5. RESEARCH AND DEVELOPMENT

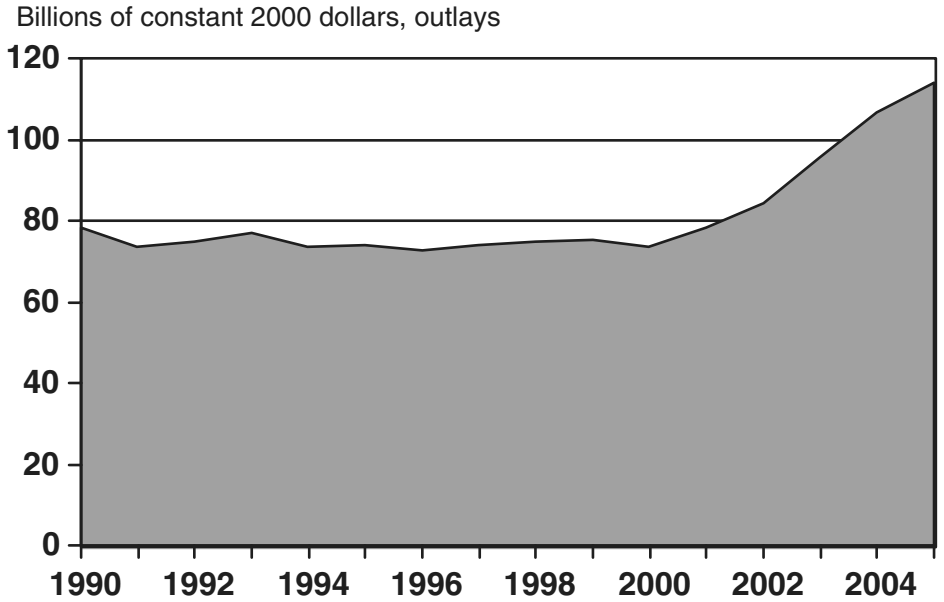
I. INTRODUCTION

The eminent 19th Century American scientist Joseph Henry once asserted, "Modern civilization depends on science." This still holds true. Indeed, investments in science and technology have resulted in much of the unparalleled economic growth in the United States over the last 50 years, as well as the standard of living and quality of life we now enjoy. Advances have been possible only with the support of both public and private investment in research and development (R&D).

And we continue to invest. The R&D investments of the United States are unmatched. However, unlike 40 years ago, when Federal R&D expenditures doubled those of the private sector, industry R&D spending now exceeds that of the Federal Government. Still, by a wide margin, the U.S. Government continues to lead the world in R&D spending.

Investments in technological advancement are vital to strengthening our capabilities to combat terrorism and defend our country. The President's 2005 Budget continues to focus R&D on winning the war against terrorism, while moderating the growth in overall spending. But the benefits of innovation and discovery are not limited to national security. They are just as critical to economic security. The Administration, recognizing that fundamental research is the fuel for future innovation and technology development, has maintained the highest levels of support for priority R&D areas such as nanotechnology, information technology, hydrogen energy, and space exploration. The non-defense R&D share of the discretionary budget is at a near-record high over the last 30 years.

Chart 5-1. Federal R&D Spending



Author Aubrey Eben noted, "Science is not a sacred cow. Science is a horse. Don't worship it. Feed it." To this we would add: the horse also needs to be kept in good shape. The focus should not be solely on spending but, just as importantly, on performance. The Administration will continue to meet the President's charge to improve the management, performance, and results of the Federal Government. By strengthening effective programs and addressing lower performers through reforms or reallocations to higher performers, we will increase the productivity of the Federal R&D portfolio and transcend the attention given to year-to-

year marginal increases or decreases. Additionally, while it can be difficult to assess the outcomes of some research programs—many of which may not have a measurable effect for decades—agencies can establish meaningful program goals and measure annual progress and performance in appropriate ways. Towards that end, the Administration is continuing to implement and improve investment criteria for R&D programs across the government. Further, the government will coordinate interrelated and complementary R&D efforts among agencies, combining programs where appropriate to improve effectiveness and eliminate redundancy, to leverage these resources to the greatest effect.

The Federal Government funds R&D in many ways. The government is a strong supporter of basic research, which is directed toward greater understanding of fundamental phenomena. Basic research is the source of tomorrow's discoveries and new capabilities, and this long-term research will fuel further gains in economic productivity, quality of life, and homeland and national security. The government also has a vital role in supporting applied research, which is driven by more specific needs, and development, which applies scientific knowledge and technology to specific needs. Together, the R&D portfolio is critical to the missions of Federal agencies, particularly in priority areas that private sources are not motivated to support. For example, if the private sector cannot profit from the development of a particular technology, Federal funding may be appropriate if the technology in question addresses a national priority or otherwise provides significant societal benefits. A good indicator of the relevance of Federal development funding is the level at which industry is willing to share the costs. Also, the Federal Government should help stimulate private investment and provide the proper incentives for private sources to continue to fuel the discovery and innovation of tomorrow. The Administration proposes to do this, for instance, by permanently extending the Research and Experimentation tax credit.

This chapter discusses how the Administration will improve the performance of R&D programs through new investment principles and other means that encourage and reinforce quality research. The chapter also highlights the priority areas proposed for R&D agencies and the coordinated efforts among them. The chapter concludes with details of R&D funding across the Federal Government.

II. IMPROVING PERFORMANCE OF R&D PROGRAMS

R&D is critically important for keeping our Nation economically competitive, and it will help solve the challenges we face in health, defense, energy, and the environment. As a result, and consistent with the Government Performance and Results Act, every Federal R&D dollar must be invested as effectively as possible.

R&D Investment Criteria

The Administration is improving the effectiveness of the Federal Government's investments in R&D by continuing to apply transparent investment criteria in making recommendations for program funding and management. R&D performance assessment requires special consideration. Research often leads scientists and engineers down unpredictable pathways with unpredictable results. This poses a difficult problem for measuring an R&D program's performance against its initial goals. Adopting ideas first laid out by the National Academy of Sciences, the Administration is improving methods for setting priorities based on expected results, including applying specific criteria that programs or projects must meet to be started or continued, clear milestones for gauging progress, and improved metrics for assessing results.

As directed by the President's Management Agenda, the R&D Investment Criteria were first applied in 2001 to selected applied R&D programs at the Department of Energy (DOE). Through the lessons learned from that DOE pilot, the criteria subsequently were broadened in scope to cover other types of R&D programs at DOE and other agencies. To accommodate the wide range of R&D activities from basic research to development and demonstration programs, a new framework was devised for the criteria to address three fundamental aspects of R&D:

- *Relevance.*—Programs must be able to articulate why they are important, relevant, and appropriate for Federal investment;
- *Quality.*—Programs must justify how funds will be allocated to ensure quality; and
- *Performance.*—Programs must be able to monitor and document how well the investments are performing.

In addition, R&D projects and programs relevant to industry are expected to meet criteria to determine the appropriateness of the public investment, enable comparisons of proposed and demonstrated benefits, and provide meaningful decision points for completing or transitioning the activity to the private sector.

