

## DOE Science Gains 14 Percent, Energy R&D Slides in 2007 Budget

### AAAS R&D Funding Update on R&D in the FY 2007 DOE Budget

(This analysis is a preview of the DOE chapter in the forthcoming *AAAS Report XXXI: Research and Development FY 2007*, a comprehensive look at the President's budget for R&D in FY 2007. This analysis contains revised AAAS estimates of DOE R&D, different from figures originally presented in the President's budget. More tables and continually updated supplemental materials on R&D in the FY 2007 budget can be found on the AAAS R&D Web site at <http://www.aaas.org/spp/rd>.)

#### Highlights

- The **Department of Energy (DOE)** would enjoy a **substantial increase for its science portfolio** in 2007 because of the Office of Science's (OS) leading role in the Bush Administration's proposed increases for physical sciences research in the American Competitiveness Initiative. DOE R&D would increase \$326 million or 3.7 percent in FY 2007 to \$9.0 billion (see Table II-11), despite tough budgetary conditions in the overall budget. DOE's Office of Science would emerge as the clear winner among R&D funding agencies with a 14.4 percent increase to \$3.8 billion for its R&D portfolio centered on the physical sciences.

- **After several years of flat or declining budgets, funding for every OS program would increase substantially.** The largest OS programs would all receive increases of 8 percent or more, including a dramatic boost of 24 percent for Nuclear Physics after a decade of stagnant funding, a 36 percent increase for computing research, a 25 percent increase for Basic Energy Sciences centered around several large-scale facilities, and a 31 percent increase for the core life sciences research portfolio.

- Although President Bush outlined large increases for some alternative energy R&D programs as part of an Advanced Energy Initiative in his State of the Union address, **overall DOE energy R&D would fall 4.8 percent to \$1.3 billion in 2007.** Substantial increases for R&D on hydrogen, fuel cells, biomass, and solar technologies would be more than offset by steep cuts in other areas of the energy R&D portfolio. Many but not all of the cuts would be due to the proposed elimination of a bumper crop of 2006 congressional earmarks. Many of the increases are related to a \$288 million Hydrogen Fuel Initiative (up from \$235 million) to develop technologies for hydrogen-powered cars.

- DOE's defense R&D would fall 2.1 percent to \$4.0 billion in 2007.

#### DOE R&D in the FY 2007 Budget

In January, President Bush put DOE's programs in the spotlight when he announced an American Competitiveness Initiative (ACI) to boost physical sciences research and an Advanced Energy Initiative to boost alternative energy R&D. The FY 2007 budget would enable the department to increase its R&D funding at a time when most other agencies face declining budgets. DOE's Office of Science (OS) is the largest federal sponsor of physical sciences research and is one of three federal agencies (the other two are the National Science Foundation and the National Institute of Standards and Technology laboratories) that would receive substantial R&D increases to fulfill the ACI's physical sciences goals. DOE's energy R&D portfolio funds R&D on a variety of energy topics, including renewable energy R&D on the new Administration priorities of hydrogen, solar power, and biomass energy, all of which would receive substantial increases. But those increases would be matched by cuts in other energy R&D programs.

Within a total DOE budget of \$23.6 billion that would remain flat from this year to next year, DOE would shift nearly \$1 billion in projected savings from completed environmental cleanups in Colorado and Ohio to other DOE programs in 2007, with half going to OS and the other half going to energy and nonproliferation activities. The DOE R&D portfolio in FY 2007 would total \$9.0 billion, an increase of \$326 million or 3.7 percent (see Table II-11) that would reverse the sliding DOE R&D portfolio of the last few years (see Figure 1).

