



## Senate Boosts DOE Office of Science Facilities and Fusion Funding

### AAAS R&D Funding Update on R&D in Senate FY 2006 DOE Appropriations

#### Highlights

- The Senate would provide \$8.9 billion for **R&D in the Department of Energy (DOE) next year, a 3.1 percent boost over FY 2005 in contrast to a requested cut of nearly 2.6 percent** (see Table).
- The Senate would add to the request for **DOE's Office of Science (OS) to boost utilization of scientific user facilities. Science R&D would gain 1.3 percent to \$3.4 billion**, a dramatic improvement over a requested cut of 4.5 percent. The House would provide a similar appropriation.
- **Energy-related R&D would gain 20 percent to \$1.4 billion because the Senate would support Administration priorities in hydrogen, coal, and nuclear energy R&D strongly while at the same time sustaining DOE investments in other energy R&D areas.**
- The Senate would continue its traditional support of **DOE's defense R&D investments by adding \$100 million to the DOE request. DOE defense R&D would fall slightly by 0.2 percent to \$4.1 billion**, but the Senate would moderate even steeper requested cuts. Unlike the House, the Senate would agree to fund the controversial Robust Nuclear Earth Penetrator program in 2006 at the requested \$4 million but would eliminate funding entirely for the National Ignition Facility.

#### DOE R&D in FY 2006 Senate Appropriations

On June 16, the Senate Appropriations Committee drafted its version of the FY 2006 Energy and Water appropriations bill, following on last month's House approval of its own version. For the first time, the bill funds all of the Department of Energy (DOE), while in previous years some DOE programs had been funded in the Interior bill. **The Senate Energy and Water bill would provide \$8.9 billion for DOE R&D in FY 2006**, a 3.1 percent or \$268 million boost over this year's funding level and an improvement over a cut of 2.6 percent contained in DOE's budget request (see Table). The Senate would also improve on the House version of the bill, which would provide \$8.6 billion or a 0.4 percent cut.

Traditionally, the Senate has been far more generous to DOE than either the House or the Bush Administration, and the FY 2006 appropriations process is shaping up to be no exception. The FY 2006 Senate plan would provide \$25.1 billion for DOE's total budget, a 2.7 percent increase in contrast to budget cuts in both the House appropriation and the DOE request. More than two-thirds of DOE's budget goes to defense programs to maintain the nuclear weapons stockpile and to clean up past weapons sites. While most DOE program areas would see cuts in the budget request, the Senate would boost funding for most areas. DOE's R&D, split roughly in half between defense and nondefense missions, would total \$8.9 billion, 3.1 percent above this year's funding level in a year when most R&D programs would be lucky just to stay even (see Table). (For details of the President's request for DOE R&D, please see Chapter 9 of *AAAS Report XXX: R&D FY 2006* or the March 1 DOE R&D Funding Update. For details of DOE R&D in FY 2006 House appropriations, see the June 3 R&D Funding Update).

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

**Both the House and the Senate have now shown their support for DOE's Office of Science (OS) by adding \$200 million to the request to bring OS R&D to \$3.4 billion, a small increase in contrast to a 4.5 percent requested cut (see Table and Figure 1).** The Senate appropriation would be a 1.3 percent

---

increase over FY 2005, slightly smaller than the House-approved increase. Both the House and the Senate would make additional operating time at OS user facilities and domestic fusion research high priorities.

**The Senate appropriation would allocate \$100 million of its funding boost specifically to allow OS programs to stabilize operating times at its user facilities,** and the bill specifically instructs DOE to give high priority to maintaining user access to facilities. The House Energy-Water bill contains similar language. The Office of Science operates unique, large-scale research facilities at DOE's national laboratories around the country, which external researchers can use for their own experiments through a competitive proposal process. In recent years, tight budgets (see Figure 1) have squeezed operating time at these facilities, and the FY 2006 request would squeeze even tighter, with operating times reduced by as much as 61 percent at some OS facilities but the Senate appropriation should allow OS programs to at least sustain operating times at current rates. In Basic Energy Sciences (BES), for example, which would rise 12.3 percent to \$1.2 billion in the Senate plan, \$20 million of the boost over the request would go to sustaining BES user facilities. The entire \$49 million boost over the request for Nuclear Physics to \$420 million (3.7 percent over FY 2005) would go to Nuclear Physics user facilities.

