

## The Department of Energy in the FY 2001 Budget

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### HIGHLIGHTS

- For FY 2001, the Department of Energy's (DOE) R&D budget, mostly funded by the Energy and Water Development appropriations bill, would increase 7.3 percent to more than \$7.6 billion under the President's request (see Table II-11).
- Consistent with congressional directives first issued three years ago, the Department would keep the majority of its civilian research activities consolidated into a single appropriations account, called the Office of Science. For FY 2001, R&D in the Science account would grow by 13 percent, nudging the \$3.0 billion threshold for the first time. The Science request would represent more than 70 percent of DOE's civilian R&D effort.
- The Department's FY 2001 budget would maintain DOE as the lead federal agency for research in the physical sciences. Its \$2.0 billion total for these activities would match the combined requests for all other federal agencies. DOE's \$623 million budget for mathematics and computing would come close to the Department of Defense (DOD) total of \$657 million and would represent almost a third of all federal activity in these two areas.
- Expecting to face continued congressional criticism of its technology, regulatory, waste management, and national security programs, DOE this year turned a spotlight on its premier research portfolio, subtitled its FY 2001 budget request *Strength Through Science*.

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- The President's budget would boost R&D in Solar & Renewable Energy by 38.0 percent to a level of \$376 million. Last year, the DOE requested an 18.8 percent increase, and Congress responded with a 4.9 percent cut. DOE is pinning its Solar and Renewable hopes this year on heightened public sensitivity to climate change issues and American vulnerability to the vagaries of foreign oil markets.
- The biggest change in the Department's Atomic Energy Defense R&D program is not in its budget, but in its administrative structure. Last year, Congress blasted DOE for violating its own counter-intelligence procedures. Then, over Energy Secretary Bill Richardson's vociferous objections but with strong bipartisan support, it created the semi-autonomous National Nuclear Security Administration (NNSA) to manage the Department's defense activities. The NNSA retains the existing Stockpile Stewardship Program as its primary activity, a favorite of Senate Budget Committee and Energy Appropriations Subcommittee Chairman Pete V. Domenici (R-NM). Weapons Activities would climb 6.3 percent to \$4.6 billion. The R&D component of Weapons Activities would rise 3.3 percent to \$2.3 billion.

## **INTRODUCTION AND POLITICAL ENVIRONMENT**

The Department of Energy (DOE) is one of the principal supporters of federal R&D. Although it ranks fourth in total R&D support, behind DOD, the National Institutes of Health (NIH), and the National Aeronautics and Space Administration (NASA), it ranks first in physical sciences research, first in support of R&D facilities, and second in mathematics and computer science research.

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

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interdisciplinary activities. Today, for example, biomedical researchers constitute more than one third of the users of the synchrotron radiation facilities, developed and maintained by accelerator physicists, optical scientists, vacuum engineers, and computer scientists.

Despite its prestigious scientific record, DOE has been a perennial target of congressional animus and scrutiny. Labeling it a dysfunctional bureaucracy with an ill-defined mission and criticizing it for breaching its own rules on national security, Congress has regularly cast a highly critical eye on DOE's activities. Some members of Congress have called for the agency's elimination, although they have struggled to identify alternative homes for the department's atomic weapons, environmental clean up, and other activities.

DOE's Capitol Hill difficulties stem partially from its unnatural birth. The Department 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. 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. The Department has also been stymied in its attempts to save costs by renegotiating some of the tripartite agreements among federal, state, and local governments involving nuclear waste clean up.

The Department faces a major Capitol Hill challenge this year stemming from many members' perceptions that Secretary Richardson thwarted their will last year when he donned the additional mantle of Interim NNSA Under Secretary and appointed high-level DOE officials to dual roles as top NNSA officials, despite congressional insistence that the

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NNSA command structure should be highly independent from the rest of the DOE. Whether DOE's R&D budget will be affected by the political controversy remains to be seen. Its future hangs on two threads, one political and the other economic. First, the non-partisan nature of science makes R&D an excellent consensus issue for Congress, especially in an election year when members are eager to generate positive legislative results. Second, economists of all stripes have begun to embrace the idea that the sustained growth of the Gross Domestic Product (GDP), accompanied by low inflation and low unemployment, is powered by technological gains in productivity fed by federal investments in R&D.

Even if Congress finds these arguments persuasive, the DOE R&D budget will have to clear other serious hurdles. Most significantly, the largest part of its allocation must pass through the Energy and Water Development Appropriations Subcommittee, where it must compete with congressionally designated water projects. If the Subcommittee operates under stringent caps on discretionary spending as it has for the past several years, the DOE budget may experience an unintended squeeze.

