

The Department of Energy in the FY 2005 Budget

*Michael S. Lubell,
American Physical Society*

HIGHLIGHTS

- In October 2002, the President's Council of Advisors on Science and Technology (PCAST) cautioned that the federal R&D portfolio was becoming dangerously imbalanced and called on the White House to "improve funding levels for physical sciences and engineering." The FY 2004 presidential request did little to address the problem. The FY 2005 request for the Department of Energy's (DOE) Office of Science would do even less. The principal federal sponsor of physical science research would see its R&D budget decline by 0.4 percent (see Table II-11). With the \$50-million supplemental allocation for the Coralville demonstration project—which Congress inserted in last year's omnibus appropriations bill—included in the FY 2004 estimate, the decline would be 2.0 percent.

- Consistent with the overall defense and homeland security priorities of the presidential budget, the Administration's DOE request would continue to emphasize nuclear weapons development and stockpile safeguards. The budget would allocate \$27.6 million for feasibility and cost studies for the Robust Nuclear Earth Penetrator, for example, and total R&D for Weapons Activities would increase by 2.4 percent.

- The presidential budget request also calls for dramatic increases for the Civilian Radioactive Waste and Environmental Management programs, with their combined budgets rising by \$728 million or 9.6 percent. Yucca Mountain spending, alone, would increase by \$155 million to \$559 million. The Administration's budget would offset these costs by transferring \$749 million from the Nuclear Waste Fund, to which nuclear energy producers make mandatory payments and which has a current account balance of \$12.4 billion.

Michael S. Lubell

- In his 2003 State of the Union Address, President Bush identified “achieving energy independence for our country, while dramatically improving the environment” as one of his four policy goals. His FY 2004 budget request contained few, if any, additional resources to help meet that goal, and the FY 2005 budget would follow along much the same course. The president would slash Energy Conservation R&D by \$74 million (17.7 percent) and Renewable Energy R&D by another \$38 million (11.9 percent). The budget would also reduce total Fossil Energy R&D by \$24 million (5.1 percent) although it would boost funding for the President’s Clean Coal Initiative by \$108 million (66 percent) to accommodate FutureGen, a public-private partnership demonstration project for producing hydrogen gas and sequestering the carbon dioxide byproduct. Finally, the President’s budget would shrink the Nuclear Energy account by \$34 million (25.9 percent).

INTRODUCTION

The Department of Energy (DOE) is one of the principal supporters of federal R&D. Although it ranks fourth in overall R&D, behind the Department of Defense (DOD), the National Institutes of Health (NIH) and the National Aeronautics and Space Administration (NASA), it ranks first in physical science research, first in support of R&D facilities and second in mathematics and computer science research. Above all, its research programs play an extraordinarily important role in training the next generation of scientists and engineers.

Traditionally, about half of DOE’s R&D budget is allocated to federally funded research and development centers (FFRDCs), including multipurpose, specialized civilian and national weapons laboratories. These centers, long regarded as jewels in the nation’s R&D enterprise, contain many large facilities, such as synchrotron light sources, neutron reactors, specialized accelerators and super computers, which are used by scientists and engineers in universities, industry and other federal research agencies.

The FFRDCs also provide excellent opportunities for interdisciplinary activities. Today, for example, biomedical researchers constitute more than 40 percent of the users of the synchrotron-radiation facilities, developed and maintained by accelerator physicists, optical scientists, vacuum engineers and computer scientists.

THE DEPARTMENT OF ENERGY IN THE FY 2005 BUDGET

Particle accelerators at the FFRDCs remain the focus of American high-energy physics, a research field that pushes the envelope of technology to its limits. The World Wide Web, for example, traces its origin to the international community of high-energy physicists, who developed the information technology to enable them to transmit graphics and data.