**The Senate would also join the House in strongly supporting domestic fusion research. Total Fusion funding would jump 6.1 percent to \$291 million, the same as the request, but the Senate would dramatically rearrange fusion priorities to favor domestic fusion research over an international collaborative project.** In its budget request, DOE proposed \$56 million for the International Thermonuclear Experimental Reactor (ITER) project, up from just \$5 million this year. The \$5 billion international project has been delayed because the international partners have been unable to agree on a site in either Japan or France; more than a year after a deadline to pick a site has come and gone, the six partners are still deadlocked, but the budget request assumed that the project will proceed in time to require an increased U.S. contribution. The Senate would shift \$28 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 House would shift \$30 million out of ITER for these facilities, and as an added step inserted an amendment to its Energy-Water bill that would prohibit DOE from entering into any agreement on further U.S. contributions to ITER until at least March 1, 2006. The Senate would be more flexible, expressing its openness to reallocating Fusion funds if the ITER site is officially selected soon.

**The biggest Senate boost to Science programs would be for Basic Energy Sciences,** which would see its funding climb 12.3 percent to \$1.2 billion (see Table). The Senate would provide in \$30 million in new funds to establish a National Nanotechnology Enterprise Development Center (NNEDC) in New Mexico to translate nanotechnology research at DOE nanoscale research centers into working technologies. BES funding sustains nanoscale research centers at several DOE national labs, which would collectively receive more funding in the request and the Senate bill. The Senate would also add \$67 million to the request for energy-related issues associated with water resources, including desalination research, arsenic treatment research, water supply technology development, and some water management demonstration projects. Also in BES, funding for the Spallation Neutron Source (SNS) in Tennessee would surge \$36 million to \$149 million as the facility transitions from construction to operations beginning next year.

**While most OS accounts would see increases in FY 2006, Advanced Scientific Computing Research (ASCR) and Biological and Environmental Research (BER) funding would decline dramatically in the Senate bill (see Table).** The Senate would provide only the \$207 million request for ASCR for a 10.9 percent cut from this year's funding level. BER funding would total \$504 million in FY 2006, \$48 million more than the request but still \$78 million below this year's funding level. The entire \$48 million boost over the request would go to fund 48 congressionally earmarked projects; the House would add \$35 million for 53 projects in its version of the BER budget. Most BER core programs would have flat funding in the Senate appropriation.

**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 (see Figure 1).** In today's dollars, the Science program has been stuck at roughly \$3.2 billion since FY 2001, and now both the House and Senate appropriations would enable Science to just stay ahead of expected inflation.

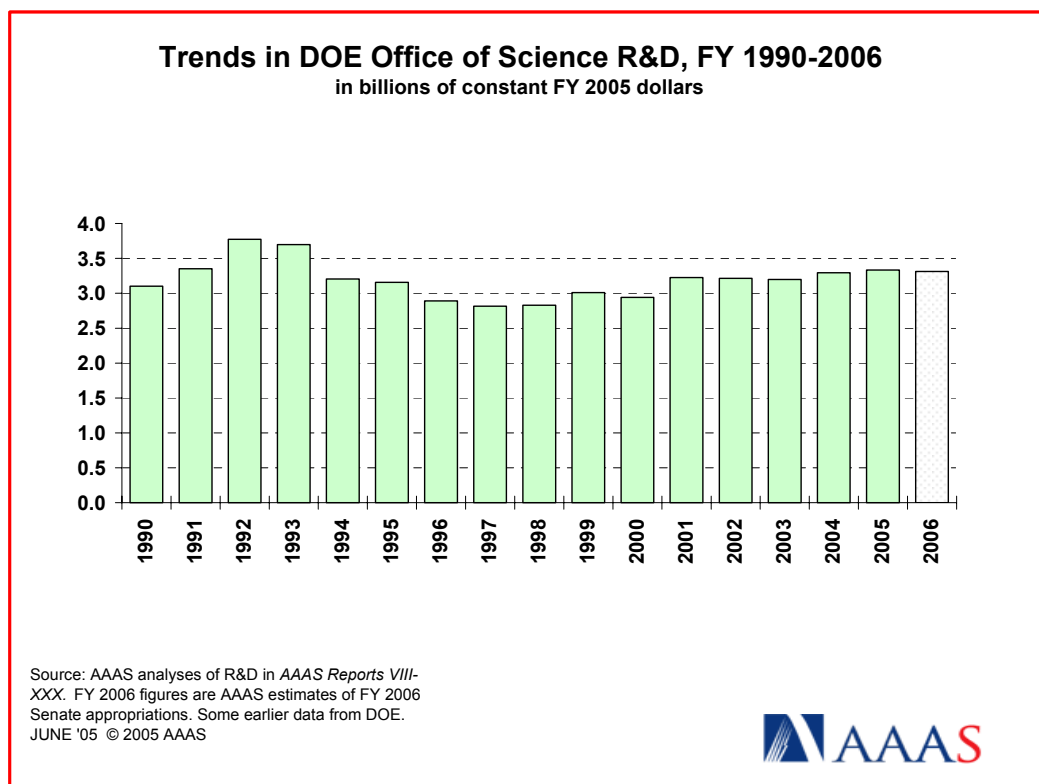


Figure 1. (click on the image for PDF)

