, the President's FY2008 request for GNEP is $395 million.

Chief among the concerns about GNEP is the cost of implementing the program (up to $40 billion) and then deploying a fleet of the required technologies on a commercial scale (more than $200 billion), and whether such a program warrants the costs. There are also issues with premature selection of technologies before the completion of a full system-wide analysis of what would be required. Many are concerned that DOE has not adequately demonstrated an ability to carry out large scale construction and operation of such a project without major cost and schedule overruns.

Finally, the Nuclear Power 2010 program also would receive a considerable boost with an FY08 request of $114 million, which is almost double the FY06 appropriation. The increase is intended to continue activities in new reactor designs and licensing applications with the Nuclear Regulatory Commission to support an industry decision to build a new power plant by 2009.

Electricity Delivery and Energy Reliability (EDER)	FY06 approps	FY07 request	FY08 request	$ change from FY06 level	% increase from FY06 level
Total, Research and Development	$ 132,589	$ 95,636	$ 85,994	$ (46,595)	-35.1%
High Temperature Superconductivity R&D	$ 48,649	$ 45,468	$ 28,186	$ (20,463)	-42.1%
Transmission Reliability R&D*	$ 12,516	$ -	$ -	$ (12,516)	-100.0%
Electricity Distribution Transformation R&D*	$ 58,453	$ -	$ -	$ (58,453)	-100.0%
Energy Storage R&D*	$ 2,889	$ -	$ -	$ (2,889)	-100.0%
GridWise*	$ 5,267	$ -	$ -	$ (5,267)	-100.0%
GridWorks*	$ 4,815	$ -	$ -	$ (4,815)	-100.0%
Visualization and Controls*	$ -	$ 17,551	$ 25,305	$ 25,305	
Energy Storage and Power Electronics	$ -	$ 2,965	$ 6,803	$ 6,803	
Renewable and Distributed Systems Integration	$ -	$ 29,652	$ 25,700	$ 25,700	
Electricity Restructuring	$ 12,276	$ -	$ -	$ (12,276)	-100.0%
Operations and Analysis	$ -	$ 12,009	$ 11,556	$ 11,556	
Program Direction	$ 13,313	$ 17,283	$ 17,387	$ 4,074	30.6%
Total EDER	**$ 158,178**	**$ 124,928**	**$ 114,937**	**$ (43,241)**	**-27.3%**

* All projects in Transmission Reliability R&D, Energy Storage R&D, GridWise, GridWorks, and most projects in Electricity Distribution Transformation R&D programs are transferred to the Visualization and Controls sub-account as of FY07.

Office of Electricity Delivery and Energy Reliability (Witness – Kevin Kolevar)

The Office of Electricity is requesting $115 million for FY08, a 27 percent reduction from the FY06 appropriation. Of the total for this office the Administration proposes $86 million for R&D, a $46.5 decrease from FY06 Appropriations. This continues a downward trend of cutting R&D to improve the reliability, efficiency and security of the nations electrical grid system, improve access to the grid, and decrease price volatility in electricity delivery.

Many of the EDER programs are being regrouped and consolidated under a new account called Visualization and Controls. This includes Transmission Reliability R&D, Energy Storage R&D, GridWise, and GridWorks. This regrouping hides the fact that most of these programs are being cut significantly.

Innovative Technology Loan Guarantee Program (LGP)

The FY 2008 budget proposes $8.4 million to fund the Office of Loan Guarantees, which will administer the Innovative Technology Loan Guarantee Program (LGP), a $1.4 million increase above the FY 2007 enacted amount. The program was established in the Energy Policy Act of 2005 to provide loan guarantees for renewable energy, energy efficiency, clean coal, advanced nuclear, and other innovative energy projects. The FY 2008 budget request assumes a loan volume of $9 billion for such projects. Of this, $4 billion is set aside for large electric power generation projects such as advanced nuclear and coal gasification with carbon sequestration. An additional $4 billion is set aside to promote biofuels and clean transportation fuels, and $1 billion for new technologies in electricity transmission and renewable power systems.

Fossil R&D	FY06 approps	FY07 request	FY08 request	$ change from FY06 level	% increase from FY06 level
Coal	$ 366,762	$ 330,119	$ 426,602	$ 59,840	16.3%
Clean Coal Power Initiative	$ 48,135	$ 4,957	$ 73,000	$ 24,865	51.7%
FutureGen	$ 17,326	$ 54,000	$ 108,000	$ 90,674	523.3%
Fuels & Power Systems	$ 240,529	$ 207,810	$ 183,577	$ (56,952)	-23.7%
Other	$ 60,772	$ 63,352	$ 62,025	$ 1,253	2.1%
Natural gas technologies	$ 31,801	$ -	$ -	$ (31,801)	-100.0%
Petroleum - Oil technologies	$ 30,805	$ -	$ -	$ (30,805)	-100.0%
Subtotal	**$ 429,368**	**$ 330,119**	**$ 426,602**	**$ (2,766)**	**-0.6%**
Other	$ 151,301	$ 139,567	$ 140,199	$ (11,102)	-7.3%
Total Fossil R&D	**$ 580,669**	**$ 469,686**	**$ 566,801**	**$ (13,868)**	**-2.4%**

Fossil Energy R&D (Witness – Thomas Shope)

Fossil Energy R&D would receive $567 million in FY 2008, a decrease of almost $14 million or 2.5 percent compared to FY 2007 appropriations. Funding increases would go exclusively to coal R&D, including the **Clean Coal Power Initiative** which aims to develop technologies that will increase efficiency of coal-fired power plants, reduce mercury and NOx emissions, and prove carbon capture and sequestration technologies. The **FutureGen** project to demonstrate near-zero atmospheric emissions electricity production sees a substantial increase to $108 million, 500 percent above the FY06 appropriated amounts. However, **Fuels and Power Systems**, which includes R&D on advanced coal technologies and carbon sequestration, actually decreases to $184 million, 24 percent less than the FY06 appropriated amount.

While the carbon sequestration program received a small increase, the request proposes conducting demos in only 3 or 4 sites across the country as opposed to doing a large scale demonstration in each of the 7 regional sequestration partnerships. Many in the industry believe that, while federal investments have increased in recent years, funding for this program and the Clean Coal Power Initiative may be woefully inadequate to address the scale of challenges facing coal as it continues to provide approximately half of the nation's electricity. Potentially forthcoming greenhouse gas regulations may adversely affect the coal industry and some other sectors of the economy. Yet it is not clear that technologies are available to cost effectively reduce carbon dioxide emissions from the use of coal, and sequester carbon dioxide on the scales required for a national greenhouse gas reduction program.

The FY2008 budget once again proposes to eliminate all oil and gas R&D, including $50 million in direct spending (mandated in the Energy Policy Act of 2005) for unconventional onshore and ultradeepwater offshore natural gas exploration technologies that would go largely to smaller independent oil and gas producers.