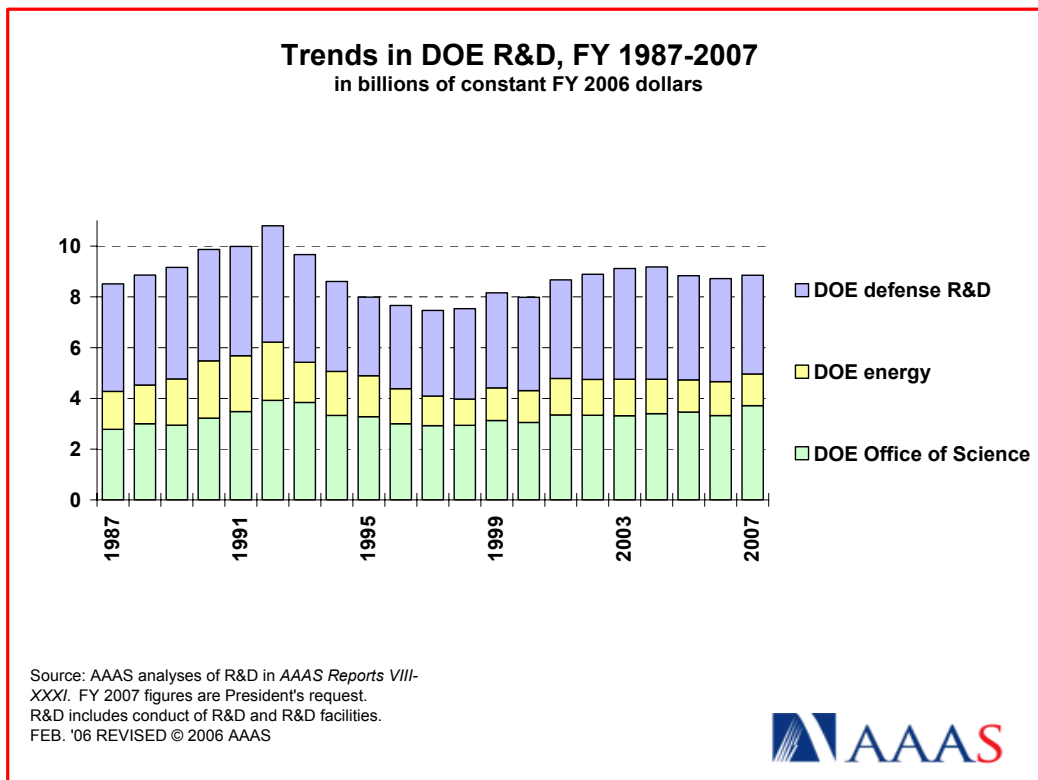


Figure 1. (click on the image for PDF)

### R&D in the DOE Office of Science (OS)

DOE's Office of Science has long been the dominant federal sponsor of physical sciences research, especially in physics and related fields. It is also a large sponsor of computer sciences, mathematics, environmental sciences, materials research, nanotechnology, mathematics, and engineering; the push by the Bush Administration to boost physical sciences research broadly defined through large increases in the OS budget would pay off for all of the Office's research areas. The total Science budget would climb 14.1 percent to \$4.1 billion, a \$505 million increase that could be the first step in an Administration vision of doubling the OS budget by 2016. More than 90 percent of the Science budget goes to R&D activities, with the remainder going to administrative and operating costs. Science R&D would gain 14.4 percent in the FY 2007 budget to \$3.8 billion, making the Office of Science the big winner among the major R&D funding agencies in the 2007 budget (see Table II-11). The large proposed increase would mark a sharp departure from the flat or declining funding trends of recent years, and could be the first in a series of increases to double the OS budget over the next decade (see Figure 1).

After several years of flat or declining budgets, funding for every OS program would increase substantially. The largest OS programs would all receive increases of 8 percent or more, including a dramatic boost of 24 percent for Nuclear Physics after a decade of stagnant funding, a 36 percent increase for computing research, a 25 percent increase for Basic Energy Sciences centered around several large-scale facilities, and a 31 percent increase for the core life sciences research portfolio (see Figure 2).

OS programs support cutting-edge research through a mix of laboratory research at DOE's national laboratories, university-based research, and the construction and operation of large scientific user facilities that can be used by external researchers for their experiments. Roughly half of OS R&D funding (\$1.8 billion) would go to operate and construct facilities, while the other half (\$1.9 billion) would support research, mostly at DOE laboratories (\$1.1 billion) but a large portion at universities (\$600 million, with the remainder going to other types of institutions). The laboratory research and large facilities are housed primarily at ten Office of Science laboratories around the nation that are federally owned and contractor operated, such as the Oak Ridge National Laboratory in Tennessee, Brookhaven National Laboratory in New York, and Argonne National Laboratory in Illinois. After facing several years in which tight budgets have forced the cancellation of planned facilities construction projects, dramatic reductions in facilities operating times (resulting in one facility being forced to accept private donations to keep operating in 2006), and reductions in external research support, the large requested 2007 increase would allow OS to have the best of all worlds: new facilities would come on line and others would begin construction, operating times for users would be expanded at existing facilities, and increasing numbers of external researchers could win research grants.