### DOE Energy and Defense R&D Programs

**The Senate would provide dramatic boosts in funding for energy R&D programs, funding both Administration priorities in coal, hydrogen, and nuclear energy as well as other energy R&D programs that were slated for cuts in the request.** The overall DOE energy R&D portfolio would climb 20.2 percent to \$1.4 billion in the Senate, far more than either the House or the DOE request (see Table).

**Fossil Energy R&D funding would surge 15.5 percent to \$518 million in the Senate bill**, in sharp contrast to steep cuts in the House and the request. Although the House and the request would boost coal-related R&D at the expense of other fossil fuels, the Senate would add funds across the board. The Senate would keep funding for the FutureGen program at the \$18 million request for this program to develop a near-emission-free, coal-fired electricity and hydrogen production plant, but would boost overall coal R&D from \$351 million this year to \$426 million in FY 2006, with big increases for coal power generation R&D (up from \$49 million to \$100 million) and carbon sequestration R&D (up from \$45 million to \$74 million). But the Senate would also reverse proposed DOE eliminations of funding for oil and gas R&D and keep funding closer to this year's levels. Energy conservation R&D would be one area where the Senate would cut from the request, resulting in \$321 million for R&D, down 12.6 percent, but primarily because of the transfer of distributed energy and energy transmission R&D programs from this account to the Electricity Transmission and Distribution program in Energy Supply. Fuel cells R&D and biomass R&D programs in this account would increase dramatically.

In Energy Supply, hydrogen and nuclear energy priorities would reshape the portfolio. Nuclear energy R&D funding would surge dramatically by 47 percent to \$125 million. Most of the new funding would support a dramatically expanded Next Generation Nuclear Plant program to develop new technologies for future nuclear power plants in an effort led by the Idaho National Laboratory. There would also be dramatic boosts in nuclear hydrogen R&D to explore ways to use nuclear power to produce hydrogen, and in advanced fuel cycle R&D to develop better technologies for reprocessing spent nuclear fuel. Electricity

---

Transmission and Distribution R&D would jump 40 percent to \$128 million because of the transfer of a \$56 million distributed energy and electricity reliability R&D portfolio from the Energy Conservation account. Funding for other accounts within this program would decline. In Solar and Renewables, surging spending on hydrogen technologies within a declining total R&D budget would squeeze funding for R&D on other renewables such as geothermal technology, wind energy, and solar energy.

**The Senate would once again add to requested funding for DOE's defense R&D, but would still leave funding slightly below this year's level.** The Senate would add to DOE's core defense Weapons Activities account but would leave funding at \$3.0 billion for R&D, 3.1 percent below FY 2005. The Senate would dramatically increase funding for Advanced Simulation and Computing (ASC) to \$736 million (up 5.6 percent), in contrast to steep requested and House-approved cuts. The ASC program funds R&D in high-end computing for leading-edge supercomputers and software necessary to simulate nuclear explosions without nuclear testing. The Senate's \$75 million boost over the ASC request would go specifically for Los Alamos National Laboratory to acquire a 150 teraflop computing system for weapons-related calculations. **But, in a dramatic gesture, the Senate bill would slash Inertial Confinement Fusion (ICF) funding by 41 percent to \$314 million by zeroing out funding for the National Ignition Facility (NIF)** under construction at the Lawrence Livermore National Laboratory in California. Language accompanying the Senate Energy-Water bill takes aim at DOE budget plans for reducing ICF funding dramatically in coming years to sustain NIF construction; it appears the zeroing out of NIF construction is a warning sign only, because other language indicates that the Senate expects DOE to continue building the mega-laser. The NIF reduction should allow core ICF research funding to increase slightly.

**The Senate would support the Administration's request for \$4 million to do research on the controversial Robust Nuclear Earth Penetrator (RNEP) program in 2006.** Last year, DOE requested funds but Congress provided no money. DOE tried again in FY 2006 with a request of \$4 million, but last month the House approved its Energy-Water bill with no funding. This 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. The FY 2006 request also contains \$9 million for R&D on the Reliable Replacement Warhead, a 5-year, \$98 million project initiated by Congress in the final FY 2005 budget that would explore the possibility of new warhead designs to use with existing rather than new nuclear weapons. The Senate would support both the RNEP at \$4 million and the Reliable Replacement Warhead project at \$25 million.

