

## House Boosts DOE Office of Science, Cuts Energy R&D

### AAAS R&D Funding Update on R&D in FY 2005 DOE House Appropriations

#### Highlights

- The House would give **\$8.9 billion for R&D in the Department of Energy in FY 2005, an increase of \$141 million or 1.6 percent that would barely stay ahead of inflation** (see Table).

- **DOE's Office of Science would have an R&D budget of \$3.3 billion in FY 2005, a boost of 4.4 percent or \$141 million in contrast to a requested cut.** The House would add funds for high-performance computing research, domestic fusion research, increased operating time at user facilities, and nanoscale science but would refrain from the traditional addition of earmarked projects.

- The House would cut DOE's energy R&D programs by 8.3 percent to \$1.3 billion. The House would add funds to the defense request for a 2.7 percent increase to \$4.4 billion for DOE's defense-related R&D.

Recently, the House of Representatives drafted its version of the FY 2005 Energy/Water appropriations bill (HR 4614), which provides funding for the majority of Department of Energy (DOE) programs; on June 17, the full House approved its FY 2005 Interior appropriations bill (HR 4568), which funds the remainder of DOE. Together, the two bills would provide **\$8.9 billion for DOE's R&D programs in FY 2005, \$141 million or 1.6 percent more than FY 2004**, an increase just ahead of the 1.25 percent expected inflation rate (see Table). Although DOE's science and defense-related R&D activities would receive modest increases in the House plan, DOE's energy R&D would decline significantly. (For details of R&D in the FY 2005 request, please see Chapter 9 of *AAAS Report XXIX: R&D FY 2005*.)

DOE's R&D portfolio would receive a greater percentage increase than the DOE budget as a whole. The total FY 2005 DOE budget would be \$23.9 billion in the House bills, a small increase of \$179 million or 0.8 percent that would be nearly \$1 billion below the Administration request, primarily because the House would not authorize a \$749 million proposal for expanded Yucca Mountain activities financed through a new trust fund transfer (see Table). More than two-thirds of the DOE budget goes to defense-related activities involving the U.S. nuclear weapons stockpile and related environmental clean-up costs, including defense-related R&D to support these activities.

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

**R&D in DOE's Office of Science (OS) programs would be a modest winner in the House Energy/Water bill, with increases going to OS programs rather than congressional earmarks.** Although the Administration proposed declining funding at \$3.2 billion for the fourth year in a row, the House would add \$155 million to the request for a total of \$3.3 billion in R&D for FY 2005, a 4.4 percent boost compared to last year. More unusually, the additional funds do not include any congressionally designated projects (earmarks); because nearly \$90 million in FY 2004 R&D earmarks would not be renewed, the Office of Science would have even more funds to devote to its R&D programs in FY 2005.

The funding boost should allow major OS research programs to increase operating time and user support at scientific user facilities. 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 have squeezed operating time at these facilities. The \$20 million increase for High Energy Physics to \$753 million and the additional \$25 million for Nuclear Physics to \$415 million would primarily go to increasing use of its facilities. Funding

for the largest OS account, Basic Energy Sciences, would increase \$68 million to \$1.1 billion, at the same time that construction costs of the Spallation Neutron Source, a new large-scale facility in Tennessee, would decline. As a result, BES support of research grants and user time at existing facilities would increase substantially in FY 2005, especially in the area of nanoscale science.

In addition to its support of facilities, DOE's Office of Science is also the dominant federal supporter of research in the physical sciences, particularly high-energy physics and nuclear physics. It is also a leading supporter of biological sciences, environmental sciences, computing sciences, and fusion research.

**The House would provide additional funds to the Fusion Energy Sciences program to ensure that U.S. participation in an international fusion project will not crowd out domestic research.** The Fusion appropriation of \$276 million would be \$14 million more than last year and \$12 million more than the request. The additional funds would go to increase user time at domestic fusion experimental facilities. The House also urges DOE to support additional domestic fusion research with funds freed up by delays in the International Thermonuclear Experimental Reactor (ITER). 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.