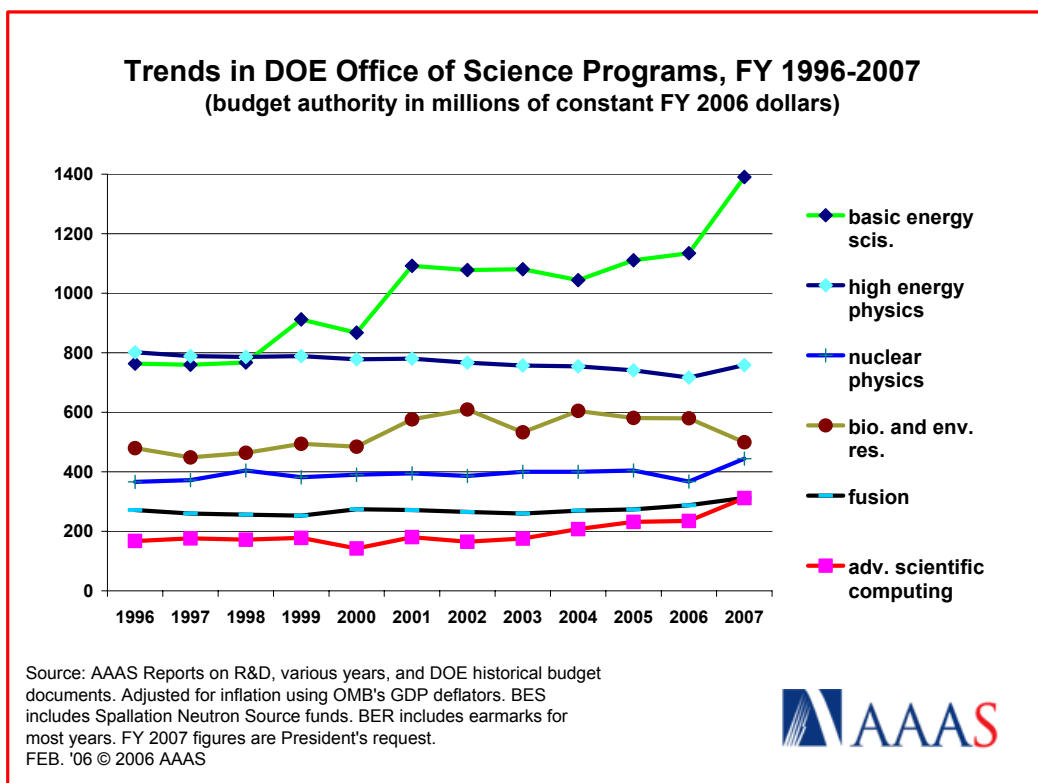


Figure 2. (click on the image for PDF)

Basic Energy Sciences (BES) is the OS program that has fared the best even in the tough budget conditions of recent years, and would more than half the additional OS dollars in 2007 (see Figure 2). BES funding would surge 25 percent to \$1.4 billion in the 2007 request across the entire range of BES programs, from materials sciences, nanotechnology research, and basic hydrogen research to ramped-up construction of the Linac Coherent Light Source (LCLS) in California. The largest increase to \$171 million (up \$71 million) would go to operations of the Spallation Neutron Source (SNS) at Oak Ridge in Tennessee, which would have its first full year of operations in 2007. BES also takes the lead in DOE's nanotechnology efforts with a \$51 million requested increase to \$254 million for research and 5 nanoscale research facilities. BES would also fund \$50 million (up from \$33 million) in basic hydrogen research as part of the Administration's Hydrogen Fuel Initiative.

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The largest percentage increase of 36 percent would go to Advanced Scientific Computing Research (ASCR) which leads DOE's efforts in high-performance computing for research applications. The \$319 million 2007 request would boost high performance computing capacity that researchers can use for their experiments, primarily at Oak Ridge, Argonne, and Lawrence Berkeley laboratories. In 2007, ASCR would work toward achieving 250 teraflop computing capabilities to run the most complicated and detailed scientific models.

The Biological and Environmental Research (BER) program appears to decline by 12 percent in the FY 2007 request, but the 2006 total includes \$129 million in congressional earmarks that would be eliminated in 2007. As a result, non-earmarked BER funding would climb 12 percent to \$510 million, including a 31 percent boost for the Life Sciences program to \$264 million, to pay for a dramatic expansion of the Genomes to Life program and a boost for the Joint Genome Institute's sequencing capacity.

**The U.S. contribution to the multinational International Thermonuclear Experimental Reactor (ITER) would go full speed ahead in 2007**, but unlike in past years' requests there would also be a robust domestic fusion program. The 11 percent increase to \$319 million for Fusion Energy Sciences would be a sharp break from the flat funding of recent years (see Figure 2), and would alleviate congressional concerns that U.S. participation in ITER construction could siphon off resources from domestic fusion research and facilities. ITER funding would climb from \$19 million to \$60 million in 2007, leaving enough funding to keep domestic fusion activities nearly level. The \$5 billion international project had been delayed because the international partners were unable to agree on a site, but in 2005 a site in France was chosen, a director was selected, and construction got underway. The energy policy bill signed into law in August 2005 authorized U.S. participation in the project and authorized DOE to negotiate with the other partners. But in the 2006 budget, Congress shifted \$30 million from the ITER request to domestic fusion research in order to sustain operating times at fusion facilities in New Jersey, California, and Massachusetts.