### Next Steps

The Senate Energy-Water bill is expected to go to the full Senate for debate and approval in July. The House has already approved its version of the bill. A House-Senate conference to hammer out the final version of the bill could be convened later this summer.

(This analysis is one of a series of AAAS R&D Funding Updates on FY 2006 congressional appropriations. The complete series of AAAS R&D Funding Updates, including continually updated analyses of R&D in FY 2006 appropriations, is available on the AAAS R&D Web Site (<http://www.aaas.org/spp/rd>) in the "FY 2006 R&D" or the "What's New" sections.)

- June 20, 2005  
AAAS R&D Budget and Policy Program  
1200 New York Avenue, NW  
Washington, DC 20005  
(202) 326-6607  
AAAS R&D Web site: <http://www.aaas.org/spp/rd>



Table. DOE R&amp;D in FY 2006 Senate Appropriations

**Table. Department of Energy  
Senate Appropriations Committee Action on R&D in the FY 2006 Budget  
(budget authority in millions of dollars)**

	FY 2005 Estimate	FY 2006 Request	FY 2006 House	Senate Action				
				FY 2006 Senate	Chg. from Request Amount	Percent	Chg. from FY 2005 Amount	Percent
DOE Appropriations Containing R&D:								
1. Energy Supply R&D	423	397	409	<b>489</b>	93	23.4%	66	15.6%
2. Science	3,334	3,184	3,385	<b>3,379</b>	195	6.1%	45	1.3%
3. Fossil Energy R&D	448	382	407	<b>518</b>	136	35.5%	70	15.5%
4. Energy Conservation	367	356	346	<b>321</b>	-35	-9.9%	-46	-12.6%
5. Atomic Energy Defense Activities	4,138	4,031	3,986	<b>4,131</b>	100	2.5%	-7	-0.2%
6. Clean Coal Technology <sup>1</sup>	-160	0	0	<b>0</b>	0	--	160	-100.0%
7. Radioactive Waste Management	63	44	44	<b>44</b>	0	0.0%	-19	-30.2%
<b>Total DOE R&amp;D</b>	<b>8,614</b>	<b>8,393</b>	<b>8,576</b>	<b>8,882</b>	<b>488</b>	<b>5.8%</b>	<b>268</b>	<b>3.1%</b>
Detail of selected appropriations:								
1. Energy Supply R&D								
Solar and Renewables	247	230	239	<b>236</b>	6	2.8%	-11	-4.4%
Electricity Transmission & Distrib.	91	72	77	<b>128</b>	57	78.9%	37	40.4%
Nuclear Energy	85	95	93	<b>125</b>	30	31.4%	40	46.9%
<b>TOTAL Energy Supply</b>	<b>423</b>	<b>397</b>	<b>409</b>	<b>489</b>	<b>93</b>	<b>23.4%</b>	<b>66</b>	<b>15.6%</b>
2. Science <sup>2</sup>								
High Energy Physics	736	714	736	<b>717</b>	3	0.4%	-20	-2.6%
Nuclear Physics	405	371	408	<b>420</b>	49	13.2%	15	3.7%
Fusion Energy Sciences	274	291	296	<b>291</b>	0	0.0%	17	6.1%
Basic Energy Sciences	1,105	1,146	1,173	<b>1,241</b>	95	8.3%	136	12.3%
(Spallation Neutron Source)	113	149	149	<b>149</b>	0	0.0%	36	31.5%
Adv. Scientific Computing Res.	232	207	246	<b>207</b>	0	0.0%	-25	-10.9%
Biological and Environmental Res.	582	456	526	<b>504</b>	48	10.5%	-78	-13.4%
<b>TOTAL Science <sup>2</sup></b>	<b>3,334</b>	<b>3,184</b>	<b>3,385</b>	<b>3,379</b>	<b>195</b>	<b>6.1%</b>	<b>45</b>	<b>1.3%</b>
5. Atomic Energy Defense Activities								
<b>National Nuclear Security Administration (NNSA)</b>								
Naval Reactors	772	756	769	<b>769</b>	14	1.8%	-3	-0.4%
Weapons Activities	3,084	2,940	2,818	<b>2,988</b>	48	1.6%	-96	-3.1%
(Science Campaigns)	276	262	217	<b>308</b>	46	17.6%	32	11.6%
(Adv. Simulation and Computing)	697	661	501	<b>736</b>	75	11.3%	39	5.6%
(Inertial Confinement Fusion)	536	460	541	<b>314</b>	-146	-31.8%	-222	-41.4%
(All Other Weapons Acts. R&D)	1,575	1,557	1,559	<b>1,631</b>	74	4.7%	55	3.5%
Nonproliferation & Verification R&D	224	272	335	<b>310</b>	38	14.1%	86	38.5%
<b>Total NNSA R&amp;D</b>	<b>4,080</b>	<b>3,968</b>	<b>3,923</b>	<b>4,068</b>	<b>100</b>	<b>2.5%</b>	<b>-12</b>	<b>-0.3%</b>
Environmental Management	56	61	61	<b>61</b>	0	0.0%	5	8.9%
Other AEDA R&D	2	2	2	<b>2</b>	0	0.0%	0	0.0%
<b>TOTAL Atomic Defense R&amp;D</b>	<b>4,138</b>	<b>4,031</b>	<b>3,986</b>	<b>4,131</b>	<b>100</b>	<b>2.5%</b>	<b>-7</b>	<b>-0.2%</b>