**The largest Office of Science increase would go to Advanced Scientific Computing Research (ASCR),** whose funding jumps 15.8 percent to \$234 million in contrast to a flat request. The additional funds would help develop hardware, software, and algorithms necessary for world-leading research supercomputing capabilities. There has been increasing congressional concern that the U.S. is losing its lead in high-performance research computing, especially to Japan. In recent weeks, the House Science Committee has approved two bills that would give a higher profile to U.S. high-performance computing, one bill that would require an ongoing, coordinated national computing strategy and another that would establish a specific DOE R&D program to develop more advanced research supercomputing user facilities.

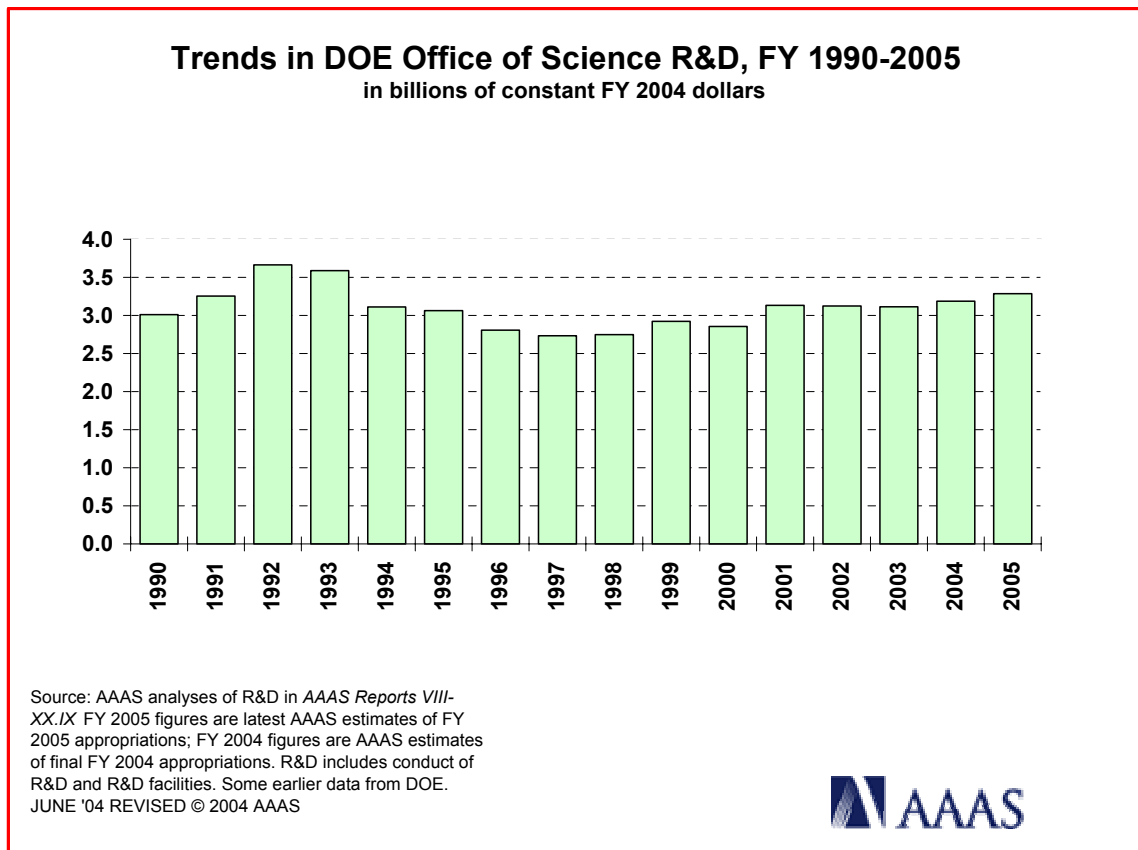


Figure 1. (click on the image to view or download a full-page color PDF version of the chart)

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**The Biological and Environmental Research (BER) account would decline 3.0 percent to \$572 million in the House bill, but this would translate to an increase for core programs because of the lack of FY 2005 earmarks.** The BER account is the traditional home of earmarks in the OS account, totaling \$87 million in FY 2004 for R&D earmarks and an additional \$50 million (not shown in the Table) for a tropical rain forest project in Iowa. The FY 2005 request would delete all these earmarks and provide flat to slightly increasing funding for most BER programs for a \$502 million total. The \$70 million House addition to the request would be free of earmarks, and should allow BER to increase funding significantly for its support of research in genomics, medical applications, biological imaging, climate change science, and environmental remediation.