Year Three in DOE Implementation of the Criteria. The Department of Energy continues to expand its use of the R&D criteria. For example, to ensure the relevance of the research it supports, DOE's basic research programs have incorporated the programs' long-term measures into requests for research proposals. The basic research programs have also expanded their use of Committees of Visitors, teams of independent experts that periodically assess the quality and performance of the research that the program has supported. Many of DOE's applied R&D programs have made similar improvements, and some have even incorporated the specific "industry-related" R&D criteria into evaluation forms used by peer reviewers to assess individual projects. While DOE's applied R&D programs still are faced with the challenge of generating comparable estimates of expected public benefits, they continue to work toward improving the consistency and quality of the data to better inform budget decisions.

The Administration has been studying R&D management strategies that some agencies use to operate particularly effective programs. The Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP) are continuing to assess the strengths and weaknesses of R&D programs across agencies, in order to identify and apply good R&D management practices throughout the government. For example, some agencies have a more deliberate project-prioritization process, while other agencies have more experience estimating the returns of R&D and assessing the impact of prior investments. Assessing and implementing new approaches is an iterative process, involving the research agencies and the science and technology community.

As the investment criteria are implemented more broadly and more deeply, one lesson that is increasingly apparent is the importance of coordination and partnerships. First, partnerships are key in determining the proper Federal role. These include partnerships with industry (such as the Administration's FreedomCAR partnerships with U.S. automakers), partnerships with other countries (such as the Administration's International Partnership for a Hydrogen Economy), and partnerships with university researchers. Partnerships and coordination across agencies, through the National Science and Technology Council, for example, can also make the use of research resources more efficient and effective. More effective coordination and partnerships will be pursued in further implementation of the investment criteria.

Broader Application of the R&D Investment Criteria. This was the second year of implementation of the investment criteria for most R&D agencies. The National Aeronautics and Space Administration is recasting its strategic plans and budget to tie directly to the R&D criteria. To reflect the criteria, the National Science Foundation changed the way it characterizes its budget, as well as the guidelines it uses to evaluate its research. Nearly all R&D agencies assessed some R&D programs using a tailored Program Assessment Rating Tool that was based on the R&D criteria. The R&D agencies have more work to do to integrate the R&D criteria more meaningfully into their management processes and budget decisions, and OMB will continue to improve guidance and standards for implementing the R&D Investment Criteria.

DOE has started to use the results of the R&D investment criteria to help analyze its portfolio of investments on the basis of the potential public benefits. This approach helps DOE to analyze, for example, whether the expected fruits of its investments are balanced across time, as well as the types of benefits they may yield. As data analysis of the Department's applied R&D programs has shown, there is a greater need for consistent methods of analysis, including ways to present benefits estimates that make comparisons meaningful. DOE is continuing to improve the consistency and quality of its data.

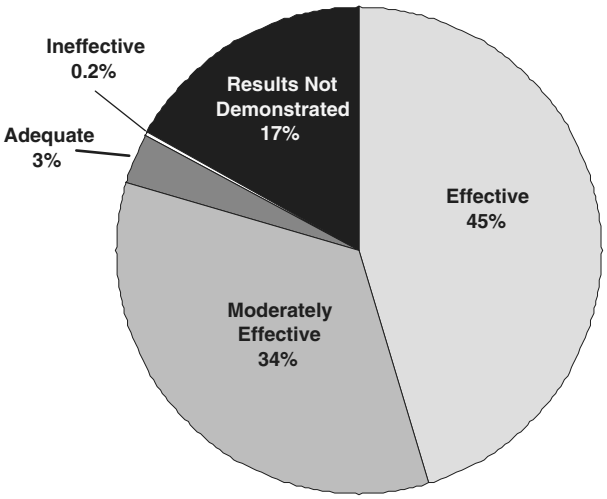
As discussed throughout the 2005 Budget, OMB and the agencies have been working on other initiatives as part of the President's Management Agenda. To support the Budget and Performance Integration initiative, OMB developed a tool to assess the effectiveness of programs consistently: the Program Assessment Rating Tool (PART). Last year the effort included a version of the PART to specifically assess R&D programs, but PART assessments were done in isolation of the R&D Investment Criteria initiative. This year, the R&D PART was modified to align with the R&D criteria. In the process, the R&D PART became the instrument for assessing management and performance at the program level. In preparation of the 2005 Budget, OMB and the agencies completed or updated PART assessments of 58 R&D programs.

Some programs rated "effective" were provided added funding to further the work they do. For example, the Budget requests $305 million for the National Science Foundation's Nanoscale Science and Engineering, an increase of 20 percent from the 2004 likely enacted level. Other examples include: DOE's Basic Energy Science

Program, the National Aeronautics and Space Administration's Mars Exploration Program, and the Department of Commerce's laboratories at the National Institute of Standards and Technology. Other programs that were rated "ineffective" were cut, such as DOE's Oil Technology program. However, funding changes and management reforms are not made by formula or based solely on PART results. For example, funding may be reduced for "effective" programs that have achieved what they set out to, and "ineffective" programs might receive more money if it is clear it would help them become more effective. The PART provides information that permits informed decisions.

Chart 5-2. PART Assessments of 58 R&D Programs

(Share of Total Funding Assessed)



OMB will continue to work with the R&D agencies and others to integrate the R&D criteria more meaningfully into the budget formulation process in the coming year, and to clarify expectations for using the R&D Investment Criteria across the agencies. Based on lessons learned and other feedback from experts and stakeholders, the Administration will continue to improve the R&D investment criteria and their implementation to achieve more effective management of R&D programs and better-informed budget-allocation decisions across the R&D agencies.

President's Management Agenda Initiative

Better Research and Development (R&D) Investment Criteria

FY 2004, Quarter 1 Status: RED, Progress: YELLOW

The initiative's red status score reflects the limited success many agencies have had in the government-wide implementation of the initiative. The yellow progress score indicates that the initiative retains momentum, as some agencies have made improvements this year, including the National Science Foundation, NASA, and DOE. More R&D agencies are using the criteria to assess their programs, due to the improved alignment of the R&D investment criteria with the R&D PART for program-level assessments. Twelve of the top 13 R&D agencies are using the R&D PART to assess their programs this year, up from seven last year. Most of the major R&D agencies submitted 2005 Budget requests that, to varying degrees, observe the principles of the investment criteria. To achieve a yellow status score, half of the R&D programs assessed for each agency must receive at least a "moderately effective" rating, which is proving to be a challenging requirement. Agencies must also integrate the R&D criteria framework into their budget proposals, including using detailed criteria-based assessments to justify specific requests or allocation changes.