The High Energy Physics (HEP) program, which funds basic research on the nature of matter and energy, would get an 8.1 percent increase to \$775 million (see Table II-11). The program does most of its work at three facilities located at two DOE labs (Fermilab in Illinois and the Stanford Linear Accelerator Center in California), and also cooperates in the Large Hadron Collider in Switzerland. The increase would allow DOE to sustain operating times at facilities, boost research funding slightly, increase support for the LHC toward the beginning of operations in 2007, and double the DOE contribution to \$60 million for design and development of the International Linear Collider, the next big international high-energy physics project. The Nuclear Physics program (NP) would enjoy a 23.7 percent surge in funding to \$454 million after being stuck at \$400 million in today's dollars for nearly a decade (see Figure 2). NP seeks to understand the structure and interactions of subatomic particles, and supports two large facilities, the Thomas Jefferson National Accelerator Facility in Virginia and the Relativistic Heavy Ion Collider (RHIC) in New York. After yet another year of flat appropriations in the 2006 budget, the program was forced to announce the termination of operations at RHIC, and in an embarrassing turn of events was only able to keep the facility operating because of a private donation. But the large 2007 increase would provide full funding for facility operations at all NP facilities and also money to initiate new facilities construction and upgrades.

**After more than a decade of steep cuts and stagnant budgets, the DOE Office of Science has less money now for its R&D programs than it did in the early 1990s, but the 2007 budget could be a reversal of fortune (see Figure 1).** In today's dollars, the Science program has been stuck at roughly \$3.3 billion since FY 2001, but the large 2007 request would represent a decisive break from recent trends, and is envisioned as the first in a decade of increases that could double the OS budget over the next decade.

### **DOE Energy R&D Programs**

Although some alternative energy R&D programs would receive large increases in the FY 2007 budget request because of the Administration's new push to reduce U.S. dependence on Middle East oil, **overall DOE energy R&D would decline 4.8 percent to \$1.3 billion as increases in some areas would be offset by steep cuts in fossil energy R&D and conservation programs** (see Figure 3). Some, though not all, of

the cuts would be due to the proposed elimination of 2006's bumper crop of energy R&D earmarks, but several longstanding energy programs would be eliminated in the 2007 request.

The Bush Administration has consistently favored increases for hydrogen and fuel cell R&D as investments in a promising energy source for the future, but in his 2006 State of the Union address the President added solar energy and biomass energy to his list of renewable energy priorities. The Administration's Hydrogen Fuel Initiative would total \$288 million from the DOE budget, up from \$235 million in 2006 for an agency-wide effort to enable hydrogen-powered motor vehicles using fuel cells, including \$50 million from the Office of Science. Most of the hydrogen R&D would come from the Energy Supply and Conservation account, which combines the formerly separate Energy Supply and Energy Conservation programs. R&D in the combined account would climb 13.9 percent to \$888 million in 2007. Within the total, the Hydrogen Technology program would increase from \$156 million to \$196 million, a 25.8 percent boost (see Table II-11 and Figure 3). But taking out \$43 million in congressional earmarks from the 2006 budget would allow for an even larger 73 percent increase for core hydrogen R&D funding. The program would dramatically boost funding to tackle technical challenges in hydrogen production and delivery, hydrogen storage, and hydrogen fuel cells. The Nuclear Energy R&D portfolio would contain \$19 million for the Nuclear Hydrogen Initiative to produce hydrogen from nuclear power plants, and the Fossil Energy program would have \$24 million for the initiative to fund additional fuel cells R&D.