Portion of the DOE R&D request will also probably run into opposition from House Science Committee Chairman James Sensenbrenner, Jr., (R-WI), who has repeatedly attempted to cut DOE's budget request in his committee. Many observers credit the shortfall in the Basic Energy Sciences (BES) portion of last year's DOE budget to his relentless attack on the Spallation Neutron Source (SNS) now under construction at Tennessee's Oak Ridge National Laboratory (ORNL). Prodded by Sensenbrenner, the House Appropriations Committee cut the FY 2000 SNS request, and although House-Senate conferees ultimately restored its construction funds, they failed to raise the appropriation sufficiently to accommodate the adjustment. Advocates of DOE science will have to be vigilant if they want to avoid a repeat performance this year.

#### **FUNDING REQUEST AND PRIORITIES**

Last year, building on a growing bipartisan recognition that science and technology will be the bed rock of the United States in the new millennium, DOE adopted the budget slogan *Science, Security and Energy: Powering the 21st Century*. This year, touting its role as the dominant federal player in the physical sciences, the Department issued

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its budget request under the proclamation *Strength Through Science*. This emphasis, long urged by many policy makers, stands in strong contrast to DOE's public image cultivated by former Secretary Hazel O'Leary, when science barely appeared above the horizon. Energy Secretary Richardson could not have been more direct, when he said in a March 8 opinion piece in *The Hill*, "The Department of Energy is at its heart a science agency. Forty percent, or \$7.6 billion, of our next year's budget is for research."

To counter prevailing Capitol Hill perceptions of DOE as a dysfunctional bureaucracy that cannot be trusted with nuclear secrets, the FY 2001 DOE budget request attempts to spark the imagination of its readers. DOE highlights four interagency initiatives: Nanotechnology and Nanoscience Initiative (NNI), Information Technology (IT), Life Sciences and Robotics, and Intelligent Machines. The first two dominate the proposed initiative spending plan.

Of the nearly \$500 million the Administration would assign to NNI, DOE would receive \$90.8 million, nearly double its allocation for FY 2000, with all of the funds directed to the Office of Science to push the envelope in one of the hottest fields of physical science research. Players in the nanotech arena point to future payoffs such as palm-sized supercomputers and miniature machines that could fight diseases inside the human body. The budget request also bubbles over with enthusiasm for IT, for which DOE would receive \$667 million out of a \$2.3 billion, seven-agency initiative (see Table I-10). Appropriators might look kindly on this request, given the unusually candid assessment of a bipartisan icon, Federal Reserve Chairman Alan Greenspan, who has said, "Information innovation lies at the root of productivity and economic growth."

**Energy Supply:** R&D in the Solar and Renewable Energy activity, which currently represents 75 percent of the Energy Supply R&D budget, would rise 38 percent to \$376 million for FY 2001. Last year, the Administration proposed a more modest 18.8 percent increase, and Congress responded with a 7.4 percent cut. The budgetary clash reflects the fault line that separates White House environmentalists from congressional conservatives, who have consistently opposed expanding this program. The proposed increase of \$31 million for Biomass/Biofuels

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in the Department's FY 2001 request, however, could draw some support from farm state conservatives. Nuclear Energy R&D represents the balance of the Energy Supply budget. Last year, it grew 26 percent, with strong support from White House science and technology advisors. For FY 2001, the Administration would hold the line on further increases and sustain the R&D program at FY 2000 levels.

**Science:** The Science account's largest program, Basic Energy Sciences (BES), was whipsawed in the controversy last year over the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory (ORNL) in Tennessee. Convinced that technical and administrative problems in the large construction project, which provoked that dispute, lie in the past, the DOE proposes to move the SNS spending profile back onto track with a 138.3 percent boost to \$281 million for FY 2001. Proponents of the project point to the rapid flight of critical neutron research to laboratories in Europe. Now that DOE has permanently closed the troubled High Flux Beam Reactor at Brookhaven National Laboratory (BNL), they say that the flight will only increase in intensity as neutron researchers become unable to fund suitable facilities for frontier research in the United States. But critics of the SNS continue to point to its unwieldy structure that blends the activities of five DOE laboratories. Elsewhere in the portfolio, as indicated in Table II-11, the BES program successfully convinced the Department to propose significant increases to help it regain the ground it lost last year. Much of that new money would go to university investigators.

Continuing the pattern of recent years, High Energy Physics (HEP), the second largest program in the Science account, would be essentially flat funded, as shown in Table II-11. In justifying the requested level, the Department notes that the new Fermilab Main Injector project has been finished and that upgrades of the Fermilab D0 and CDF detectors are nearing completion. Still, it projects cutting operating time at Fermilab from 29 weeks in FY 2000 to 22 weeks in FY 2001. It also projects a cut from 39 weeks to 36 weeks at the Stanford Linear Accelerator Center. Proponents of HEP argue that such cuts represent backsliding from the goals of the Facilities Utilization Initiative set in place several years ago. The HEP budget would, however, fully fund the \$70 million FY 2001 U.S. commitment to construction of CERN's Large Hadron Collider in Geneva, Switzerland.

