

The Department of Energy in the FY 2007 Budget

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HIGHLIGHTS

- Defending last year's presidential budget request for the Department of Energy (DOE), in Secretary Samuel Bodman's words, was one of the most unpleasant tasks of his life. He had inherited from Spencer Abraham, his predecessor, an austere request for most of the DOE's R&D programs, especially the Office of Science, which was slated to decline by almost 4 percent in current dollars and more than 7 percent in level of effort. Bodman made it clear from his earliest days in office that the FY 2007 would be remarkably different. DOE, in his view, was a science department, and the budgetary priorities had to reflect that reality. Without a doubt, the FY 2007 presidential request for DOE carries Bodman's strong imprimatur: the focus is clearly on science.

- DOE's Office of Science, once the forgotten asset in the federal R&D portfolio, was called out for special treatment in the American Competitive Initiative, which President Bush unveiled in his State of the Union Address. Reversing the cuts in the FY 2006 budget, which resulted in layoffs at national laboratories, reductions in running times at user's facilities, a planned mothballing of Brookhaven's Relativistic Heavy Ion Collider (RHIC), and significant trimming of university-based research, the FY 2007 request calls for a 14.1 percent increase in support for the Office of Science. The strong boost—coupled with a ten-year plan to double the aggregate budgets of the Office of Science, the National Science Foundation and the core programs of the National Institutes of Standards and Technology—would allow DOE to begin pursuing its 20-year strategic plan that was put on ice by last year's decline in funding.

- To make room for a \$505 million increase for the Office of Science and a \$211 million expansion of the National Nuclear Security

Michael S. Lubell

Administration (NNSA), both within the context of a flat overall Department budget, DOE would trim spending on Environmental Management by \$762 million. Of that reduction, \$697 million would come from anticipated completion of cleanup activities at Rocky Flats in Colorado and the Ashtabula, Fernald and Miamisburg (Mound) sites in Ohio. The Department would refrain from transferring those funds to other sites, such as Hanford and Idaho National Laboratory, and maintain cleanup activities at those locations on present schedules.

- In his State of the Union Address, President Bush announced the Advanced Energy Initiative, noting that “America is addicted to oil, which is often imported from unstable parts of the world” and that “the best way to break this addiction is through technology.” Recognizing that “keeping America competitive requires affordable energy,” his budget would increase spending on clean energy by 22 percent, dominated by a 79 percent increase for Solar R&D, 65 percent for Biomass, 55 percent for Nuclear, 26 percent for Hydrogen and 13 percent for Wind. The President’s budget request represents a reversal in energy policy, which, apart from nuclear energy and hydrogen, had emphasized fossil fuels.

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 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 DEPARTMENT OF ENERGY IN THE FY 2007 BUDGET

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.

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

Of all the DOE R&D programs, the Office of Science would see the greatest growth in the presidential request for FY 2007. A central component of the American Competitiveness Initiative (ACI), which stresses investment in the physical sciences, it would receive an increase of 14.1 percent, bringing its funding to a level of \$4.1 billion (see Table II-11 for details of the DOE budget and the DOE R&D portfolio). The proposed increase should receive strong support among congressional science advocates, who are concerned about America's competitive position in high technology. But the size of the increase, \$505 million, is likely to cause *angst* among fiscal conservatives, who worry that federal spending is out of control, and it is also likely to run into hostility from liberals, who oppose proposed cuts to many social programs that are part of the presidential request.

Within the DOE portfolio itself, several proposed reductions might run into significant congressional opposition. The President's call for trimming Weatherization Assistance grants by 33 percent will certainly be opposed by delegations from northern states. And his proposal to reduce Environment Management spending, as a result of completion of remediation activities at Rocky Flats and the Mound sites, might prompt some members of Congress to press for transfer of those funds to accelerate the cleanup of nuclear waste at sites in Washington, Idaho and South Carolina.

Favored treatment of DOE civilian research at the expense of other Department programs, which is what the President has called for, would be an anomaly by recent historical standards. Despite the DOE's

Michael S. Lubell

prestigious scientific record, its research budgets have stagnated. During the last 15 years, the purchasing power of the Office of Science, for example, has slipped by almost 30 percent, more than 7 percent in FY 2006 alone. For most of that time, the science and energy research portfolio simply has not been a priority for the Department's top-level administrators, who often have not had the educational background, professional experience and interest that those programs require in order to thrive. In most years, Congress has been loath to repair the damage caused by a poor presidential request. With Samuel Bodman's appointment as Secretary of Energy and the management team he has assembled, the landscape has changed dramatically.