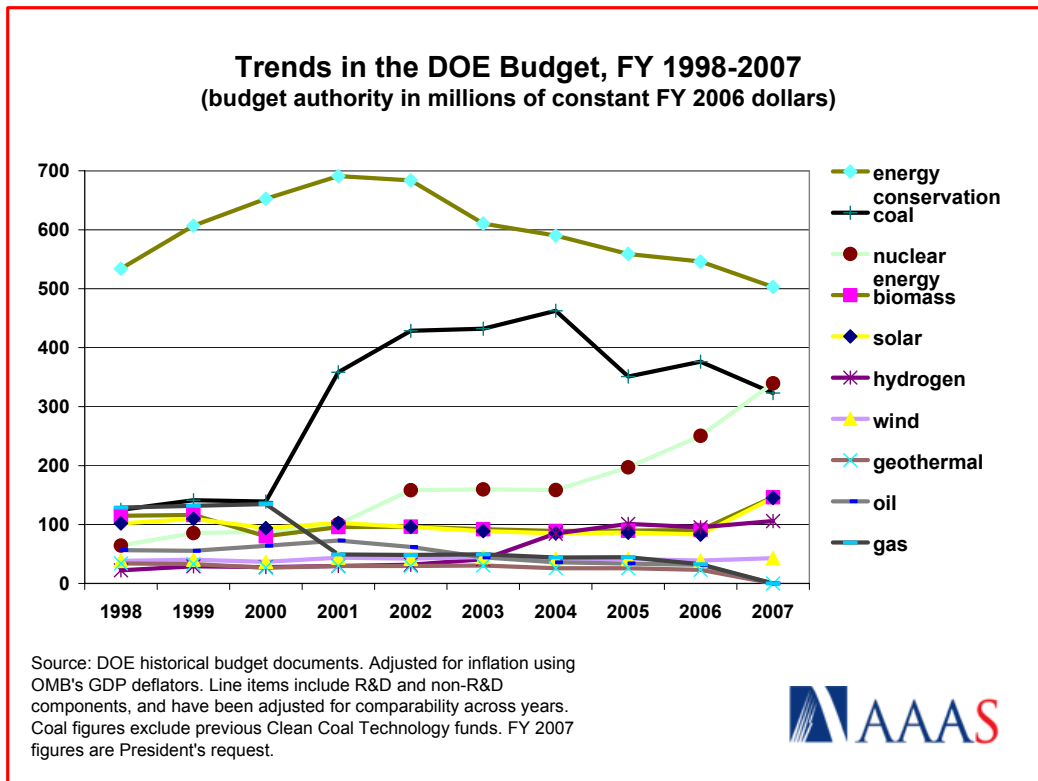


Figure 3. (click on the image for PDF)

After several years of flat or declining funding requests, the Bush Administration would seek \$148 million for the solar energy R&D program, a dramatic 79 percent increase from 2006. Excluding 2006 earmarks, the core solar energy R&D portfolio would double. Similarly, after flat funding for many years the biomass R&D program would increase 65 percent to \$150 million, but because more than half the 2006 portfolio is earmarked the non-earmarked biomass R&D portfolio would more than triple. The requested increase would dramatically expand federal efforts to develop biorefineries to convert biomass into gasoline substitutes, new and improved biofuels, and technologies to enable cars to run on several kinds of biofuels. Wind energy R&D would also increase, by 13 percent to \$44 million.

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**But there would be steep cuts to other renewable energy R&D programs.** The budget request would eliminate the \$23 million geothermal R&D program, and also eliminate the dwindling hydropower R&D program. Although the Administration proposes a dramatic increase in Nuclear Energy programs, including a \$250 million initiative called the Global Nuclear Energy Partnership, the increases would go to non-R&D programs, leaving the Nuclear Energy R&D portfolio with a 19 percent tumble to \$95 million, though after a larger increase in 2006. Funding for Nuclear Power 2010, next-generation nuclear energy systems, and hydrogen from nuclear would all fall, to make room for large increases in demonstration projects and other nuclear projects.

**There would also be steep cuts in energy conservation and fossil energy R&D programs.** Fossil Energy R&D funding would fall 31.1 percent down to \$330 million, in part because the Administration's longstanding emphasis on coal R&D would wane and also because other R&D on other fossil fuels would end. Coal R&D would fall \$46 million down to \$330 million (see Table II-11 and Figure 3). Although FutureGen funding to develop a near-emission-free, coal-fired electricity and hydrogen production plant would triple from \$18 million to \$54 million, funding for the Clean Coal Power Initiative program to develop cleaner coal-based power plants would tumble from \$50 million to \$5 million to clear a backlog of unspent funds from previous years. Other coal-related research would fall to \$271 million, but there would be increases for key areas: carbon sequestration R&D, after a big increase in 2006, would further increase to \$74 million, while fuel cells R&D related to coal would increase slightly to \$63 million. But as the Administration proposed last year (but Congress rejected), the budget would eliminate the oil R&D and gas R&D programs, and also cooperative fossil energy R&D. Although the Energy Conservation portfolio is now part of the larger Energy Supply and Conservation program, funding for its component Vehicle Technologies (down \$16 million to \$166 million) and Industrial Technologies (down \$11 million to \$46 million) programs would fall, offsetting a gain in the Building Technologies program (up \$8 million to \$77 million). Some of the cuts would be from the elimination of 2006 earmarks, allowing for increases not only in residential buildings conservation R&D but also in hybrid vehicle R&D (up from \$44 million to \$51 million in Vehicles). As shown in Figure 3, energy conservation R&D has declined every year since 2001 in real terms.