Research Earmarks

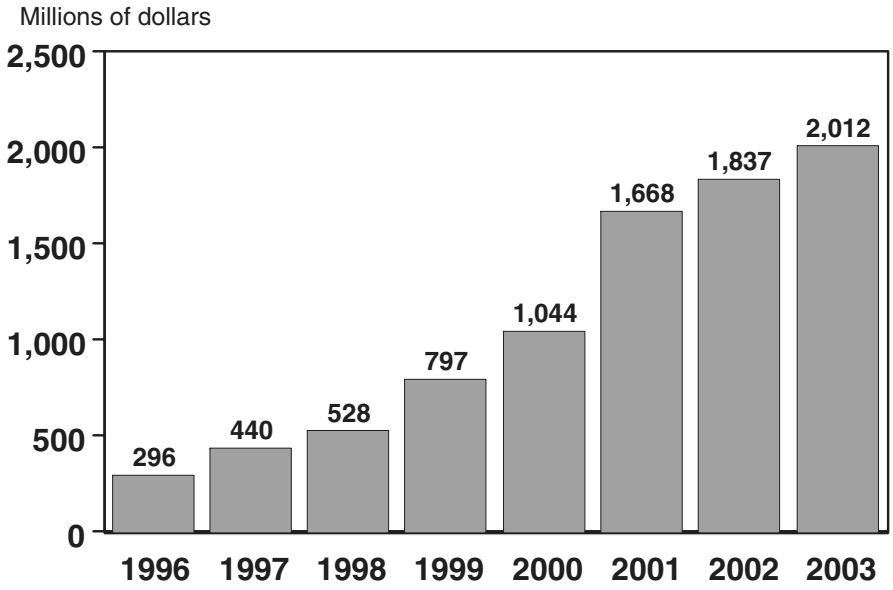
The Administration supports awarding research funds based on merit review through a competitive process. Such a system ensures that the best research is supported. Research earmarks—in general the assignment of money during the legislative process for use only by a specific organization or project—are counter to a merit-based competitive selection process. The use of earmarks improperly signals to potential investigators that there is an alternative to creating quality research proposals for merit-based consideration, including the use of political influence or appeals to parochial interests.

Moreover, the practice of earmarking funds directly to colleges and universities for specific research projects has expanded dramatically in recent years. Despite broad-based support for merit review, earmarks for specific projects at colleges and universities have yet again broken prior records. According to *The Chronicle of Higher Education*, academic earmarks have steadily increased from a level of $296 million in 1996 to over $2 billion in 2003. These funds now form a greater share of the total Federal funding to colleges and universities, and increasingly displace competitive research that is awarded by merit. For example, in 2003, academic earmarks accounted for eight percent of all Federal funding to colleges and universities, which is quite high relative to the 1996 level of 2.5 percent.

Some argue that earmarks help spread the research money to states or institutions that would receive less research funding through other means. *The Chronicle of Higher Education* reports that this is not the main role they play; often only a minor portion of academic earmark funding goes to the states with the smallest shares of Federal research funds. Meanwhile, earmarks help some rich institutions become richer. In 2003, 17 of the 30 institutions receiving the most Federal earmarks were also among the 100 that received the most research funds from all sources.

Some proponents of earmarking assert that earmarks provide a means of funding unique projects that would not be recognized by the conventional peer-review process. To address this concern, a number of agencies have procedures and programs to reward out-of-the-box thinking in the research they award. For example, within the Department of Defense (DOD), the Defense Advanced Research Projects Agency seeks out high risk, high payoff scientific proposals, and program managers at NSF set aside a share of funding for higher-risk projects in which they see high potential.

Chart 5-3. Funding for Academic Earmarks



Many earmarks have little to do with an agency's mission. For example, the Congress earmarked DOD's 2004 budget to fund research on a wide range of diseases, including breast cancer, ovarian cancer, prostate cancer, diabetes, leukemia, and polio. Funding at DOD for such research totals over two-thirds of a billion dollars in 2004 alone. While research on these diseases is very important, it is generally not unique to the U.S. military and can be better carried out and coordinated within civil medical research agencies, without disruption to the military mission. At the same time, intrusion of earmarks into the peer-review processes of civilian medical research agencies would have a significant detrimental impact on funding the most important and promising research.

The Administration will continue to work with academic organizations, colleges and universities, and the Congress to discourage the practice of research earmarks and to achieve our common objectives.

III. PRIORITIES FOR FEDERAL RESEARCH AND DEVELOPMENT

The 2005 Budget requests $132 billion for Federal R&D funding, a $41 billion increase since the beginning of this Administration (Table 5–2 provides details by agency). This is a 44-percent increase over four years. Even if military R&D is excluded, the Administration has raised civilian R&D investment 26 percent over this same period. The 2005 Budget targets key basic research investments within agencies such as NSF, DOE's Office of Science, DOC's National Institute of Standards and Technology, and the National Institutes of Health (NIH), increasing basic research funding across all agencies by $6 billion (29 percent) since 2001.

In a 1995 report from the National Academy of Sciences, the scientific community proposed a "Federal Science and Technology" (FS&T) budget to highlight the creation of new knowledge and technologies more consistently and accurately than the traditional R&D data collection. Also, because the FS&T budget emphasizes research, it does not include funding for defense development, testing, and evaluation, and totals less than half of Federal R&D spending. FS&T is readily tracked through the budget and appropriations process, so the effects of budget decisions are clearer more immediately. As shown in Table 5–3, the 2005 Budget requests $60.4 billion for FS&T, a 27-percent increase since 2001.

Over the past year, OSTP and OMB have worked with the Federal agencies and the science community to identify top priorities for Federal R&D. These are in areas critical to the Nation, such as information technologies, and in emerging fields, such as nanotechnology, that will provide new breakthroughs across many fields. Some priorities, such as combating terrorism R&D, address newly recognized needs. The discussion below identifies five multi-agency priority

areas, followed by highlights of agency-specific R&D priorities.

Multi-Agency R&D Priorities

The 2005 Budget targets investments in important research and innovation that benefits from specialization and improved coordination across multiple agencies. Three of these multi-agency initiatives—nanotechnology, information technology R&D, and climate change science—have dedicated separate coordination offices to ensure unified strategic planning and implementation. The Administration is strengthening interagency coordination for other priority areas—such as combating bioterrorism. The Administration will continue to analyze other areas of critical need that could benefit in the future from improved focus and coordination among agencies.

Combating Terrorism R&D: With the creation of the Department of Homeland Security (DHS), 2003 marked a fundamental change to the management of the Nation's investment in combating terrorism R&D. Research programs from across the Federal Government were brought together and focused with the specific goal to develop systems to help prevent future terrorist activities, minimize our Nation's vulnerability to terrorist acts, and respond and recover if an attack should occur. In addition to the DHS R&D funding (about $1 billion in 2005), substantial combating terrorism programs exist in the Departments of Health and Human Services (HHS—over $1.7 billion in 2005), Energy, Defense, Commerce, and Justice, as well as the National Science Foundation and Environmental Protection Agency (EPA).