POLITICAL ENVIRONMENT

Despite DOE's prestigious scientific record, the Department's research budgets have not fared very well for the last 15 years. During that time, for example, the purchasing power of the Office of Science has slipped by about 20 percent. Part of the problem stems from the DOE organization chart, which restricts the visibility of the science programs by assigning them to a Director who holds the rank of a fourth-level administrator, despite the \$3.5 billion budget authority that he currently manages. The generally low repute with which many government officials hold the Department as a whole poses yet another obstacle that the well-run Office of Science must overcome.

DOE traces its origin to 1946, when Congress established the Atomic Energy Commission (AEC) to oversee the nation's embryonic nuclear weapons and civilian nuclear reactor programs. In 1974, responding to the national energy crisis, Congress consolidated energy R&D programs housed throughout the federal government and combined them with the non-regulatory activities of the AEC to create the Energy Research and Development Administration (ERDA). In 1977, when ERDA achieved Cabinet status, it was renamed the Department of Energy.

The Department has been saddled with the bureaucratic layers that accompanied its transplanted components, and on the few occasions when the Department has made serious attempts to eliminate administrative redundancy, members of Congress have intervened to preserve DOE jobs in their own districts. Security lapses and toxic waste spills have also marred the Department's reputation. Unfortunately, the successes of DOE's stellar scientific portfolio have often been lost in the accusatory rhetoric that these difficulties have engendered.

This year, despite signals from the Office of Management and Budget that the White House would receive favorably requests for enhanced science funding within DOE, the Department again relegated the research programs to a priority below the weapons programs and waste

Michael S. Lubell

clean-up. In election years especially, the appropriations process offers the DOE R&D programs little hope for recovering from poor treatment in the presidential budget. The Energy and Water Development Appropriations Subcommittee is responsible for the majority of the Department's allocation, and there, DOE programs must compete with water projects that are dear to the hearts of many members of Congress. And with the federal government facing a frightening deficit this year, the challenge for DOE R&D proponents will be enormous.

For the past several years, the Senate has sought to improve the visibility of science within DOE by creating a new Under Secretary for Science and Energy Research, who would serve additionally as the science advisor to the Secretary of Energy. Each time, the House Energy and Commerce Committee has thwarted the attempt, and the White House has refused to offer any support. It is likely that the matter will die in the 108th Congress, and the Office of Science will continue to struggle.

Still, despite the visibility issue and DOE's generally tarnished image, congressional recognition of the Department's science programs has been building slowly. The Office of Science has attracted strong bipartisan support for an authorization that would increase its funding levels by 60 percent over five years. Should comprehensive energy legislation pass this year, Congress will have put its imprimatur on such a policy recommendation.

A final comment on the political environment in which the FY 2005 budget will find itself concerns Yucca Mountain, the long-term, high-level nuclear waste facility that the Bush Administration approved a year ago. The presidential request assumes the transfer of \$749 million from a special fund, authorized by the Nuclear Waste Policy Act, into which nuclear power producers have been making mandatory payments (0.1 cent per kilowatt hour of nuclear electricity generated) since 1983 for the ultimate disposal of spent fuel rods. The transfer of the funds, which would reduce the DOE's total discretionary funding from \$24.3 billion to \$23.6 billion, will probably require separate authorizing legislation, and such a bill conceivably could be blocked in the Senate by Harry Reid (D-NV) and John Ensign (R-NV) of Nevada. Should the legislation fail to pass, appropriators would have to find money for Yucca Mountain within the Energy and Water 302(b) allocation, placing some of DOE's R&D spending requests in jeopardy.

FUNDING REQUEST AND PRIORITIES

Overview: The presidential budget request clearly establishes DOE's weapons programs and waste cleanup as the Department's top priorities. Science appears to be an afterthought, Energy Secretary Spencer Abraham's yearlong rhetorical efforts to the contrary notwithstanding. Even in the case of the President's much touted Hydrogen Initiative, most of the resources would be directed toward demonstration projects and technologies that appear to lack any ability to achieve marketplace competitiveness with the conventional fuels currently in use. Expansion of the requisite knowledge base through scientific research to achieve such competitiveness, as recommended in reports prepared by the American Physical Society¹ and the National Academy of Sciences², seems to be a fairly low priority in the FY 2005 budget request.

