

## The Department of Energy in the FY 2004 Budget

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### HIGHLIGHTS

- Last fall, 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." Had the President heeded PCAST's advice, the Department of Energy (DOE) – the principal steward of physical science research – would have been a prime beneficiary of a change in policy. But White House policy didn't change. For FY 2004 the budget request calls for DOE's civilian research programs to remain frozen at the FY 2003 level, or just 0.9 percent above actual spending in FY 2002 (see Table II-11).
- By contrast, reflecting the Bush Administration's emphasis on defense programs and nuclear weapons readiness, R&D in the DOE's National Nuclear Security Administration (NNSA) would rise steeply. The NNSA would receive a 9.4 percent boost above its FY 2003 level for R&D or 14.4 percent above FY 2002.
- In his State of the Union Address, the President identified "achieving energy independence for our country, while dramatically improving the environment" as one of his four policy goals. He called for support of his "plan to promote energy efficiency and conservation, to develop cleaner technology, and to produce more energy at home." But his budget request would boost R&D spending for DOE's Energy Conservation account by only 3.6 percent above the FY 2003 appropriation, a scant 1.8 percent rise above FY 2002 spending. Additionally, the President would fund Fossil Energy R&D at a

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level 14.9 percent below the FY 2003 appropriation, an 8.5 percent reduction below FY 2002 spending.

- In his State of the Union Address, the President also called for “\$1.2 billion in research funding so that America can lead the world in developing clean, hydrogen-powered automobiles.” Yet his budget request for FY 2004 would provide only \$10 million more for R&D in DOE’s Renewable Energy Resources account – a principal office for hydrogen research. The request would amount to a modest 4.3 percent increase above the FY 2003 appropriation, 16.9 percent above FY 2002 spending.
- In his budget message, the President “directed the DOE to enter into negotiations with international parties aimed at building the International Thermonuclear Experimental Reactor (ITER).” He called for a \$12 million initial investment in ITER in FY 2004. Yet the White House budget request would keep the DOE Fusion program, in which ITER research is housed, clamped at the President’s proposed spending for FY 2003, the baseline for all FY 2004 budgeting. In actuality, Congress cut the FY 2003 Fusion program by \$9 million, which the presidential request for FY 2004 would simply restore. Fusion would receive a 3.6 percent increase over FY 2003 or 6.6 percent over FY 2002.

## **INTRODUCTION**

The Department of Energy (DOE) is one of the principal supporters of federal R&D. Although it ranks fourth overall, 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 first 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

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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.

### **POLITICAL ENVIRONMENT**

Despite its prestigious scientific record, DOE has received little praise for its accomplishments on Capitol Hill. The DOE's difficulties stem partially from its unnatural birth that led to an awkward agglomeration of activities – ranging from pure civilian science, epitomized by high-energy physics, to pure defense applications, exemplified by nuclear weapons development – and partially from hazardous-waste and national-security scandals that have periodically rocked the Department since it achieved cabinet status in 1977.

The DOE enabling legislation reshaped many of the activities of the fledging department and established an organizational structure with three principal officers: a Secretary, a Deputy Secretary and an Under Secretary. Over the years, the roles and responsibilities of the Under Secretary and the Deputy Secretary have seesawed: sometimes the Under Secretary reported to the Deputy, at other times, directly to the Secretary. Sometimes all of the Department's Assistant Secretaries reported to the Under Secretary; at other times, management of the Assistant Secretaries was split between the Deputy Secretary and the Under Secretary. The frequent redrawing of the management chart has produced little in the way of improved departmental performance, according to analysts, and much in the way of skepticism, in the minds of congressional critics.

In the aftermath of the "Wen Ho Lee Scandal" that roiled Los Alamos National Laboratory beginning in 1998, Congress established the National Nuclear Security Administration (NNSA) within DOE, creating a new Under Secretary with sole responsibility for the Department's defense programs. The NNSA formally began operating on March 1, 2000. Less than six months later, the federal government dropped its spying charges against Dr. Lee, who pled guilty to a single count of mishandling classified information.

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Among federal agencies in which science plays a central role, the DOE is virtually unique in its organization structure. The Office of Science, which has a budget authority of \$3.1 billion in the FY 2004 R&D request, is led by a “Director” who is buried three layers below the Cabinet Secretary. So low is the appointment level that the position remained vacant for more than thirteen months into President Bush’s term. Moreover, the Director of the Office of Science generally is the DOE’s highest-ranking presidential appointee with any background in science or engineering.