In 2003, there was significant progress in multi-agency efforts, including:

- BioWatch, a collaborative effort of DHS, HHS, and EPA, which employs environmental sampling devices in 31 cities across the Nation to quickly detect hazardous biological releases in time to distribute life-saving pharmaceuticals to affected persons.
- Project BioShield—A Presidential initiative that will speed development and procurement of new medical countermeasures against current and future terrorist threats. The Administration is coordinating research agendas and generating requirements and acquisition plans for the next generation of medical countermeasures to biological, chemical, and radiological/nuclear threat agents.
- Atmospheric plume modeling and validation was enhanced by a joint effort of DHS, DOD, and DOE in a month-long atmospheric aerosol dispersion study in Oklahoma City. The resulting data and models will help emergency management, law enforcement, and other personnel to train for and respond to potential chemical, biological, or radiological events.
- Demonstration of radiological and nuclear detection was deployed in the New York City metropolitan area (tunnels, bridges, ports, and airports). This demonstration used state-of-the-art detectors from DOE with operations support by DHS and the City of New York, and serves as a model for deploying these technologies in other urban settings.
- DHS initiated a development program for protection of commercial aircraft against surface-to-air missles (Man-Portable Air Defense Systems), following an interagency effort that included the Departments of Defense, Transportation, Justice, and State, and the intelligence community. DHS has solicited and selected projects to address this research effort.

The National Science and Technology Council's (NSTC) Committee on Homeland and National Security is working with the Homeland Security Council and the National Security Council to identify priorities for and facilitate planning among Federal departments and agencies involved in homeland security R&D. The coordinated Federal effort is developing: strategies to combat weapons of mass destruction; radiological and nuclear countermeasures; biological agent detection, diagnostics, therapeutics, and forensics; social, behavioral, and economic aspects of combating terrorism; and border entry/exit technologies.

Networking and Information Technology R&D: The budget provides $2.0 billion for the multi-agency Networking and Information Technology Research and Development (NITRD) program. Networking and information technologies enable advances in other fields and provide capabilities that are utilized by virtually every sector of the economy, generating not only new products and tools but also significant improvements in productivity. Agencies with NITRD investments work together to coordinate their programs and leverage each others' resources, which enables more rapid advancement than they could achieve working on their own. Recent accomplishments of the NITRD program are helping to support progress towards some of the Nation's highest priorities, including defense and homeland security. For example, research on the incorporation of microsensors into wireless networks has implications not only for battlefield reconnaissance but also for environmental monitoring, and may also be used to improve the tools that first responders depend upon for communication in the field. The development of grid computing for accessing and managing distributed information technology resources is another example where NITRD research is influencing the information technology industry.

High-end computing continues to be a major focus of interagency coordination efforts. In 2003, agencies with responsibilities for high-end computing formed the High-End Computing Revitalization Task Force and have worked to develop an interagency R&D roadmap for high-end computing core technologies, a Federal high-end computing capacity and accessibility improvement plan, and recommendations relating to Federal procurement of high-end computing systems. The NITRD interagency working group has taken the first

steps toward implementing task force recommendations, and it will continue to leverage the work of the Task Force in improving interagency coordination of high-end computing activities and investments.

Nanotechnology R&D: The budget provides $886 million for the multi-agency National Nanotechnology Initiative (NNI), a three-percent increase over likely enacted funding in 2004. The NNI focuses on R&D that is directed toward understanding and creating materials, devices, and systems that exploit the fundamentally distinct properties of matter as it is manipulated at the atomic and molecular levels. The results of NNI-supported R&D could lead to breakthroughs in disease detection and treatment, manufacturing at the nanoscale, environmental monitoring and protection, energy production and storage, and electronic devices with even greater capabilities than those available today.

Last year the President signed the 21st Century Nanotechnology Research and Development Act, which codified programs and activities supported by the NNI. Consistent with this legislation, in 2005, the Initiative will continue to focus on fundamental and applied research through investigator-led activities, multidisciplinary centers of excellence, education and training of nanotechnology workers, and infrastructure development, including user facilities and networks that are broadly available to researchers from across the scientific research community. In addition to supporting advancement of scientific and technical knowledge and understanding, as well as development of useful applications, the NNI will continue to promote activities aimed at assessing the societal implications of nanotechnology, including ethical, legal, environmental, and workforce-related issues.

Last year the President's Council of Advisors on Science and Technology (PCAST) was tasked with reviewing the multi-agency nanotechnology R&D program, articulating a strategic plan for the program, defining specific grand challenges to guide the program, and identifying metrics for measuring progress toward those grand challenges. In response, PCAST examined the status of nanotechnology R&D generally and the NNI in particular. PCAST will deliver an initial report in 2004 providing recommendations to further strengthen the Initiative.

Climate Change R&D: In July 2003, the Administration released the Strategic Plan for the Climate Change Science Program (CCSP). The Plan provides a 10-year strategy and establishes near-term priorities consistent with the President's Climate Change Research Initiative, which focuses on reducing significant uncertainties in climate science, improving global climate observing systems, and developing resources to support policymaking and resource management.

To achieve the goals outlined in the Strategic Plan, the 2005 Budget includes $57 million of the $103 million in targeted funding committed over two years to accelerate efforts to advance understanding of the role of aerosols in climate science, better quantify carbon sources and sinks, and improve the technology and infrastructure used to observe and model climate variations. These investments will help address critical knowledge gaps in climate change science.

In November 2003, the Administration's Climate Change Technology Program (CCTP) released two reports. The first, CCTP's *Research and Current Activities* report, highlights several Administration initiatives and other areas of ongoing technology R&D that can help reduce greenhouse gas emissions. The CCTP's more comprehensive *Technology Options for the Near and Long Term* is a compendium of technology profiles and ongoing R&D at participating Federal agencies.

The CCTP continues to examine the portfolio of federally funded climate change technology R&D and to develop a strategic plan to coordinate and prioritize these activities, consistent with the President's National Climate Change Technology Initiative (NCCTI). The 2005 Budget continues support for a NCCTI Competitive Solicitation program, a unique approach to selecting and funding innovative research ideas based on their potential to reduce, avoid, or sequester greenhouse gases. The program will enhance and complement the ongoing base of climate change technology R&D.

Hydrogen R&D: The Hydrogen R&D Interagency Task Force, established by OSTP shortly after the President's announcement of the Hydrogen Fuel Initiative, serves as the mechanism for collaboration among the nine Federal agencies that fund hydrogen-related R&D. In 2003, the task force gathered information and provided guidance for agency research directions. In 2004, the task force will complete an interagency 10-year plan that will improve coordination of agency efforts, accelerate progress toward the goals of the initiative, and foster collaboration between the Federal Government and the private sector, state agencies, and other stakeholders. The DOE-led International Partnership for the Hydrogen Economy coordinates hydrogen research between the U.S. and other participating governments.

Agency R&D Highlights

Each Federal agency conducts R&D in the context of that agency's unique mission, structure, and statutory requirements. Below are highlights of key programs in selected agencies in the 2005 Budget. Table 5–3 shows the FS&T budget. As shown in Table 5–2, these programs and those of other agencies are part of the larger Federal R&D portfolio.

National Institutes of Health (NIH): The 2005 Budget provides $28.6 billion for NIH, a 2.6-percent increase over the 2004 likely enacted level. This level is an $8.2 billion (40.5-percent) increase since 2001.