(continued)

Table. DOE R&amp;D in FY 2006 Senate Appropriations

## DOE R&amp;D by Budget Function:

Defense	4,138	4,031	3,986	<b>4,131</b>	100	2.5%	-7	-0.2%
General Science	3,334	3,184	3,385	<b>3,379</b>	195	6.1%	45	1.3%
Energy	1,141	1,179	1,205	<b>1,372</b>	193	16.4%	230	20.2%

AAAS estimates based on FY 2005 and FY 2006 appropriations bills. Includes conduct of R&D and R&D facilities.

FY 2005 and FY 2006 request figures based on OMB R&D data and supplemental agency budget data.

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

1/ Negative budget authority because of rescissions and deferrals of previously appropriated funds. Coal research is now funded in the Fossil Energy program.

2/ Does not include non-R&D management and other costs.

**June 20, 2005 - AAAS estimates of Senate Appropriations Committee-approved bills.**

**These figures may be amended or rejected by the full Senate.**

**Department of Energy Budget (budget authority in millions of dollars)**

	FY 2005 Estimate	FY 2006 Request	FY 2006 House	FY 2006 <b>Senate</b>	Senate Action			
					Chg. from Request Amount	Percent	Chg. from FY 2005 Amount	Percent
Weapons Activities (NNSA)	6,632	6,630	6,181	<b>6,554</b>	-76	-1.1%	-77	-1.2%
Other NNSA Activities	2,348	2,767	2,667	<b>2,872</b>	105	3.8%	525	22.3%
<b>Total NNSA</b>	<b>8,979</b>	<b>9,397</b>	<b>8,848</b>	<b>9,427</b>	<b>30</b>	<b>0.3%</b>	<b>447</b>	<b>5.0%</b>
Defense Environmental Activities	6,808	6,015	6,468	<b>6,366</b>	351	5.8%	-442	-6.5%
Nuclear Waste and Other Defense	916	987	1,054	<b>939</b>	-48	-4.9%	23	2.5%
<b>Total DOE defense</b>	<b>16,704</b>	<b>16,400</b>	<b>16,371</b>	<b>16,732</b>	<b>332</b>	<b>2.0%</b>	<b>28</b>	<b>0.2%</b>
Science	3,600	3,463	3,666	<b>3,703</b>	240	6.9%	103	2.9%
Energy Supply and Conservation 1/	1,807	1,749	1,763	<b>1,945</b>	196	11.2%	138	7.7%
Fossil Energy	572	491	502	<b>642</b>	150	30.6%	70	12.2%
Other Energy Programs	929	1,246	1,256	<b>1,219</b>	-27	-2.2%	289	31.1%
Nondefense Environmental Mngmt.	440	350	320	<b>353</b>	3	0.9%	-86	-19.7%
Power Marketing Administrations	209	57	265	<b>279</b>	222	388.8%	70	33.7%
Departmental Administration	159	200	174	<b>201</b>	1	0.5%	42	26.7%
<b>Total DOE Budget</b>	<b>24,419</b>	<b>23,956</b>	<b>24,318</b>	<b>25,074</b>	<b>1,118</b>	<b>4.7%</b>	<b>655</b>	<b>2.7%</b>

Source: Department of Energy budget justification and FY 2006 appropriations bills.

DOE appropriations only (does not include offsets and other mandatory).

1/ Combines Energy Supply and Energy Conservation accounts.

**June 20, 2005 - AAAS estimates of Senate Appropriations Committee-approved bills.**

**These figures may be amended or rejected by the full Senate.**