The presidential budget would actually trim Office of Science spending by 2.0 percent relative to the FY 2004 enacted appropriations that included \$140 million in earmarks in the Biological and Environmental Research (BER) account. The FY 2005 request provides no headroom for any such congressionally directed projects, which the Administration argues are totally inappropriate, even though Congress has included them every year. Absent the earmarks, the Office of Science budget would rise by 2.2 percent, but if Congress does not relinquish what it regards as its constitutional prerogative, the relatively small increases for the various subprograms that range from 0.1 percent for non-congressionally directed BER on the low end to 5.5 percent for Basic Energy Sciences on the high-end would all but vanish.

As Table II-11 shows, DOE's total civilian R&D budget for FY 2005 would shrink, with Energy Conservation bearing the brunt of the reductions, both in dollars and percentage terms. The proposals for FY 2005 DOE R&D spending clearly reflect the President's emphasis on military and homeland security needs. In this year's budget, science and energy research are simply treated as placeholders for the future.

Energy Supply: Although the Hydrogen Initiative would add \$13.3 million (16.2 percent) to the Hydrogen Research Subprogram and \$12.3 million (18.9 percent) to the Fuel Cell Technology Subprogram, overall

¹ *The Hydrogen Initiative*, APS Panel on Public Affairs, March 2004.

² *The Hydrogen Economy: Opportunities, Costs, Barriers and R&D Needs*, National Academies Press, 2004.

Michael S. Lubell

spending for Energy Supply R&D would fall \$65 million (12.6 percent). Biomass would decline \$13.8 million (16.0 percent) with the close-out of Small Modular Biopower and the elimination of congressional earmarks, and Solar Power would fall \$3.1 million (3.7 percent).

Spending for Nuclear Energy R&D would plummet by \$34 million (25.9 percent), with the Advanced Fuel Cycle Initiative (AFCI) taking the biggest hit, down \$20.5 million (30.7 percent). The presidential budget would also complete the closeout of the Nuclear Energy Research Initiative, originally designed to stimulate university student enrollment in nuclear engineering, and would integrate the NERI activities into other Nuclear R&D programs. Yet the budget would all but eliminate funding for Transmutation Education, which was designed to achieve the same goal within the AFCI program. Only the Generation IV Nuclear Energy Systems Initiative (up 10.1 percent) and the Nuclear Hydrogen Initiative (up 41.1 percent) would receive additional funding.

Science: According to DOE, “The mission of the Science program is to deliver the discoveries and scientific tools that transform our understanding of energy and matter and advance the national, economic and energy security of the United States.” Science is the largest DOE R&D program, and in FY 2005 as in past years Basic Energy Sciences would continue to dominate the portfolio. The BES R&D budget would grow by \$55 million (5.5 percent), largely to address four needs: the Hydrogen Initiative (up \$21 million); increased Facilities Operations (up \$18.9 million, including \$14.7 million for pre-operations R&D at the Spallation Neutron Source); the start of construction of the Linac Coherent Light Source (up \$42.6 million); and construction of four Nanoscale Science Research Center projects (up \$14.9 million). With the Spallation Neutron Source (SNS) nearing completion, SNS construction funding would drop by \$98 million (43.2 percent) as planned.

High-Energy Physics, DOE’s second largest Science program, funded at \$737 million in the FY 2005 request, would be held close to its FY 2004 spending level of \$734 million. Support for Fermilab would increase by \$24.4 million (10.2 percent), principally to fund Tevatron upgrades and the start of engineering design of the BTeV experiment. The Stanford Linear Accelerator Center would receive an additional \$4.5 million (3.8 percent), not nearly enough to cover the anticipated increases in electricity costs. Funding for non-accelerator physics would decline \$6.5 million (13.1 percent), and NuMI construction funding would fall \$11.7

THE DEPARTMENT OF ENERGY IN THE FY 2005 BUDGET

million to \$0.7 million, as the project nears completion. Finally, funding for U.S. participation at the Large Hadron Collider in Geneva, Switzerland would begin to shift from construction to research programming, resulting in a small decline of \$2.3 million (3.4 percent).