- The Administration has demonstrated its strong commitment to biomedical research by completing a five-year doubling of the NIH budget.
- NIH continues to play a key role in addressing pressing health research issues, such as access

to state-of-the-art instrumentation and biomedical technologies; development of specialized animal and non-animal research models; and emphasis on "smart" network-connected technologies, computer-aided drug design, gene and molecular therapy development, and bioengineering approaches to decreased health care costs.
- In addition, the NIH budget continues support for biodefense research by providing $1.74 billion for NIH to accelerate clinical trials, target the development of new therapeutic and vaccine products for agents of bioterrorism, and establish Regional Centers of Excellence in Biodefense and Emerging Infectious Diseases.

National Aeronautics and Space Administration (NASA): The 2005 Budget provides $9.4 billion for FS&T programs at NASA, a 1.3-percent increase over the 2004 likely enacted level. This is a 35-percent increase since 2001.
- The 2005 Budget supports the President's new vision of sustained solar system exploration involving both humans and robots. NASA's FS&T programs will increasingly focus on this vision, which includes:
  —a new program of lunar exploration;
  —further robotic exploration of the solar system;
  —focused exploration of Mars to accelerate the search for water and life and to prepare for future human exploration;
  —development of technologies to support human and robotic space exploration; and
  —refocused Space Station research on activities that support space-exploration goals.
- The budget also supports increased NASA investments in the President's Climate Change Research Initiative, including investment in a critical satellite to help determine the impact of aerosols such as soot and dust on global climate change.
- The budget supports several new major initiatives in aeronautics R&D, including a five-year $600 million program to improve the efficiency of aircraft propulsion systems.
- PART assessments found NASA's Mars and Solar System exploration programs to be effective and the agency's crosscutting technology R&D to be moderately effective. The PART determined that the Space Station Program, Space Station R&D, and the Space Shuttle Program need to develop better performance goals and demonstrate results.

National Science Foundation (NSF): To further promote research and education across the fields of science and engineering, the 2005 Budget provides $5.7 billion for NSF, a three-percent increase over the 2004 likely enacted level. This level is a 30-percent increase since 2001.
- The budget provides: $761 million for NSF's lead role in NITRD, focusing on long-term computer science research and applications; $305 million for NSF's lead role in the National Nanotechnology Initiative; and $210 million for climate change science.
- The budget provides $1.1 billion for NSF programs that emphasize the mathematical and physical sciences, including physics, chemistry, and astronomy. This represents a 31-percent increase ($261 million) for these programs since 2001.
- To attract the most promising students into the sciences, the 2005 Budget provides funds for 5,500 graduate research fellowships and traineeships, an increase of 1,800 since 2001. Annual stipends in these programs have increased to a projected $30,000, compared with $18,000 in 2001.
- To enhance science infrastructure capabilities, the Budget initiates construction of the National Ecological Observatory Network, the Scientific Ocean Drilling Vessel, and the Rare Symmetry Violating Processes (RSVP) facility.
- PART assessments found all four of the NSF programs assessed to be effective: Facilities, Individuals, Nanoscale Science and Engineering, and Information Technology Research.

Department of Energy (DOE): The 2005 Budget provides $5.4 billion for FS&T at DOE, a $492 million (or 10-percent) increase since 2001.
- DOE will continue the President's Hydrogen Fuel Initiative to accelerate the worldwide availability and affordability of hydrogen-powered fuel cell vehicles. The initiative, which will now include targeted basic research investments, focuses on research to advance hydrogen production, storage, and infrastructure. The Initiative complements the Department's FreedomCAR Partnership with the auto industry, which is aimed at developing viable hydrogen fuel cell vehicle technology.
- The 2005 Budget provides $3.4 billion for the Office of Science, including funding to ensure its continuing leadership in physical science research and its unique research in genomics, climate change, and supercomputing. The fifth and final nanoscience research center will begin construction as a part of the Office's $211 million investment in the National Nanotechnology Initiative.
- The budget dedicates $447 million to the President's Coal Research Initiative on clean coal technologies, including $237 million for FutureGen which will be the world's first zero-emissions electricity-producing power plant. This 10-year, $1 billion project will be cost-shared by the private sector and international participants.
- DOE will continue its support for R&D to improve energy efficiency and reliability in buildings, industry, transportation, and the Federal Government ($544 million), and to reduce the cost of renewable energy technologies, such as wind, solar, geothermal, and biomass ($375 million).
- The budget provides $34 million for the Generation IV Nuclear Energy Systems Initiative and $46 million for the Advanced Fuel Cycle Initiative to develop next-generation nuclear reactor and fuel

cycle technologies that are sustainable, proliferation-resistant, and economical.
- The budget includes $91 million for electricity transmission and distribution reliability R&D activities, a 12-percent increase over 2004. These funds include $45 million for high temperature superconductivity, $6 million for the new Gridworks program to support research that will enable power lines to carry more power and better control the flow of electricity to prevent blackouts, and $5 million for the Gridwise program to improve the communications and control system for the electricity grid.

Department of Defense (DOD): DOD funds a wide range of R&D to ensure that our military forces have the tools to protect the Nation's security. In 2005, DOD's budget includes $5.2 billion that appears in the FS&T budget. This level is a $225 million (4.6-percent) increase since 2001.
- The 2005 Budget funds "Science and Technology" programs to explore and develop technical options for new defense systems and to avoid being surprised by new technologies in the hands of adversaries. Areas of emphasis include computing and communications, sensors, nanotechnology, and hypersonic propulsion systems. DOD's S&T includes the research counted in the FS&T budget, plus advanced technology development.
- The Missile Defense Agency continues to develop technologies for intercepting ballistic missiles in multiple phases of flight. The budget provides funding for missile defense R&D, which includes new efforts for high-speed, boost-phase interceptors, sea-based radars, directed energy technology and advanced battle management systems.
- The Army continues development efforts in support of the Future Combat System as a major part of its transformation to a lighter, more mobile, and more effective fighting force.
- Development continues on the Joint Strike Fighter, the next generation affordable multi-role fighter aircraft, which will use innovative technologies to keep costs low.
- The Navy continues development of the next generation DD(X) destroyer, the Littoral Combat Ship and associated shipboard technologies. These platforms will provide advanced capabilities that will ensure U.S. naval superiority continues into the future.
- R&D to address terrorist and other unconventional threats continue to be a high priority. Systems and technologies under development to address defense against chemical or biological agents include: improved detectors of chemical and biological threats; troop protective gear for use under chemical and biological attack that is both more effective and more comfortable; and vaccines to protect against biological agents.

Department of Agriculture (USDA): The 2005 Budget provides $1.9 billion for FS&T at USDA.
- Funding for the Agricultural Research Service includes increases in high priority areas, such as homeland security (food safety and emerging and exotic diseases), genomics and genetics, human nutrition, and the establishment of a National Plant Disease Recovery System.
- The Cooperative State Research, Education, and Extension Service funding for research and education grants includes $180 million for the National Research Initiative, an increase of $16 million (10 percent) over 2004, and $30 million for the network of university-based diagnostic laboratories. The budgets for both in-house research and research grants do not continue funding for unrequested earmarks.
- The Economic Research Service budget includes increases totaling $7 million to study consumer behavior, particularly dietary attitudes, food consumption, and health awareness.
- The budget includes an emphasis on putting forestry research to work, providing a significant increase to optimize the delivery of research findings by improving Forest Service management of investments in research, development, and technology applications. Funds are also provided for research on rapid management responses to address threats against forest and rangeland health and agriculture by invasive species.