To demonstrate the centrality of science to the DOE mission, Bodman, shortly after assuming office, began to press Congress for the creation of an Under Secretary for Science. The Senate had proposed the position twice before, but the House Energy and Commerce Committee had refused to act on the legislation each time. With Bodman's strong urging, this time the House acquiesced, and the position was established in the Energy Policy Act of 2005, which the President signed into law in August 2005 (Public Law 109-58). In December, President Bush nominated Office of Science Director Raymond Orbach to fill the position. Upon confirmation, Orbach would join Under Secretary David Garman, who would retain Environmental Management and Energy in his portfolio, and Under Secretary Linton Brooks, who manages the National Nuclear Security Administration. With Jeffrey Clay Sell serving as Deputy Secretary of Energy, the Department unquestionably has the finest set of administrators in its history. If the team Bodman has assembled is unable to transform the dysfunctional image that has plagued the Department since its birth, it is likely no one ever will.

The 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). With the agglomeration came layers of bureaucracy that remain to this day. In 1977, ERDA was renamed the Department of Energy when Congress elevated it to Cabinet status. The elevation brought with it the heightened visibility that energy issues demanded, but it also injected a political

THE DEPARTMENT OF ENERGY IN THE FY 2007 BUDGET

overtone, particularly in a President's choice of Department Secretary. But even when an enlightened Secretary of Energy has made attempts to streamline the DOE bureaucracy by proposing to close duplicative field offices, members of Congress have frequently intervened to block the closures in their home districts.

The DOE civilian research programs, in spite of lackluster budgets, have generally risen above congressional parochialism, at least rhetorically. In 2005, for example, 68 members of the Senate signed a letter urging Energy and Water appropriators to fund the Office of Science well above the presidential request. In conference, both bodies agreed to do so, but they directed much of the additional funding to "earmarked projects," most of them having little or no relevance to the Biological and Environmental Research (BER) programs in which they resided. In fact, most of them had scant relevance to any of the DOE missions. This year, with the President requesting more than \$0.5 billion in additional funding for the Office of Science, Hill staffers worry that special member requests will raid the account and vitiate the impact on science that is the focus of ACI. Of further concern to analysts is the not-so-veiled threat by the Administration to penalize in future years any ACI account that has had science funding diverted to pork-barrel projects. Whether Congress can control its appetite for earmarking as part of lobbying reform or whether university presidents and hospital administrators can take a more catholic view of the scientific enterprise and rein in their craving for local advantages remain unanswered questions.

FUNDING REQUEST AND PRIORITIES

Overview: In a reversal of prior Bush White House requests, this year's presidential budget clearly establishes DOE's Office of Science (OS) as the Department's top funding priority. After years of flat or declining budgets that reduced the OS level of effort by almost one third, this year's budget would increase funding for every OS program substantially (see Table II-11). Advanced Scientific Computing Research (ASCR) would surge 36 percent, Basic Energy Sciences (BES) would jump 25 percent, Nuclear Physics (NP) would climb 24 percent, Fusion Energy Sciences (FES) would rise 11 percent and High Energy Physics (HEP) would go up 8 percent. Biological and Environmental Research (BER), the heavily earmarked account, would fall 12 percent in the aggregate but non-earmarked funding would rise by 13 percent.

Michael S. Lubell

The presidential request for DOE's Energy Programs also reflects a change in priorities. Once dominated by Fossil Energy, the presidential budget would increase spending on Renewable Energy Sources significantly, while cutting funding for Fossil Energy research. Joining Hydrogen and Nuclear Energy as Administration priorities, Solar Energy would soar 79 percent, Biomass would climb 65 percent and Wind Energy would increase 13 percent. The presidential budget would continue to expand Hydrogen R&D, boosting spending by almost 26 percent. The budget would also raise spending on Nuclear Energy R&D by 18 percent, largely to accommodate the Global Nuclear Energy Partnership (GNEP), which is aimed at proliferation resistant waste disposal and recycling technologies.

Defense R&D, which received favored treatment in previous Bush Administration request, would see a decline of 2 percent in the R&D accounts. Much of that would reflect a growing emphasis on Fissile Materials Disposition and Nonproliferation International Security at the expense of Nonproliferation R&D, which would fall almost 16 percent.

