

Electrotechnology-Related Research in the FY 2003 Budget

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HIGHLIGHTS

- Reflecting the Bush Administration's new focus on the effort to combat terrorism and ensure homeland security, the R&D budget for these purposes will rise from \$1 billion in FY 2002 to approximately \$3 billion in FY 2003.
- The Department of Defense (DOD) R&D budget overall would increase by \$5 billion over FY 2002 to a level of \$54.8 billion (see Table II-2).
- The DOD Science and Technology budget ("6.1"- "6.3" plus medical research) would decrease by 3.7 percent to a level of \$10.0 billion.
- NASA's R&D Budget would increase by 4.3 percent to \$10.7 billion (see Table II-12).
- R&D at the National Science Foundation (NSF) would increase \$125 million to \$3.7 billion (see Table II-7).
- The Department of Energy (DOE) R&D budget would decrease by 0.5 percent to \$8.3 billion (see Table II-11).
- The Department of Commerce R&D budget would receive a slight 0.3 percent increase to \$1.11 billion (see Table II-14).

INTRODUCTION

The federal government supports a substantial amount of research and development of electrical, electronics and computing technologies spanning a range of fields including electrical generation and energy efficiency, communication and information technologies, aerospace and satellites, intelligent highway systems, electronic warfare, telemedicine and medical devices. The Department of Defense has been the key supporter of electrotechnology R&D.

For example, in FY 1999, the DOD funded 70 percent of all federal research done at universities in electrical engineering. Much of the federally funded research has applications that cross over into the private sector, such as the Internet, which was made possible through research done at the Defense Advanced Research Projects Agency (DARPA).

The following chapter presents an overview of the President's FY 2003 budget request for electrotechnology-related research and development in five key agencies: the Department of Defense (DOD), National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), the Department of Energy (DOE), and the Department of Commerce.

All figures are in current dollars and are not adjusted for inflation.

DEPARTMENT OF DEFENSE (DOD)

The Department of Defense's Research, Development, Test, and Evaluation (RDT&E) appropriation provides funding for future military hardware and software and their underlying technologies, covering the full spectrum of R&D from the most basic research to advanced full-scale military systems development. RDT&E collectively consists of seven budget activities: Basic Research ("6.1"), Applied Research ("6.2"), Advanced Technology Development ("6.3"), Demonstration and Validation ("6.4"), Engineering and Manufacturing Development ("6.5"), Management Support ("6.6"), and Operational Systems Development ("6.7"). RDT&E is the federal government's single largest research and development account.

The Bush Administration has indicated that in the effort to combat terrorism and provide for homeland security, programs that "address

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terrorist threats” would be the primary focus of additional R&D funding and urgency. Reflecting this commitment, the overall Department of Defense budget for RDT&E would increase by 11.4 percent to a level of \$54.1 billion. When medical research and other appropriations are factored in, the total DOD R&D budget would equal \$54.8 billion (see Table II-2).

However, the bulk of this increase is spread between later stage development activities, specifically, Engineering and Manufacturing Development (“6.5”) and Operational Systems Development (“6.7”). These two programs would receive a \$5.3 billion increase collectively, which would equal the entire increase in the RDT&E budget. Funding for all other programs remain essentially flat or decrease.

Basic Research (“6.1”), Applied Research (“6.2”), and Advanced Technology Development (“6.3”), known collectively as Science and Technology (S&T), would increase only slightly (0.1 percent) to a level of \$9.9 billion.

The Demonstration and Validation activity (“6.4”) and Management Support (“6.6”) would both increase slightly at 1.7 percent and 1.4 percent respectively to levels of \$10.5 billion and \$2.9 billion.

Also funded by RDT&E are the two major defense research agencies, the Defense Advanced Research Projects Agency (DARPA) and the Missile Defense Agency (MDA). DARPA, whose mission is to “develop imaginative, innovative and often high-risk research ideas offering a significant technological impact that will go beyond the normal evolutionary developmental approaches,” will receive a 19.2 percent increase to a level of \$2.7 billion (see Table II-3). After a large increase in FY 2002, the MDA, formerly known as the Ballistic Missile Defense Organization (BMDO), would see its funding decrease slightly to \$6.7 billion.