Department of the Interior (DOI): Within the Department of the Interior, the 2005 Budget provides $920 million for the United States Geological Survey (USGS). USGS provides science and information for DOI bureaus and local communities to make informed decisions regarding land and resource management. In 2005 some areas of focus for USGS include:
- Work with at-risk jurisdictions to increase the number that have adopted hazard mitigation measures based on USGS geologic hazard information, and coordination with Federal partners to determine the effectiveness of Federal efforts to reduce the loss of life and property due to geologic hazards.
- Expansion of USGS capabilities to monitor ground deformations with remote sensing technology, InSAR, to assist in predicting volcanic activity.
- Additional water availability and aquifer characterization studies to support DOI's Water 2025, and an additional $2 million to provide critical information about water quality and quantity and fish ecology that is necessary for management of the Klamath River Basin.
- Consistent with 2004 PART findings, USGS is restructuring the Geography program in order to migrate from its traditional role as the primary data collector and producer of topographic maps to one that focuses on data sharing and partnerships. Workforce restructuring will provide savings in 2004 and 2005 to fund partnerships to

develop needed science and applications to promote geographic integration and analyses.

Department of Commerce (DOC): The 2005 Budget provides $832 million for FS&T at the Department of Commerce.

- For the National Institute of Standards and Technology (NIST), the budget provides $482 million for research and physical improvements at NIST's Measurement and Standards Laboratories. The budget also supports NIST facilities, including equipment for the Advanced Measurement Laboratory in Maryland and renovations of facilities in Boulder, Colorado.
- The 2005 Budget proposes to terminate the Advanced Technology Program (ATP). The Administration believes that other NIST research and development programs are much more effective and necessary in supporting the fundamental scientific understanding and technological needs of U.S.-based businesses, American workers, and the domestic economy. Further, large shares of ATP funding have gone to major corporations, and projects often have been similar to those being carried out by firms not receiving such subsidies.
- For the National Oceanic and Atmospheric Administration (NOAA) the 2005 Budget provides $350 million for ongoing research on climate, weather, air quality, and ocean processes. This funding level includes $19 million for NOAA to expand climate observing capabilities in support of the Administration's recently released Climate Change Science Program (CCSP) Strategic Plan.

Department of Veterans Affairs (VA): The 2005 Budget provides $770 million for FS&T at the Department of Veterans Affairs. This level is a seven-percent increase since 2001. This will provide level funding to the VA R&D program after taking into consideration the significant funding the Department receives from other governmental agencies and private entities to support VA-conducted research. The total VA R&D program resources are $1.7 billion.

- VA will soon begin to use increased funding from private companies for the indirect administration costs of conducting research in VA facilities.
- The 2005 Budget provides for clinical, epidemiological, and behavioral studies across a broad spectrum of medical research disciplines. Among the agency's top research priorities are improving the translation of research results into patient care, special populations (those afflicted with spinal cord injury, visual and hearing impairments, and serious mental illness), geriatrics, diseases of the brain (e.g., Alzheimer's and Parkinson's), treatment of chronic progressive multiple sclerosis, and chronic disease management.
- The 2005 Budget reflects a restructuring of total resources in the Research Business Line as first shown in the 2004 Budget.

Environmental Protection Agency (EPA): The budget provides $725 million for FS&T for the Environmental Protection Agency to ensure that its efforts to safeguard human health and the environment are based on the best available scientific and technical information.

- EPA's homeland security research will result in more efficient and effective cleanup of contaminated buildings and faster threat detection and response for water systems. Additionally, EPA will develop practices and procedures that provide elected officials and other decision makers, the public, and first responders with rapid risk assessment protocols for chemical and biological threats.
- As part of its Water Quality Monitoring initiative, EPA will address the integration of different scales and types of monitoring to target effective water quality management actions and document effectiveness of water quality management programs.

Department of Transportation (DOT): The 2005 Budget provides $659 million for FS&T at DOT, a $138 million (26.5-percent) increase since 2001.

- The Federal Highway Administration ($429 million in 2005) supports research, technology, and education to improve the quality and safety of the Nation's transportation infrastructure, such as increasing the quality and longevity of roadways, identifying safety improvements, and promoting congestion mitigation through the use of Intelligent Transportation Systems.
- The budget of the National Highway Traffic Safety Administration provides $103 million for R&D in crash-worthiness, crash avoidance, and data analysis to help reduce highway fatalities and injuries. The budget also includes funding for a crash causation survey.
- In 2005, R&D at the Federal Motor Carrier Safety Administration focuses on issues including driver safety performance, commercial vehicle safety performance, carrier compliance and safety, and other studies toward the goal of achieving a substantial reduction in crashes and fatalities.
- The 2005 Budget provides $117 million for the Federal Aviation Administration to continue critical safety and capacity research. The PART assessment found this program to be effective; it is well-managed and results-oriented, with a strategic plan that sets forth clear long-term goals that are tied to program performance measures.

Department of Education: The 2005 Budget provides $370 million for research activities at the Department of Education, a $20 million increase over the 2004 likely enacted level.

- The Institute of Education Sciences (IES) has the lead responsibility for the Department's strategic goal of transforming education into an evidence-based field. Research, development, and dissemination ($185 million in 2005) supports research

to advance our understanding of how students learn and identify effective approaches and interventions to improve education.

- Research and innovation in special education activities ($78 million in 2005) yield new knowledge and help translate scientifically valid information into applied strategies. The 2005 PART showed that the program does not have specific long-term outcome goals against which its impact can be measured. The program is working to articulate long-term research objectives that have measurable outcomes. Pending legislation would transfer this program from the Office of Special Education Programs to IES to promote better coordination.
- The National Institute for Disability Rehabilitation and Research (NIDRR—$107 million in 2005) conducts research, demonstration and training activities that advance independent living for people with disabilities. Consistent with the President's New Freedom Initiative, NIDRR's activities promote community integration and employment outcomes. The 2005 PART showed that NIDRR cannot demonstrate the results of its investments without long term performance measures. In response to this finding, NIDRR is developing long-term research goals that have measurable outcomes.

Department of Homeland Security (DHS): The 2005 Budget requests just over one billion dollars for DHS R&D. Within DHS, the Directorate of Science and Technology (S&T) serves as a centralized R&D arm that consolidates piecemeal R&D efforts into one agency. Its sole focus is to harness revolutionary technology, which can be used by law enforcement and emergency response personnel in carrying out their mission to protect the Nation. S&T works to solicit proposals and seeks to engage our Nation's well-established R&D community in the fight against terrorism. S&T has separate offices dedicated to addressing the threat posed by each major category of weapons of mass destruction, such as chemical, biological, radiological, nuclear, and high-explosives.