Nuclear Physics, as it did in FY 2004, would see its budget increase, but this time by only \$11.0 million (2.9 percent), again principally to increase operating hours at the Thomas Jefferson National Accelerator Facility (by 34 percent) and at Brookhaven's Relativistic Heavy Ion Collider (by 16 percent). Two facilities, the MIT-Bates Electron Accelerator and the Lawrence Berkeley National Laboratory 88-Inch Cyclotron, originally slated for closure, would receive temporary reprieves and would continue to operate during FY 2005. Finally, although the Rare Isotope Accelerator remains a high priority on DOE's 20-year facilities plan, its pre-conceptual design funding would decline from \$6.0 million in FY 2004 to \$4.0 million in FY 2005. (For more on the physics programs, see Chapter 14.)

Fusion Energy Sciences, despite the President's renewed commitment of the United States to the International Thermonuclear Experimental Reactor (ITER) project, would climb a scant \$1.5 million (0.6 percent). Reversing last year's management and budget decisions, the President's spending plan would reduce operations and research at DOE's three major fusion facilities, DIII-D, Alcator C-Mod and NSTX, from 18 weeks to 14 weeks in FY 2005, netting \$3.7 million in program savings. The funds would go to pre-construction activities for ITER, which would increase from \$3.0 million this year to \$7.0 million in FY 2005.

Advanced Scientific Computing Research would see virtually no changes in its budget, which would rise by \$2.0 million (1.0 percent). The Laboratory Technology Research program, which received \$3.0 million in funding in FY 2004, would conclude and the Atomic to Microscopic Mathematics program would begin with \$8.5 million in FY 2005.

Biological and Environmental Research, the third largest Science program, would receive \$502 million, down 14.9 percent. But the proposed cut reflects almost exclusively the elimination of congressional earmarks that appeared in the FY 2004 Medical Applications and Measurement Sciences appropriations. The Department would continue to focus major resources on the Human Genome program (\$64.6 million, virtually unchanged from FY 2004) and the Genomes to Life program

Michael S. Lubell

(\$67.5 million, up 6.3 percent). Structural Biology, by contrast, would decline \$5.1 million (18.9 percent).

Fossil Energy and Energy Conservation: These are the only two R&D programs within DOE that receive their funding through the Interior and Related Agencies Appropriations Bill. Apart from the President's Clean Coal Initiative, which would see its R&D funding rise by \$108 million, largely to accommodate the FutureGen hydrogen and carbon-sequestration demonstration project, the Fossil Energy budget would decline significantly. For the Fossil programs in total, the budget would trim \$24 million (5.1 percent), continuing the Administration's past program reductions. Reflecting the Administration's emphasis on energy production, the budget would cut Conservation R&D even more. For FY 2005, Conservation programs would decline \$74 million (17.7 percent).

Atomic Energy Defense Activities – National Nuclear Security Administration (NNSA): Defense represents the largest portion of the DOE R&D portfolio and this year, it is again the primary focus of the presidential budget request. Maintaining the nuclear stockpile as a safe, secure and reliable weapons system has been a major challenge for DOE, since the U.S. ceased testing nuclear weapons more than a decade ago. To meet the challenge, DOE has developed the Stockpile Stewardship program, the largest component of its Defense R&D portfolio. Including Inertial Confinement Fusion, Advanced Simulation and Computing and Science Campaigns, the FY 2005 budget would commit \$1.9 billion in R&D spending to this program out of a proposed \$3.3 billion for all Nuclear Weapons R&D. By contrast, the Administration would cut \$16 million (6.8 percent) out of Nonproliferation and Verification R&D.

Radioactive Waste Management: The Department 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. This year, 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 presidential budget request for radioactive waste management R&D would take a \$206 million (298.6 percent) leap upward. Opponents of Yucca Mountain, although they do not command a majority of votes in either the House or Senate, are likely to scrutinize the request closely and try to find ways to delay the project.