### **DOE Defense R&D**

DOE and its predecessors have long had responsibility for managing the nation's nuclear weapons stockpile, supplying nuclear reactors to the Navy, and dealing with the environmental legacies of nuclear weapons work. DOE's defense R&D to address these responsibilities would fall 2.1 percent to \$4.0 billion in the 2007 budget (see Table II-11). The core Weapons Activities program, which funds science-based alternatives to nuclear testing in order to maintain the U.S. nuclear weapons stockpile, would receive \$6.4 billion in 2007. Roughly half of this portfolio goes to R&D activities, totaling \$2.9 billion in 2007, a decline of \$51 million or 1.7 percent. To keep pace with an increasing reliance on complex high-end computing simulations of nuclear explosions, the Advanced Simulation and Computing program would increase 3.0 percent to \$618 million. The program, the defense counterpart to the nondefense ASCR program, would mostly take place in DOE's three weapons laboratories (Los Alamos and Sandia in New Mexico, Lawrence Livermore in California).

After Congress terminated research on the controversial Robust Nuclear Earth Penetrator (RNEP) program in 2006, DOE would move on to other nuclear weapons projects. The Administration proposal to initiate research on a new generation of nuclear weapons, including the RNEP and other tactical or 'low-yield' nuclear weapons (also called 'bunker buster' bombs), has been opposed by Congress so far because building these weapons would require the repeal of a U.S. ban on developing new nuclear weapons. Instead, DOE would move forward on the Reliable Replacement Warhead (RRW) project, a 5-year, \$98 million project initiated by Congress in the FY 2005 budget that would explore the possibility of new warhead designs to use with existing rather than new nuclear weapons. DOE requests \$28 million in 2007 for the RRW.

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Although the 2007 request takes a step back from a substantial increase in 2006, the Nonproliferation and Verification R&D program investment of \$272 million (down \$50 million) is a substantial increase compared to previous years, and reflects increasing concern about the proliferation of nuclear weapons and the perceived need to find new technical solutions for verifying compliance with nonproliferation agreements.

### **Outlook for the DOE Budget**

Because the American Competitiveness Initiative and alternative energy R&D are high priorities in the FY 2007 budget, DOE would receive an increase even as most other domestic agencies face cuts within a declining domestic budget. Looking to the future, the Bush Administration's outyear budget projections show that in the push to reduce the budget deficit in half over the next few years, funding for most domestic programs would decline each year to 2011, but funding for DOE's Office of Science and the other two ACI programs would continue to increase. The projections show the Office of Science budget increasing steadily from \$4.1 billion in 2007 up to \$5.3 billion by 2011. After adjusting for inflation, Science would gain 35 percent over the next five years. Although budgets are always determined one year at a time, and Congress has not even acted on the first installment for 2007, Congress has so far been supportive of the Administration's proposed 2007 increase for the Office of Science, and key appropriators have promised to sustain most if not all of the increase in 2007 appropriations. But the increases for alternative energy R&D may be short-lived; the budget projections show renewable energy funding falling after 2007, joining other energy R&D funding in decline. As a result, the 14 percent increase in 2007 for Energy Supply and Conservation R&D would be eroded over subsequent years and would end up back at the 2006 level in real terms by 2011. Fossil Energy R&D, meanwhile, would lose 39 percent of its funding in real terms by 2011 according to the budget projections.

(More materials on R&D in the FY 2007 budget, historical data and charts, and more information on *AAAS Report XXXI: Research and Development FY 2007*, can be found on the AAAS R&D Web site at <http://www.aaas.org/spp/rd>.)

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Table II-11. Department of Energy R&amp;D