Stimulating Private Investment

Along with direct spending on R&D, the Federal Government has sought to stimulate private R&D investment through tax preferences. Current law provides a 20-percent tax credit for private research and experimentation expenditures above a certain base amount. The credit, which expired in 1999, was retroactively reinstated for five years, through 2004, in the Tax Relief Extension Act of 1999. The budget proposes to make the Research and Experimentation (R&E) tax credit permanent. The proposed extension will cost nearly $30 billion over the period from 2005 to 2009. In addition, a permanent tax provision lets companies deduct, up front, the costs of certain kinds of research and experimentation, rather than capitalize these costs. Also, equipment used for research benefits from relatively rapid cost recovery. Table 5–1 shows a forecast of the costs of the tax credit.

Table 5–1. PERMANENT EXTENSION OF THE RESEARCH AND EXPERIMENTATION TAX CREDIT

(Budget authority, dollar amounts in millions)

	2004	2005	2006	2007	2008	2009	2005–09
Current Law	4,400	2,550	1,090	460	150	60	4,310
Proposed Extension	672	3,610	5,187	6,291	7,129	7,775	29,992
Total	**5,072**	**6,160**	**6,277**	**6,751**	**7,279**	**7,835**	**34,302**

IV. FEDERAL R&D DATA

Federal R&D Funding

R&D is the collection of efforts directed towards gaining greater knowledge or understanding and applying knowledge toward the production of useful materials, devices, and methods. R&D investments can be characterized as basic research, applied research, development, R&D equipment, or R&D facilities, and OMB has used those or similar categories in its collection of R&D data since 1949.

Basic research is defined as systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind.

Applied research is systematic study to gain knowledge or understanding necessary to determine the means by which a recognized and specific need may be met.

Development is systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

Research and development equipment includes acquisition or design and production of movable equipment, such as spectrometers, microscopes, detectors, and other instruments.

Research and development facilities include the acquisition, design, and construction of, or major repairs or alterations to, all physical facilities for use in R&D activities. Facilities include land, buildings, and fixed capital equipment, regardless of whether the facilities are to be used by the Government or by a private organization, and regardless of where title to the property may rest. This category includes such fixed facilities as reactors, wind tunnels, and particle accelerators.

There are over twenty Federal agencies that fund R&D in the U.S. The nature of the R&D that these agencies fund depends on the mission of each agency and on the role of R&D in accomplishing it. Table 5–2 shows agency-by-agency spending on basic and applied research, development, and R&D equipment and facilities.

Table 5–2. FEDERAL RESEARCH AND DEVELOPMENT SPENDING

(Budget authority, dollar amounts in millions)

	2003 Actual	2004 Estimate	2005 Proposed	Dollar Change: 2004 to 2005	Percent Change: 2004 to 2005
By Agency					
Defense	58,838	65,484	69,856	4,372	7%
Health and Human Services	27,411	28,275	29,381	1,106	4%
NASA	10,681	10,893	11,308	415	4%
Energy	8,312	8,835	8,893	58	1%
National Science Foundation	3,972	4,115	4,252	137	3%
Agriculture	2,334	2,308	2,105	–203	–9%
Homeland Security	737	1,053	1,216	163	15%
Commerce	1,200	1,126	1,075	–51	–5%
Veterans Affairs	819	824	772	–52	–6%
Transportation	701	701	749	48	7%
Interior	643	675	648	–27	–4%
Environmental Protection Agency	568	575	577	2	0%
Other	1,223	1,092	1,034	–58	–5%
Total	**117,439**	**125,956**	**131,866**	**5,910**	**5%**
Basic Research					
Defense	1,369	1,404	1,341	–63	–4%
Health and Human Services	14,120	14,732	15,198	466	3%
NASA	2,213	2,584	2,324	–260	–10%
Energy	2,556	2,750	2,664	–86	–3%
National Science Foundation	3,422	3,551	3,642	91	3%
Agriculture	867	914	783	–131	–14%
Homeland Security	47	47	153	106	226%
Commerce	54	57	83	26	46%
Veterans Affairs	327	332	308	–24	–7%
Transportation	23	20	40	20	100%
Interior	41	40	38	–2	–5%
Environmental Protection Agency	97	79	91	12	15%
Other	170	165	182	17	10%
Subtotal	**25,306**	**26,675**	**26,847**	**172**	**0.6%**
Applied Research					
Defense	4,252	4,425	3,828	–597	–13%
Health and Human Services	11,982	13,174	13,522	348	3%
NASA	3,192	3,052	3,122	70	2%
Energy	2,656	3,020	3,395	375	12%
National Science Foundation	218	211	220	9	4%
Agriculture	974	1,049	888	–161	–15%
Homeland Security	92	124	278	154	124%
Commerce	910	891	838	–53	–6%
Veterans Affairs	451	450	425	–25	–6%
Transportation	405	398	455	57	14%
Interior	547	584	560	–24	–4%
Environmental Protection Agency	366	361	346	–15	–4%
Other	579	609	617	8	1%
Subtotal	**26,624**	**28,348**	**28,494**	**146**	**0.5%**

Table 5–2. FEDERAL RESEARCH AND DEVELOPMENT SPENDING—Continued

(Budget authority, dollar amounts in millions)

	2003 Actual	2004 Estimate	2005 Proposed	Dollar Change: 2004 to 2005	Percent Change: 2004 to 2005
Development					
Defense	53,172	59,603	64,622	5,019	8%
Health and Human Services	160	140	386	246	176%
NASA	2,963	2,994	3,247	253	8%
Energy	1,946	1,956	1,840	–116	–6%
National Science Foundation	.....	.....	.....	.....	N/A
Agriculture	145	152	142	–10	–7%
Homeland Security	549	794	750	–44	–6%
Commerce	135	128	53	–75	–59%
Veterans Affairs	41	42	39	–3	–7%
Transportation	254	270	235	–35	–13%
Interior	53	48	47	–1	–2%
Environmental Protection Agency	105	135	140	5	4%
Other	460	311	228	–83	–27%
Subtotal	**59,983**	**66,573**	**71,729**	**5,156**	**8%**
Facilities and Equipment					
Defense	45	52	65	13	25%
Health and Human Services	1,149	229	275	46	20%
NASA	2,313	2,263	2,615	352	16%
Energy	1,154	1,109	994	–115	–10%
National Science Foundation	332	353	390	37	10%
Agriculture	348	193	292	99	51%
Homeland Security	49	88	35	–53	–60%
Commerce	101	50	101	51	102%
Veterans Affairs	.....	.....	.....	.....	N/A
Transportation	19	13	19	6	46%
Interior	2	3	3	.....	.....
Environmental Protection Agency	.....	.....	.....	.....	N/A
Other	14	7	7	.....	.....
Subtotal	**5,526**	**4,360**	**4,796**	**436**	**10%**

Table 5–3. FEDERAL SCIENCE AND TECHNOLOGY BUDGET

(Budget authority, dollar amounts in millions)