Last year, in an effort to improve the management and coordination of DOE’s civilian research programs and to throw more of a spotlight on the Department’s signature science activities, Congress considered creating a new high-level management position: Under Secretary for Science and Energy Research, the designee to be credentialed in either science or engineering. The Senate Energy and Natural Resources Committee adopted the proposal with unanimity, rolling it into its comprehensive energy bill. But the energy bill ultimately foundered when House and Senate conferees could not come to agreement on electricity deregulation and oil drilling issues.

Virtually every year, the DOE R&D programs face an uphill battle during the appropriations process. This year will be no exception. The Energy and Water Development Appropriations Subcommittee is responsible for the majority of the Department’s budget and there, DOE programs must compete with water projects that are dear to the hearts of many members of Congress. With federal red ink now flowing at a record rate, the challenge for R&D proponents will be daunting.

In spite of the DOE’s tarnished image, congressional recognition of the Department’s science programs has been building ever so slowly. Last year, the Senate overwhelmingly adopted authorization language that would have set the Office of Science on a rapidly increasing budget trajectory, intended to bring its funding into consonance with the growth in the research budgets of the National Science Foundation (NSF) and NIH. Almost one hundred House members signed on as co-sponsors of similar House legislation, initiated by Representative Judith Biggert (R-IL). In the end, the plan was stillborn when the comprehensive energy bill conference miscarried.

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Although authorizers in both houses last year looked favorably on the DOE's R&D portfolio, the story was mixed among appropriators. The House hewed to a presidential line that generally provided little in the way of added funding, except for the Department's weapons programs. The Senate, when it was in the hands of the Democrats, was slightly more favorably disposed. But, by the time Congress reached agreement on the FY 2003 budget in February 2003, the Senate had switched hands, and the Democrats' relative largesse vanished.

### **FUNDING REQUEST AND PRIORITIES**

**Overview:** Leading the list of presidential priorities for DOE is increased investment in the NNSA. The spending plan would follow the policy directions outlined in the Nuclear Posture Review issued last year that highlighted the importance of operational readiness of the nuclear weapons stockpile and the ability to resume nuclear testing with an 18-month readiness posture. The NNSA budget request also supports the final construction phases of the National Ignition Facility (NIF) according to the September 2000 project baseline and the initiation of experimental activities at the Livermore facility.

The presidential budget also identifies nuclear non-proliferation and verification as priority activities. But virtually all of the increased funds would be devoted to the disposition of Russian fissile materials. R&D funding would remain almost unchanged.

Reducing American dependence on foreign oil also receives top billing in the Department's plans for FY 2004. Last year, the Administration began the FreedomCar Partnership, aimed at developing hydrogen fuel cell vehicle technology. The presidential budget would augment this program and add a new FreedomFuel initiative focused on the supply side of hydrogen power. To fund these programs, while keeping the Renewable Energy budget in check, DOE would reduce spending on many other programs in the account.

Expanding the use of nuclear power and reducing the volume and toxicity of high-level nuclear waste also capture the attention in the presidential budget request. The DOE budget would boost spending on Nuclear Energy R&D by more than 80 percent, restoring it to the FY 2002 level, with almost all of the new funds allocated to the Advanced

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Fuel Cycle Initiative, formerly called the Spent Fuel Pyroprocessing and Transmutation Program.

Within the Science Program, DOE would focus additional resources on nanoscience research. It would direct more than 75 percent of the \$84.5 million savings from the Spallation Neutron Source construction ramp down to this activity. New facilities at Argonne, Brookhaven, Berkeley, Oak Ridge and Sandia/Los Alamos National Laboratories would be the prime beneficiaries. (For more on DOE nanoscience, see Chapter 25.)

**Energy Supply:** Led by large increases for Hydrogen Research and Nuclear Energy, the Energy Supply R&D account would climb by 21.9 percent to \$376 million (see Table II-11). Apart from Hydrogen, however, the Renewable programs, including Solar, Wind, Geothermal and Biomass, would all decline, or at best, remain frozen at FY 2003 levels. The Department would proceed with phasing out the Nuclear Energy Research Initiative (NERI), which funds peer-reviewed R&D at universities, national laboratories and industry and was originally established to encourage more students to enter the depleted ranks of nuclear engineering.