Energy Supply: Hydrogen Technology remains a priority for the Bush Administration. Focusing on production, delivery, storage and fuel cells technologies, the \$196 million request for FY 2007 would keep DOE on course with the President's 5-year \$1.2 billion Hydrogen Initiative that aims at a commercialization decision by 2015 (see Table II-11). The Administration's plan to spend \$150 million on Biomass is aimed at developing technologies that would diversify usable feedstocks, help wean the United States off its dependence on foreign oil and provide a broadened base for U.S. agriculture. The presidential budget also calls for spending \$148 million on Solar Energy R&D as part of a new Solar America Initiative (SAI), which has as its goal an accelerated development of photovoltaic technologies to achieve deployment of 10-15 gigawatts of electricity (GWE) on the power grid, also by 2015. Finally, the presidential budget would commit \$243 million to the Advanced Fuel Cycle Initiative (AFCI), an increase of \$164 million over FY 2006, to begin an engineering scale development of UREX+ or other promising technologies for isotope separation. The AFCI is a key part of the Department's Global Nuclear Energy Partnership unveiled this year.

Science: The Office of Science (OS) programs support cutting-edge science through a mix of research at DOE national laboratories, university-based peer-reviewed programs and the construction and

THE DEPARTMENT OF ENERGY IN THE FY 2007 BUDGET

operation of large facilities that are used by external researchers from academia, industry and other federal agencies. Of the \$3.8 billion total for OS R&D activities in FY 2007 (excluding non-R&D activities such as administration costs), the presidential budget would allocate \$1.8 billion to construct and operate DOE user facilities, \$1.1 billion for national laboratory research, \$600 million for university research and \$300 million for a variety of other research purposes.

High-Energy Physics (HEP), DOE's second largest OS program which funds basic research on the nature of matter and energy, would be funded at \$775 million in FY 2007, allowing DOE to sustain operating time at its two major facilities, the Stanford Linear Accelerator Center (SLAC) in California and Fermilab in Illinois. It would also allow the Department to increase its support of its activities at the Large Hadron Collider (LHC) at CERN in Geneva, Switzerland as the LHC begins operations at the end of 2007. The requested increase for HEP would permit the U.S. to double its contribution from \$30 to \$60 million for R&D on the International Linear Collider project, the next major high-energy physics facility.

Nuclear Physics (NP), after suffering a crushing reduction of \$28 million in FY 2006 that caused layoffs and vastly reduced operations at Brookhaven National Laboratory's Relativistic Heavy Ion Collider (RHIC) in New York and Thomas Jefferson National Laboratory's Continuous Electron Beam Accelerator Facility (CEBAF) in Virginia, would receive an increase of \$87 million in FY 2007. That would allow the Department to resume normal operations at RHIC and CEBAF, to begin engineering and design of the 12 GeV CEBAF Upgrade Project, to start construction of the RHIC Electron Beam Ion source and to initiate research efforts at CERN's LHC heavy ion program. It would defer any commitment to the Rare Isotope Accelerator (RIA) for several years. (For more on the physics programs, see Chapter 14.)

Fusion Energy Sciences (FES) would see its budget rise from \$288 million to \$319 million, enabling funding for the International Thermonuclear Experimental Reactor (ITER) to climb from \$19 million in FY 2006 to \$60 million in FY 2007 and still provide sufficient funds for a robust domestic program. Last year's funding request for ITER came at the expense of DOE's three major fusion facilities, DIII-D in California, Alcator C-Mod in Massachusetts and NSTX in New Jersey, and it provoked a strong congressional rebuke. Appropriators restored

Michael S. Lubell

funding for the three domestic sites and stripped \$30 million from the ITER request. The U.S. might have lost some international prestige in the political squabble, but the damage was mitigated by project delays that had been caused by disagreements over the selection of a site. But on June 28, 2005 the international partners agreed to construct the project at Cadarache, France, and ground has since been broken. The FY 2007 request would permit the U.S. to be a full scientific partner, as planned.

Basic Energy Sciences (BES), the largest OS program, would receive a \$286 million increase, bringing its funding to \$1.4 billion. It would allow the Department to provide \$171 million for running the Spallation Neutron Source in Tennessee in anticipation of its first year of operation. It would also increase funding for Nanoscale Science by \$51 million, raising its total to \$254 million, and it would ramp up spending on basic hydrogen research from \$33 million to \$50 million. The request would increase the BES commitment to operation of the Stanford Linear Accelerator Center (SLAC) in California by \$23 million and allow work to proceed as planned on the construction of the Linear Collider Light Source at SLAC with additional budget authority of \$23.6 million. Finally, the budget would provide \$25 million for R&D and \$20 million for preliminary engineering design work on a new synchrotron radiation light source (NSLS II) at Brookhaven National Laboratory.