**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 \$3.1 billion since FY 2001, but the FY 2005 House increase, if it prevails in final appropriations, would represent an increase in inflation-adjusted terms.

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

**The House would cut funding for most of DOE's energy-related R&D programs.** The overall Solar and Renewables R&D program would stay at \$320 million in FY 2005; the House would scale back the Administration's request for hydrogen-related research and distribute the savings to other renewable energy programs. Nuclear energy R&D would decline by \$7 million to \$123 million, but this would be \$26 million more than the request. The House criticizes DOE for designating the newly consolidated Idaho National Laboratory (INL) as the home of nuclear energy R&D, but proposing cuts in nuclear energy R&D there; presumably, most of the added House funds would go to INL.

The Interior Bill, approved by the House on June 17, funds several DOE energy programs. \$237 million in funding for Future Gen, an initiative aimed at building an integrated, near-emission-free electricity and hydrogen production plant would be deferred until FY 2006. DOE requested the full amount for FY 2005. Also the House bill would incorporate the FutureGen program into the Clean Coal Technology program – an overarching initiative to enable cleaner use of America's coal reserves. As much as \$18 million of funds previously appropriated for Clean Coal is to be used for FutureGen in FY 2005. FutureGen is part of Fossil Energy R&D, which the House would fund at \$405 million for R&D. This would be almost \$36 million under the President's request and also \$60 million or 12.8 percent below the FY 2004 level. The House would use some of the funds freed up by the FutureGen deferral to boost funding for other programs. The separate Clean Coal power initiative would receive \$105 million, more than double the President's request. Advanced Research would remain almost flat at \$38.3 million, as the House would restore funds to the 20 percent cuts requested by the President. Distributed generation systems aimed at fuel cell research would be funded at almost triple the request, resulting in appropriations of \$74.2 million, an increase of 4.2 percent.

Energy Conservation programs overall would be cut by a significant margin, but mostly because of the shifting of Weatherization Assistance programs out of DOE. These programs are designed to help improve energy efficiency of low-income homes, and are not classified as R&D. Energy Conservation R&D would decline only slightly by 0.3 percent to \$418 million in the House Interior bill.

DOE has responsibility for managing and disposing of the nation's spent nuclear fuel and high-level radioactive waste, both civilian and military. In past years, Waste Management R&D represented a small part of the DOE's portfolio. However, as the Yucca Mountain long-term, high-level nuclear waste repository moves forward after receiving congressional and White House approvals a year ago, the FY 2005 request would quadruple the budget for radioactive waste management R&D to \$275 million, funded by the proposed transfer of nuclear power funds out of a trust fund. Although the House Energy bill expresses support for this increase, the new transfer authority has not been authorized so the Yucca Mountain-related R&D appropriation would remain at the current \$69 million level.

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On the defense side, most of DOE's R&D is funded by the **National Nuclear Security Administration (NNSA)**, which funds maintenance of the nation's nuclear weapons stockpile through science-based research, mostly in its core Weapons Activities account. R&D in Weapons Activities has grown substantially in recent years in lockstep with rapid growth in overall defense spending, from \$2.4 billion in FY 2001 to \$3.2 billion this year, but would slow down to a 1.6 percent increase to \$3.2 billion in the FY 2005 House plan. Within the overall portfolio, Inertial Confinement Fusion R&D funding would rise 6.0 percent to \$545 million, including \$130 million for continued construction of the National Ignition Facility at the Lawrence Livermore National Laboratory in California.

This year, there is again considerable controversy over the **Bush Administration's proposal to initiate research on a new generation of nuclear weapons**, including the Robust Nuclear Earth Penetrator (RNEP) project (nicknamed a 'bunker buster' bomb) and other tactical or 'low-yield' nuclear weapons. The President requested \$28 million in FY 2005 for continued R&D on the RNEP project and \$9 million for similar concept studies, but the House Energy bill would zero out funding for both programs. Last year, President Bush signed into law a defense authorization bill which repealed the longstanding U.S. prohibition on research and development of low-yield nuclear weapons, thus allowing this research program to take place, but prohibited DOE from entering the development phase of the RNEP or other tactical nuclear weapons unless it receives explicit authorization from Congress. The House bill criticizes DOE for continuing to claim that the RNEP is only a research program, while at the same time projecting \$485 million in its budget over the next five years, an investment more than sufficient to move the program well into design and development toward eventual production.