**Table II-11.** R&D in the Department of Energy  
(budget authority in millions of dollars)

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Budget	Change FY 06-07	
				Amount	Percent
<b>Summary of DOE R&amp;D (see notes at end of table):</b>					
1. Energy Supply&Conservation 1.	720	780	<b>888</b>	108	13.9%
2. Science	3,375	3,320	<b>3,798</b>	478	14.4%
3. Fossil Energy 2/	448	479	<b>330</b>	-149	-31.1%
4. Atomic Energy Defense	4,009	4,062	<b>3,975</b>	-87	-2.1%
5. Radioactive Waste Mngmt.	68	80	<b>56</b>	-24	-30.0%
<b>Total DOE R&amp;D</b>	<b>8,620</b>	<b>8,721</b>	<b>9,047</b>	<b>326</b>	<b>3.7%</b>
<b>Detail of DOE R&amp;D:</b>					
1. Energy Supply and Conservation 1/ (does not include non-R&D components)					
Efficiency and Renewables 1/	554	530	<b>670</b>	140	26.4%
- Hydrogen Technology	166	156	<b>196</b>	40	25.8%
- Biomass and Biorefinery Sys.	87	91	<b>150</b>	59	65.0%
- Solar Energy	84	83	<b>148</b>	65	78.5%
- Wind Energy	41	39	<b>44</b>	5	12.8%
- Geothermal Tech.	25	23	<b>0</b>	-23	-100.0%
- Hydropower	5	0	<b>0</b>	0	-100.0%
- Vehicle Tech.	161	182	<b>166</b>	-16	-8.8%
- Building Tech.	65	69	<b>77</b>	8	11.6%
- Industrial Tech.	73	57	<b>46</b>	-11	-19.9%
- Distrib. Energy 3/	59	0	<b>0</b>	0	--
- minus demos & other non-R&D	-214	-170	<b>-157</b>	14	-7.9%
Electricity Delivery & Reliability 3.	84	132	<b>123</b>	-9	-6.8%
Nuclear Energy	82	118	<b>95</b>	-23	-19.3%
Total Supply & Conservation R&C	720	780	<b>888</b>	108	13.9%
2. Science (does not include non-R&D components)					
High-Energy Physics (HEP)					
Proton Accelerator-Based	391	375	<b>377</b>	1	0.4%
Electron Accelerator-Based	135	117	<b>117</b>	0	0.4%
Non-Accelerator Physics	56	48	<b>59</b>	11	23.4%
Theoretical Physics	50	48	<b>52</b>	4	8.0%
Advanced Tech. R&D	90	128	<b>159</b>	31	24.2%
Construction	1	0	<b>10</b>	10	--
Total HEP	723	717	<b>775</b>	58	8.1%
Nuclear Physics					
Medium-Energy Nuclear Phys.	119	109	<b>123</b>	14	13.1%
Heavy Ion Nuclear Phys.	170	160	<b>198</b>	37	23.3%
Low Energy Nuclear Phys.	75	68	<b>84</b>	16	23.0%
Nuclear Theory	31	28	<b>35</b>	7	25.6%
Construction	0	2	<b>15</b>	13	633.3%
Total Nuclear Physics	395	367	<b>454</b>	87	23.7%

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				Amount	Percent
<b>Fusion Energy Sciences</b>					
Science	148	157	<b>154</b>	-3	-1.7%
Facility Operations	90	104	<b>122</b>	18	17.4%
Enabling R&D	29	27	<b>43</b>	16	58.8%
Total Fusion	267	288	<b>319</b>	31	10.9%
<b>Basic Energy Sciences (BES)</b>					
Materials Sciences	621	738	<b>1,004</b>	266	36.1%
Chem. Scis., Geoscis., Energy	232	221	<b>268</b>	48	21.7%
Construction	230	176	<b>148</b>	-28	-15.9%
Total BES	1,084	1,135	<b>1,421</b>	286	25.2%
<b>Advanced Scientific Computing Research (ASCR)</b>					
Math., Info. and Compu. Sci.	226	235	<b>319</b>	84	35.8%
Laboratory Technology Res.	0	0	<b>0</b>	0	--
Total ASCR	226	235	<b>319</b>	84	35.8%
<b>Biological and Environmental Research (BER)</b>					
Life Sciences	199	202	<b>264</b>	62	30.8%
Climate Change Research	136	142	<b>135</b>	-7	-4.7%
Environmental Remediation	101	94	<b>97</b>	3	3.7%
Medical Apps./ Measure.	122	143	<b>14</b>	-129	-90.2%
Construction	10	0	<b>0</b>	0	--
Total BER	567	580	<b>510</b>	-70	-12.0%
Small Bus. Innov. Research	114	0	<b>0</b>	0	--
Total Science R&D	3,375	3,320	<b>3,798</b>	478	14.4%
<i>Science Non-R&amp;D Items</i>	261	276	<b>304</b>	28	10.1%
<i>Total Science Budget (incl nonRD,</i>	<i>3,636</i>	<i>3,596</i>	<i><b>4,102</b></i>	<i>505</i>	<i>14.1%</i>
<b>3. Fossil Energy R&amp;D 2/ (does not include non-R&amp;D components)</b>					
Coal Research	343	376	<b>330</b>	-46	-12.2%
- <i>Clean Coal Power Init.</i>	48	50	<b>5</b>	-45	-90.0%
- <i>FutureGen</i>	17	18	<b>54</b>	36	203.0%
- <i>Fuels and Power Sys.</i>	277	309	<b>271</b>	-38	-12.2%
Oil Technology	33	32	<b>0</b>	-32	-100.0%
Natural Gas Technology	44	33	<b>0</b>	-33	-100.0%
Cooperative R&D	8	6	<b>0</b>	-6	-100.0%