	2001 Actual	2003 Actual	2004 Estimate	2005 Proposed	Dollar Change: 2004 to 2005	Percent Change: 2004 to 2005
By Agency						
National Institutes of Health	**20,361**	**27,066**	**27,878**	**28,607**	**729**	**3%**
NASA [1]	**6,945**	**7,276**	**9,249**	**9,373**	**124**	**1%**
Space Science	2,609	3,531	3,971	4,068	97	2%
Earth Science	1,762	1,717	1,613	1,485	–128	–8%
Biological & Physical Research	362	883	985	1,049	64	6%
Aeronautics Technology	975	1,145	1,034	919	–115	–11%
Exploration Systems and Crosscutting Technology [2]	1,237	1,741	1,646	1,852	206	13%
National Science Foundation	**4,431**	**5,323**	**5,578**	**5,745**	**167**	**3%**
Energy [3]	**4,886**	**5,208**	**5,494**	**5,378**	**–116**	**–2%**
Science Programs	3,218	3,307	3,484	3,432	–52	–1%
Energy Supply: Renewables	312	322	357	375	18	5%
Energy Supply: Electricity Transmission & Distribution [4]	56	88	81	91	10	12%
Energy Supply: Nuclear Energy	238	258	292	300	8	3%
Energy Conservation [5]	619	612	607	544	–63	–10%
Fossil Energy [6]	443	621	673	636	–37	–5%
Defense	**4,944**	**5,621**	**5,829**	**5,169**	**–660**	**–11%**
Basic Research	1,271	1,369	1,404	1,341	–63	–4%
Applied Research	3,673	4,252	4,425	3,828	–597	–13%
Agriculture	**1,885**	**1,988**	**2,048**	**1,865**	**–183**	**–9%**
CSREES Research & Education [7]	514	626	629	516	–113	–18%
Economic Research Service	69	69	71	80	9	13%
Agricultural Research Service [8]	936	1,043	1,082	988	–94	–9%
Mandatory IFAFS [9]	120	.....	.....	.....	.....	N/A
Forest Service [10]	246	250	266	281	15	6%
Interior (USGS)	**884**	**919**	**938**	**920**	**–18**	**–2%**
Commerce	**817**	**974**	**965**	**832**	**–133**	**–14%**
NOAA (Oceanic & Atmospheric Research)	325	372	393	350	–43	–11%
NIST Intramural Research and Facilities	347	423	401	482	81	20%
NIST Advanced Technology Program	145	179	171	.....	–171	–100%
Veterans Affairs [11]	**719**	**818**	**820**	**770**	**–50**	**–6%**
Environmental Protection Agency [12]	**746**	**801**	**826**	**725**	**–101**	**–12%**
Transportation	**521**	**655**	**683**	**659**	**–24**	**–4%**
Highway research [13]	387	508	564	542	–22	–4%
Aviation research [14]	134	147	119	117	–2	–2%
Education	**363**	**325**	**350**	**370**	**20**	**6%**
Special Education Research and Innovation	77	77	78	78	.....	.....
NIDRR [15]	100	109	107	107	.....	.....
Research, Development, and Dissemination [16]	186	139	165	185	20	12%
Total	**47,502**	**56,974**	**60,658**	**60,413**	**–245**	**–0.4%**

[1] All years normalized to reflect 2003 transfers of funding for Space Station research facilities, space communications activities, and associated institutional support from human space flight.
[2] Includes Integrated Technology Transfer Partnerships, Mission and Science Measurement Technology, and the Space Launch Initiative.
[3] 2001 and 2003 data reflect transfers to Science Programs from other Department of Energy R&D programs to support the Small Business Innovation Research program and the Small Business Technology Transfer program.
[4] This office was created in 2004. Data for 2001 and 2003 reflect funding for these activities from within the Renewable budget, which has been adjusted accordingly.
[5] Excludes weatherization and state grant programs.
[6] Enacted and requested levels exclude balances transferred from the Clean Coal Technology program for activities in 2003 ($40 million), and 2004 ($14 million). No transfers in 2005.
[7] Includes Receipts for Native American Endowment: $7 million in 2003; $9 million in 2004; $12 million in 2005.
[8] Excludes buildings and facilities.
[9] Initiative for Future Agriculture and Food Systems.
[10] Forest and Rangeland Research.
[11] The VA research program budget has been restructured to include the research appropriation and VA medical care support transfer to research. This table shows resources under the revised budget structure.
[12] Science and Technology, plus superfund transfer. The 2003 superfund transfer includes homeland resources for building decontamination research.
[13] Includes research and development funding for the Federal Highway Administration, the Federal Motor Carrier Safety Administration, and the National Highway Traffic Safety Administration.
[14] Includes Federal Aviation Administration Research, Engineering, and Development.
[15] National Institute on Disability and Rehabilitation Research.
[16] Does not include funding for Regional Educational Labs.

Table 5–4. AGENCY DETAIL OF SELECTED INTERAGENCY R&D EFFORTS

(Budget authority, dollar amounts in millions)

	2003 Actual	2004 Estimate	2005 Proposed	Dollar Change: 2004 to 2005	Percent Change: 2004 to 2005
Networking and Information Technology R&D					
National Science Foundation	743	754	761	7	1%
Health and Human Services [1]	376	368	371	3	1%
Energy	308	344	354	10	3%
National Aeronautics and Space Administration	213	275	259	–16	–6%
Defense	296	252	226	–26	–10%
Commerce	26	26	33	7	27%
Environmental Protection Agency	2	4	4	.....	.....
Total	**1,964**	**2,023**	**2,008**	**–15**	**–1%**
National Nanotechnology Initiative					
National Science Foundation	221	254	305	51	20%
Energy	134	203	211	8	4%
Defense	220	218	180	–38	–17%
National Institutes of Health	78	80	89	9	11%
Commerce (NIST)	64	63	53	–10	–16%
National Aeronautics and Space Administration	36	37	35	–2	–5%
Agriculture	.....	1	5	4	400%
Environmental Protection Agency	5	5	5	.....	.....
Justice	1	2	2	.....	.....
Homeland Security (TSA)	1	1	1	.....	.....
Total	**760**	**864**	**886**	**22**	**3%**
Climate Change Science Program					
National Aeronautics and Space Administration	1,146	1,334	1,271	–63	–5%
National Science Foundation	202	213	210	–3	–1%
Commerce (NOAA)	117	130	142	12	9%
Energy	120	133	134	1	1%
Agriculture	68	67	74	7	10%
National Institutes of Health	59	61	61	.....	.....
Interior (USGS)	26	28	29	1	4%
Environmental Protection Agency	19	22	21	–1	–5%
Smithsonian	6	6	6	.....	.....
U.S. Agency for International Development	6	6	6	.....	.....
Transportation	.....	.....	3	3	N/A
State	.....	1	1	.....	.....
Total	**1,769**	**2,001**	**1,958**	**–43**	**–2%**
Subtotal, CCRI [2] (included in CCSP total)	**41**	**168**	**238**	**70**	**42%**

[1] Includes funds from offsetting collections for the Agency for Healthcare Research and Quality.
[2] Climate Change Research Initiative.