### Next Steps

The full House will debate and likely approve the Energy-Water bill within the next few weeks. The House approved its Interior bill on June 17, the first of the 13 appropriations bills to make it through the House. The Senate has not drafted its version of either bill, and will not do so until July at the earliest. Congress is unlikely to send a final version of either bill to the President before the October 1 start of FY 2005, although the Interior bill has a better chance of making it through the process. Both bills may end up as part of a multi-bill omnibus appropriations package after October 1.

(This analysis is one of a series of AAAS R&D Funding Updates on the FY 2005 congressional appropriations process. This analysis includes information on R&D in House appropriations for the Department of Energy. The complete series of AAAS R&D Funding Updates, including continually updated analyses of R&D by agency in FY 2005 appropriations, is available on the AAAS R&D Web Site (<http://www.aaas.org/spp/rd>) in the "FY 2005 R&D" or the "What's New" sections.)

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**Table. Department of Energy  
House Appropriations Committee Action on R&D in the FY 2005 Budget  
(budget authority in millions of dollars)**

	FY 2004 Estimate	FY 2005 Request	Action by House				
			FY 2005 House	Chg. from Request Amount	Chg. from Request Percent	Chg. from FY 2004 Amount	Chg. from FY 2004 Percent
DOE Appropriations Containing R&D:							
1. Energy Supply R&D	519	454	<b>508</b>	54	11.8%	-12	-2.3%
2. Fossil Energy R&D	465	441	<b>405</b>	-36	-8.1%	-60	-12.8%
3. Energy Conservation	419	345	<b>418</b>	73	21.1%	-1	-0.3%
4. Science	3,186	3,172	<b>3,327</b>	155	4.9%	141	4.4%
5. Atomic Energy Defense Activities	4,244	4,333	<b>4,358</b>	25	0.6%	114	2.7%
6. Clean Coal Technology <sup>1</sup>	-98	-140	<b>-140</b>	0	0.0%	-42	42.9%
7. Radioactive Waste Management	69	275	<b>69</b>	-206	-74.9%	0	0.0%
<b>Total DOE R&amp;D</b>	<b>8,804</b>	<b>8,880</b>	<b>8,945</b>	<b>65</b>	<b>0.7%</b>	<b>141</b>	<b>1.6%</b>
Detail of selected appropriations:							
1. Energy Supply R&D							
Solar and Renewables	320	282	<b>320</b>	38	13.4%	0	-0.1%
Electricity Transmission & Distrib. <sup>3</sup>	69	76	<b>65</b>	-11	-13.9%	-4	-6.2%
Nuclear Energy	130	96	<b>123</b>	26	27.2%	-7	-5.7%
<b>TOTAL Energy Supply</b>	<b>519</b>	<b>454</b>	<b>508</b>	<b>54</b>	<b>11.8%</b>	<b>-12</b>	<b>-2.3%</b>
4. Science <sup>2</sup>							
High Energy Physics	734	737	<b>753</b>	16	2.2%	20	2.7%
Nuclear Physics	390	401	<b>415</b>	14	3.5%	25	6.5%
Fusion Energy Sciences	263	264	<b>276</b>	12	4.5%	14	5.2%
Basic Energy Sciences	1,008	1,064	<b>1,077</b>	13	1.2%	68	6.8%
(Spallation Neutron Source)	227	129	<b>129</b>	0	0.0%	-98	-43.2%
Adv. Scientific Computing Res.	202	204	<b>234</b>	30	14.7%	32	15.8%
Biological and Environmental Res.	590	502	<b>572</b>	70	14.0%	-18	-3.0%
<b>TOTAL Science <sup>2</sup></b>	<b>3,186</b>	<b>3,172</b>	<b>3,327</b>	<b>155</b>	<b>4.9%</b>	<b>141</b>	<b>4.4%</b>
5. Atomic Energy Defense Activities							
<b>National Nuclear Security Administration (NNSA)</b>							
Naval Reactors	738	769	<b>779</b>	10	1.3%	41	5.6%
Weapons Activities	3,184	3,261	<b>3,234</b>	-27	-0.8%	50	1.6%
(Science Campaigns)	249	301	<b>257</b>	-44	-14.7%	8	3.1%
(Adv. Simulation and Computing)	721	741	<b>666</b>	-75	-10.1%	-55	-7.6%
(Inertial Confinement Fusion)	514	492	<b>545</b>	53	10.8%	31	6.0%
-- (Nat'l Ignition Facility Const.)	149	130	<b>130</b>	0	0.0%	-19	-12.8%
(All Other Weapons Acts. R&D)	1,699	1,727	<b>1,766</b>	39	2.3%	67	3.9%
Nonproliferation & Verification R&D	234	218	<b>239</b>	21	9.8%	5	2.3%
<b>Total NNSA R&amp;D</b>	<b>4,156</b>	<b>4,248</b>	<b>4,252</b>	<b>4</b>	<b>0.1%</b>	<b>96</b>	<b>2.3%</b>
Environmental Management	60	56	<b>77</b>	21	37.3%	17	28.2%
Other AEDA R&D	28	29	<b>29</b>	0	0.0%	1	3.6%
<b>TOTAL Atomic Defense R&amp;D</b>	<b>4,244</b>	<b>4,333</b>	<b>4,358</b>	<b>25</b>	<b>0.6%</b>	<b>114</b>	<b>2.7%</b>