Advanced Scientific Computing Research (ASCR) would receive \$319 million in FY 2007. Of the \$84 million increase, \$17.3 million would be directed to Lawrence Berkeley National Laboratory's National Energy Research Scientific Computing Center (NERSC) in California for developing 100-150 teraflop high-performance production computing, \$26.3 million to Oak Ridge National Laboratory's Leadership Computing Facility (LCF) in Tennessee for developing a 250 teraflop computing capability focused on "modeling and simulation of scientific grand challenge problems in combustion, fusion and complex chemical reactions," and \$22.5 million for Argonne National Laboratory's LCF in Illinois for a 100 teraflop "Blue Gene P" computer to "address scientific challenges in materials science, catalysis, protein/DNA complexes and advanced designs of nuclear reactors." (For more on computing research, see Chapter 23.)

Biological and Environmental Research (BER), the home of DOE's genomics research programs, has been a heavily earmarked account for many years, with \$129 million of its FY 2006 total of \$580 million being

THE DEPARTMENT OF ENERGY IN THE FY 2007 BUDGET

so designated. The presidential FY 2007 request of \$510 million for non-earmarked programs would represent an increase of 13 percent, and it would be directed almost solely to the Genomes to Life Program (up \$50 million) and the Human Genome Program (up \$12 million). The BER budget would scale back Climate Change Research by \$8 million.

Fossil Energy: Already dominated by Coal Research in prior years, the Department's Fossil Energy budget would once again attempt to zero out all funding for Oil and Natural Gas Technologies in FY 2007, despite congressional objection. The Department budget would also use all unspent balances from prior year funding of the Clean Coal Power Initiative to reduce the overall Coal budget to \$330 million in FY 2007 from \$376 million in FY 2006. The request would add to \$36 million in budget authority for FutureGen to develop a near-emission-free, coal-fired electricity and hydrogen production plant. The Department would increase funding for Carbon Sequestration by \$8 million to \$74 million, and it would add \$2 million to Coal Based Fuel Cell projects, bring the total to \$63 million in FY 2007.

Energy Conservation: The Department has reassigned Energy Conservation to a combined Energy Supply and Conservation portfolio, but the reassignment has not changed the Administration's budgetary policy for this account. Unlike Renewable Energy, which the presidential request has identified as ripe for investment, Energy Conservation would continue to languish in the FY 2007 budget. Vehicle Technologies would suffer a reduction of \$16 million down to \$166 million and Industrial Technologies would fall \$11 million to \$46 million. Although some of these reductions are associated with earmarks in prior years, some are real. Bucking the trend of reductions in the Conservation request are Hybrid Vehicles (up \$44 million to \$51 million) and Building Technologies (up \$8 million to \$77 million).

DOE Defense R&D: In the FY 2007 budget, DOE Defense would still claim number one billing in the Department's R&D portfolio, but only barely. The presidential request would trim 2.1 percent from Defense R&D, reducing its total to \$4.0 billion, only \$200 million more than Science. Most of the Defense R&D funding is allocated to the National Nuclear Security Administration (NNSA), which has the responsibility for pursuing science-based alternatives to nuclear testing in order to maintain the safety and reliability of the nuclear stockpile. For FY 2007, NNSA would see its budget authority rise by slightly more than 2

Michael S. Lubell

percent, but its R&D activities would decline by \$89 million to just under \$4 billion. To keep pace with NNSA's need for reliable computer simulations of nuclear explosions, the Advanced Simulation and Computing Program—distributed across the three weapons laboratories of Los Alamos and Sandia in New Mexico and Livermore in California— would increase by 3 percent to \$618 million. By contrast, Inertial Confinement Fusion would decline by \$92 million to \$451 million. Nonproliferation and Verification R&D would also drop, by \$50 million to \$272 million.

Radioactive Waste Management: The DOE has responsibility for disposing of all nuclear waste resulting from civilian as well defense uses. Little of the \$5.4 billion Defense Environmental Cleanup funds are allocated to R&D. In FY 2007 DOE would spend \$56 million for this purpose, down \$24 million from FY 2006 (see Table II-11).