In the area of Electrotechnology the DARPA budget shows an increase of \$32 million for Sensor and Guidance Technology. This important element is developing the system-oriented technologies necessary to enhance sensor and weapon system accuracy and capability to meet current and emerging threats. However, another important element, Advanced Electronics Technologies, that addresses electronics and

microelectronics devices and other activities, shows a decrease of \$49 million.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

While NASA's budget overall is essentially flat from last year at \$15 billion, the R&D budget would increase by 4.3 percent to a level of \$10.7 billion (see Table II-12).

As of FY 2002, NASA's budget is separated into two accounts, Human Space Flight (HSF) and Science, Aeronautics, and Technology (SAT). (Last year the Mission Support account was eliminated, and an "Institutional Support" line was added to each enterprise separately.) In FY 2003, the HSF R&D budget would decrease by 16.5 percent from FY 2002 to a level of \$1.9 billion, while SAT R&D funding would increase by 10.2 percent to \$8.8 billion.

Of the proposed reduction within HSF, the International Space Station would be cut 13.3 percent to \$1.5 billion, while other HSF R&D receives an even bigger reduction of 26.6 percent to a level of \$1.9 billion. The Space Shuttle account (although non-R&D) would see a \$65 million cut in FY 2003, necessitating a planned reduction in flights from 6-7 flights per year to 4-5 flights.

Within SAT, the biggest winner would be the Space Science account, which is funded at \$3.4 billion, an increase of 19 percent. However, part of this increase is due to \$191 million for Deep Space Network being transferred from HSF to SAT. In Space Science, the Outer Planets program is zeroed out in FY 2003, and the \$15 million previously allotted there would be transferred to a new program called "New Frontiers," where missions will be selected through competitive proposals.

The Biological and Physical Research programs, which focus on basic and applied research, would increase by 2.8 percent to \$851 million. Aerospace Technology would increase by 12.3 percent to a level of \$2.9 billion. However, nearly all of that increase is directed towards a project to develop a 2nd Generation Reusable Launch Vehicle.

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Earth Science is essentially flat at \$1.6 billion. Academic Programs, which consist of Education Programs and Minority Research and Education, would be cut 36.8 percent to a level of \$144 million.

One of the major multi-agency initiatives is the Networking and Information Technology Research and Development initiative. NASA has received the largest increase of all agencies for the initiative. The increase over FY 2002 funding is \$32 million or 18 percent (see Table I-10). The research will emphasize network security, reliability, and privacy.

NATIONAL SCIENCE FOUNDATION (NSF)

During a speech at the National Press Club, Mitch Daniels, the Director of the Office of Management and Budget (OMB), touted the NSF's financial management success and declared it one of the "true centers of excellence in government." The President's budget request cites the agency's "expertise and success" in funding competitive research as the reason it transferred a number of science and engineering programs to the NSF in FY 2003, including the National Oceanic and Atmospheric Administration's (NOAA) Sea Grant program and the U.S. Geological Survey's (USGS) toxic substances hydrology research program. The Administration hopes that merit-based competition will "improve overall program effectiveness."

These two program transfers and one other (Environmental Education from the Environmental Protection Agency) account for \$76 million of the NSF's \$125 million increase in R&D, resulting in a total \$3.7 billion request for R&D in FY 2003. Without these two programs factored in, R&D at NSF would increase slightly (1.5 percent). The NSF overall budget would increase 5 percent to \$5 billion (see Table II-7).

The Engineering Directorate, which supports research in areas including information technology, biotechnology, and microelectronics would increase by \$16 million to a level of \$488 million, or 9.7 percent of NSF's budget. The Mathematical and Physical Sciences (MPS) activity would increase by \$21 million to a level of \$942 million. This Directorate supports education and research in the physical and mathematical sciences.

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The FY 2003 funding level for Major Research Equipment and Facilities Construction (MREFC) would decrease by \$13 million (9.0 percent) to a level of \$126 million.

The Computer and Information Science and Engineering Directorate (CISE) budget would increase by 2.3 percent to \$527 million, \$191 million of which will go to the NSF's Information Technology Research priority area (an increase of 9.9 percent). The IT Research work is being directed at seeking ways to improve methods of gathering, storing, analyzing, sharing, and displaying information. All other programs under CISE would decrease slightly or stay flat.