(continued)

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**Table II-11.** R&D in the Department of Energy  
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	FY 2005 Actual	FY 2006 Estimate	FY 2007 Budget	Change FY 06-07	
				Amount	Percent
Plant & Cap. Equip. and adjs.	21	33	0	-33	-100.0%
Total Fossil Energy R&D 2/	448	479	330	-149	-31.1%
4. Atomic Energy Defense Activities (does not include non-R&D components)					
<b>National Nuclear Security Administration (NNSA)</b>					
Weapons Activities					
Science Campaigns	277	277	264	-13	-4.7%
Adv. Simulation & Computing	698	600	618	18	3.0%
Inertial Confinement Fusion	537	544	451	-92	-17.0%
All Other Weapons R&D	1,450	1,539	1,575	36	2.3%
Total Weapons Acts. R&D	2,962	2,959	2,908	-51	-1.7%
Nonproliferation & Verification	220	322	272	-50	-15.5%
Naval Reactors	772	759	771	12	1.6%
<b>Total NNSA R&amp;D</b>	3,954	4,040	3,951	-89	-2.2%
Environmental Management	53	19	20	1	5.3%
Other AEDA R&D	2	3	4	1	33.3%
Total Atomic Defense R&D	4,009	4,062	3,975	-87	-2.1%
5. Radioactive Waste Mngmt.	68	80	56	-24	-30.0%
<b>Total DOE R&amp;D</b>	8,620	8,721	9,047	326	3.7%
Conduct of R&D	7,601	7,589	7,889	300	4.0%
R&D Facilities	1,019	1,132	1,158	26	2.3%
DOE R&D by Function:					
Defense	4,009	4,062	3,975	-87	-2.1%
General Science	3,375	3,320	3,798	478	14.4%
Energy	1,236	1,339	1,274	-65	-4.8%

Source: DOE budget justification, OMB data for R&D, and agency supporting documents.

Some data adjusted by AAAS based on DOE agency budget documents.

1/ Combined from the former Energy Supply and Energy Conservation accounts.

FY 2005 figures combined for comparability.

2/ There is an additional \$50 million in mandatory funding for ultra-deepwater and unconventional natural gas R&D in FY 2007, but the FY 2007 request proposes to cancel these funds.

3/ Distributed Energy moved from Energy Supply to Electricity Delivery in FY 2006.

**Please see Chapter 9 for a discussion of DOE R&D.**

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	FY 2005 Actual	FY 2006 Estimate	<b>FY 2007 Budget</b>	Change FY 06-07	
				Amount	Percent
<b>Department of Energy Budget</b> (discretionary budget authority in millions of dollars)					
DOE Defense Programs:					
National Nuclear Security Administration (NNSA):					
Weapons Activities	6,626	6,370	<b>6,408</b>	38	0.6%
Defense Nuclear Nonprolif.	1,508	1,615	<b>1,726</b>	111	6.9%
Naval Reactors	801	782	<b>795</b>	14	1.7%
Other NNSA	363	338	<b>387</b>	48	14.2%
<b>Total NNSA</b>	<b>9,298</b>	<b>9,104</b>	<b>9,316</b>	211	2.3%
Defense Env. Cleanup	6,801	6,130	<b>5,390</b>	-740	-12.1%
Other Def. Environ. Activities	916	982	<b>1,106</b>	124	12.6%
<b>Total DOE Defense</b>	<b>17,015</b>	<b>16,217</b>	<b>15,812</b>	-405	-2.5%
Science	3,636	3,596	<b>4,102</b>	505	14.1%
Energy Supply and Conservation	1,802	1,813	<b>1,923</b>	111	6.1%
Fossil Energy	629	842	<b>649</b>	-193	-22.9%
Nondef. Environ. Cleanup	440	350	<b>310</b>	-39	-11.2%
Nuclear Waste Disposal	343	149	<b>156</b>	8	5.3%
Power Marketing Administrations	209	247	<b>229</b>	-18	-7.2%
Departmental Administration & IG	170	170	<b>174</b>	4	2.5%
All Other	101	180	<b>201</b>	21	11.6%
<b>Total DOE Budget</b>	<b>24,345</b>	<b>23,563</b>	<b>23,557</b>	-6	0.0%

Source: Department of Energy budget justification.

DOE appropriations only (discretionary), excluding offsets.

Includes R&D and non-R&D components.

All figures are rounded to the nearest million. Changes calculated from unrounded figures.

**Please see Chapter 9 for a discussion of DOE R&D.**

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