(continued)

AAAS R&D Funding Update - DOE R&D in FY 2005 House Appropriations

DOE R&D by Budget Function:

Defense	4,244	4,333	<b>4,358</b>	25	0.6%	114	2.7%
General Science	3,186	3,172	<b>3,327</b>	155	4.9%	141	4.4%
Energy	1,374	1,375	<b>1,260</b>	-115	-8.4%	-115	-8.3%

AAAS estimates based on FY 2004 and FY 2005 appropriations bills. Includes conduct of R&D and R&D facilities.

FY 2004 and FY 2005 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.

<sup>1</sup> Funded from advance appropriations in previous years. Does not include deferrals of previously appropriated funds.

<sup>2</sup> Does not include program direction, waste management, and other non-R&D costs.

<sup>3</sup> New account. AAAS estimates of R&D.

**June 23, 2004 - House Appropriations Committee-approved funding levels.**

**These funding levels may be amended or rejected on the House floor.**

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

	FY 2004 Estimate	FY 2005 Request	FY 2005 House	Action by House			
				Chg. from Request Amount	Chg. from Request Percent	Chg. from FY 2004 Amount	Chg. from FY 2004 Percent
Weapons Activities (NNSA)	6,234	6,568	<b>6,514</b>	-54	-0.8%	281	4.5%
Other NNSA Activities	2,433	2,480	<b>2,513</b>	32	1.3%	80	3.3%
<b>Total NNSA</b>	<b>8,666</b>	<b>9,049</b>	<b>9,027</b>	<b>-22</b>	<b>-0.2%</b>	<b>361</b>	<b>4.2%</b>
Defense Environmental Activities	6,574	6,953	<b>6,889</b>	-64	-0.9%	315	4.8%
Nuclear Waste and Other Defense	1,058	795	<b>828</b>	33	4.2%	-230	-21.7%
<b>Total DOE defense</b>	<b>16,298</b>	<b>16,797</b>	<b>16,744</b>	<b>-53</b>	<b>-0.3%</b>	<b>446</b>	<b>2.7%</b>
Science	3,500	3,432	<b>3,600</b>	168	4.9%	100	2.9%
Energy Supply	789	835	<b>817</b>	-18	-2.2%	29	3.6%
Fossil Energy	673	636	<b>602</b>	-34	-5.3%	-71	-10.5%
Energy Conservation	878	876	<b>656</b>	-220	-25.1%	-222	-25.3%
Other Energy Programs	817	1,427	<b>712</b>	-715	-50.1%	-105	-12.8%
Nondefense Environmental Mngmt.	469	443	<b>443</b>	0	0.0%	-26	-5.5%
Power Marketing Administrations	213	210	<b>210</b>	0	0.0%	-3	-1.2%
Departmental Administration	133	164	<b>163</b>	-1	-0.4%	30	22.9%
<b>Total DOE Budget</b>	<b>23,769</b>	<b>24,820</b>	<b>23,948</b>	<b>-872</b>	<b>-3.5%</b>	<b>179</b>	<b>0.8%</b>

Source: Department of Energy budget justification and FY 2005 appropriations bills.

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

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