The President's budget request includes \$200 million for the Math and Science Partnership (MSP) program, \$40 million over last year. This is the second year in a 5-year, \$1 billion program designed to improve achievement in math and science at the pre-kindergarten to 12th grade level.

DEPARTMENT OF ENERGY (DOE)

The DOE R&D budget is divided into 7 separate accounts: Energy Supply, Science, Fossil Energy, Energy Conservation, Atomic Energy Defense, Clean Coal Technology, and Radioactive Waste Management. R&D funding within each of these accounts, with the exception of Radioactive Waste Management and Atomic Energy Defense, is either flat or cut in the President's budget request. DOE's FY 2003 R&D budget overall would decrease by 0.5 percent to \$8.3 billion (see Table II-11).

Taking the biggest hits are the Fossil Energy and Energy Conservation accounts, which are cut by 17.3 percent and 10.9 percent respectively to levels of \$416 million and \$413 million.

Energy Supply R&D would also take a cut of 5.1 percent to a level of \$424 million. Within the Energy Supply account Renewable Energy Resources increase slightly by 2.8 percent to a level of \$361 million, while Nuclear Energy would be cut 34.3 percent to \$63 million.

R&D in the Office of Science account overall would stay basically flat (a 0.4 percent increase) at a level of \$3.1 billion. Within the account, however, there are some relative winners and losers. Nuclear Physics

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would see a 6.5 percent jump to \$382 million, and Advanced Scientific Computing Research (ASCR) would climb 7.8 percent to \$170 million. Meanwhile, Biological and Environmental Research (BER) would see an 11.6 percent cut to \$504 million. Fusion Energy Sciences would increase by 4.0 percent to \$257 million. Although Basic Energy Sciences would increase overall by 2.0 percent, the Spallation Neutron Source program within BES would take a 22.8 percent or \$66 million cut.

The President's Clean Coal Technology account is consolidated with the Coal Research Initiative under the Fossil Energy account. The consolidated account would decrease by 3.8 percent to \$326 million.

A second important initiative in the Electrotechnology area is the Nanoscale Science, Engineering, and Technology initiative. In FY 2003, the total budget for this initiative would increase by \$106 million (see Table I-10). By far the largest increase occurs in the Department of Energy whose budget will be increased by \$48 million or 53 percent. This reflects the expertise of DOE's national laboratories (*e.g.* Sandia, Los Alamos). (Please see Chapter 24 for more information on the initiative.)

DEPARTMENT OF COMMERCE (DOC)

Research and Development in the FY 2003 Department of Commerce budget proposal would receive a slight 0.3 percent increase to \$1.1 billion (see Table II-14).

R&D at the National Institute of Standards and Technology (NIST) would increase by 5.0 percent to a level of \$483 million. The intramural line within NIST, *i.e.* the research that is conducted at NIST labs, is Scientific and Technical Research and Services (STRS). This includes research in Electronics and Electrical Engineering, Chemical Science and Technology, Physics, Materials Science and Engineering, and Computer Science, among other disciplines. STRS R&D would increase by 24.2 percent, or \$68 million, to \$348 million.

The NIST account also includes the Advanced Technology Program (ATP), which the Bush Administration attempted to zero out in the FY 2002 budget, but was restored by Congress. ATP has been a significant source of electrotechnology R&D. This year the ATP would take another large hit of 48.7 percent or \$77 million to a level of \$81 million.

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One significant change that the Administration has proposed for ATP is for universities to be able to lead ATP joint ventures, and to negotiate with joint venture partners over intellectual property rights. Also in the works for ATP are significant reforms that are designed to minimize what the Administration refers to as “unwarranted subsidies.” These proposed reforms include limiting large companies’ participation in the program and requiring firms to reimburse the government for up to five times its investment in successful projects.

The FY 2003 budget request also includes \$605 million for R&D at the National Oceanic and Atmospheric Administration (NOAA)—a \$6 million decrease.

The FY 2003 budget is funding a new program, a \$3 million entry for the National Telecommunications and Information Administration (NTIA), to begin the process of spectrum management reform and to upgrade its radio quiet zone test facility in Colorado. Although this is a very small element, its importance is indicated by the conflicting views of opposing parties involved in broadband issues in the Congress and the Administration. It should also be noted that the Administration will also propose legislation to streamline the current process for reimbursing federal agencies that must relocate from spectrum auctioned to commercial users.