**Science:** The Science account's largest R&D program, Basic Energy Sciences (BES), would continue to dominate the portfolio with an FY 2004 budget of \$1.0 billion. Although it would lose 1.4 percent in budget authority, its core programs would suffer no reductions, as funding would be redirected from the continued construction wind-down of the Spallation Neutron Source (SNS). Materials Sciences would grow by 3.7 percent, and Chemical Sciences, Geosciences and Energy Biosciences would remain virtually frozen at its FY 2003 level. Savings from the SNS construction account would also allow BES to proceed with the construction of four Nanoscale Science Research Facilities and the instrumentation of the Center for Nanophase Materials at Argonne.

High-Energy Physics, the second largest Science program at \$738 million, would receive a small, 2.2 percent increase. DOE would devote half of the \$16 million in new funding to enhanced operation of the program's two major facilities, FermiLab and the B-Factory at the Stanford Linear Accelerator Center. By adding \$13 million in savings from the construction account of NuMI (Neutrinos at the Main Injector), a FermiLab construction project that is almost complete, DOE would increase running times and luminosities at its two large accelerators. The

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Department would also commit \$5.6 million in additional funding to R&D for the SuperNova Acceleration Probe. All other parts of the High-Energy Physics portfolio would remain at or close to FY 2003 levels.

Nuclear Physics, which received an 8.8 percent boost last year, largely to achieve greater utilization of the Brookhaven Relativistic Heavy Ion Collider (RHIC) and the Thomas Jefferson National Accelerator Facility (TJNAF), would receive a 2.0 percent increase in FY 2004. Both RHIC and TJNAF would receive small increments to maintain operations at last year's levels. The Department would terminate operations at Lawrence Berkeley National Laboratory's 88-Inch Cyclotron and use the \$3.3 million in savings principally to improve utilization of other facilities. (For more on the two physics programs, see Chapter 14.)

Fusion Energy Sciences would climb 3.6 percent to \$257 million, the level the Department had requested last year. To address the Administration's objective of joining the International Thermonuclear Experimental Reactor (ITER), the DOE would place the ITER label on \$12 million of its current burning plasma program. The Department would also reduce its Enabling R&D program by \$10 million or almost 30 percent, principally to allow it to enhance operations at its General Atomics (DIII-D), MIT (Alcator C-Mod0) and Princeton (NSTX) facilities and to continue fabrication of the National Compact Stellarator Experiment (NCSX), also at Princeton.

Biological and Environmental Research (BER), the third largest Science program, would receive \$500 million, a cut of 5.1 percent. But the proposed \$27 million reduction is taken from an FY 2003 appropriation that contained almost \$70 million in earmarks (a new BER record), which had reduced the base program by about \$33 million. The presidential request would restore the base program loss and add \$10 million in new money. BER's signature program, Genomes to Life, begun in FY 2001 as a natural companion to the Department's Human Genome Program – which DOE pioneered long before it was on the NIH radar screen – would continue to grow, with a proposed budget authority of \$59.0 million in FY 2004. Last year, \$13.7 million of the Human Genome Program was transferred to the Department of Homeland Security. This year the DOE would shrink the program further, to a level of \$64.4 million. Climate Change research, highlighted last year by the President, would continue to be funded with little budgetary change.

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**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. The Administration would decrease Fossil Energy research by 14.9 percent. However, as part of the President's Coal Research Initiative, Carbon Sequestration R&D would increase to \$62 million, and Advanced Research in supercritical materials and mercury control would climb to \$37.5 million. Reflecting the Administration's pledge to wean America away from foreign sources of energy, the DOE budget for Energy Conservation would rise by 3.6 percent. Within the account, however, many programs would be trimmed back to make room for new research associated with the FreedomCar and FreedomFuel Initiatives.

**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 Administration. 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 R&D program, the largest component of its Defense R&D portfolio. Although the Administration's Nuclear Posture Review sent signals that it might resume nuclear testing sometime in the future, congressional support for the Stockpile program should remain relatively strong. Last year the Administration requested a 30.8 percent increase to a level of \$407 million, and Congress responded with 49.2 percent, boosting the budget to \$467 million. For FY 2004, the Administration's request would fund the Stockpile R&D program at \$433 million (see Table II-11).

The Advanced Simulation and Computing (ASC) program provides three-dimensional simulations of nuclear weapons behavior, to be tested against controlled fusion experiments at the Dual-Axis Radiographic Hydrodynamic Test Facility (DAHRT) and the National Ignition Facility (NIF), which is nearing completion. The FY 2004 budget would boost ASC by 6.6 percent and reduce NIF spending by 29.9 percent, as foreseen in the September 2000 project baseline.