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Among the remaining Office of Science accounts, the DOE would continue to slowly ramp up the Nuclear Physics budget with a 4.7 percent hike, compared to a 3.9 percent boost last year. This increase would allow the program's four major laboratories—Thomas Jefferson, MIT-Bates, BNL's Relativistic Heavy Ion Collider, and ORNL's Radioactive Ion Beam—to operate at the same utilization efficiency as last year. In the case of Fusion Energy Sciences, DOE would hold activity at the FY 2000 level, following its congressionally driven 11.2 percent hike last year. For Biological and Environmental Research (BER), the Administration continues to push its Climate Change Technology Initiative (CCTI) with a funding request \$16.3 million, up \$3.6 million from FY 2000. The Department would also add \$18.3 million to the Life Sciences subprogram, in part to support new structural biology research facilities and to enhance research in microbial genomics. Overall, the BER budget would grow at roughly the expected rate of inflation to \$444 million, as illustrated by Table II-11. By contrast, Advanced Scientific Computing would grow by more than 40 percent to \$182 million as part of the Administration's multi-agency IT initiative.

The DOE Science budget request fails to address two items that provoked large outcries from researchers last year: a cut in laboratory directors' discretionary funds and a reduction in budgets for scientific travel. Appropriators are bound to hear more about these issues this year.

#### **Fossil Energy, Energy Conservation, and Clean Coal Technology:**

These are the only three R&D programs within DOE that receive their funding through the Interior and Related Agencies Appropriations Bill. In its FY 2001 request, DOE states as a principal objective of its Fossil Energy R&D the stabilization of "domestic oil production by 2005, perhaps increasing the flow of oil from U.S. fields by over 500,000 barrels of oil per day above business as usual projections by 2010." This message might resonate well, given the steep runup in oil prices this year that were precipitated by cutbacks in OPEC production. In spite of heightened public interest in fossil energy pricing, the Administration's budget request contains a sharp 10.6 percent drop for Fossil Energy R&D to \$293 million, as shown in Table II-11. Only the Gas subprogram would grow, in part due to concerns about its integrity and the ability of the existing infrastructure to meet future demands.

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The apparent contradiction between the DOE FY 2001 request and the public interest in oil prices has two probable causes. First, the price runup occurred very late in the budgetary cycle. Second, the Administration has tended to direct R&D funding away from energy sources that contribute to green house gas emissions. Consistent with this approach, the DOE would increase Energy Conservation R&D by 7.8 percent to \$465 million. The Clean Coal Technology program contains no request for additional R&D funding, as noted in Table II-11 and the accompanying footnote, because it continues to operate on previously appropriated funds.

**Atomic Energy Defense Activities – National Nuclear Security Administration (NNSA):** As indicated in Table II-11, Defense represents the largest portion of the DOE R&D portfolio. 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. Congressional support for this program should remain relatively strong, despite the Senate defeat of the Comprehensive Test Ban Treaty (CTBT) late last year. Although Stockpile R&D proponents had used the CTBT as one rationale for the program, it is difficult to find many political leaders who advocate resuming nuclear testing. Absent resumption of tests, Stockpile R&D remains a high priority for DOE.

The Accelerated Strategic Computing Initiative (ASCI), one discrete element within the program, would provide three-dimensional simulations of nuclear weapons behavior, which would be tested against controlled fusion experiments allowed under the terms of CTBT. The experiments would be carried out using two facilities currently under construction: the National Ignition Facility (NIF) and the Dual-Axis Radiographic Hydrodynamic Test Facility (DAHRT). When completed, NIF, according to DOE, “will provide a means to study primary [fission] boosting, assess secondary [fusion] performance, and validate new physics models and codes while pursuing its goal to demonstrate thermonuclear ignition in the laboratory.” The DAHRT facility is intended to validate the implosion performance of primaries. Funding for NIF would drop sharply from \$247 million to \$47 million in FY 2001 to allow the program to address serious technical issues that arose last year. Before June 1, 2000, DOE will

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submit to Congress a new execution plan with a revised funding baseline. The specifics of other NNSA budget lines, shown in Table II-11, reflect previously anticipated changes in these activities.

The Department also has responsibility for several other weapons R&D areas. These include two small ones, Nuclear Safeguards & Security and Intelligence, and one large one, Environmental Management, which would receive a 9.2 percent hike for FY 2001.

**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. Much of the R&D expenditure for this activity in recent years has been associated in recent years with the Yucca Mountain Site Characterization Project. The decrease proposed for FY 2001 R&D expenditures in this area from \$55 million to \$40 million reflects continuing reduced needs for further R&D in this area.

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