



Investing in the Building Blocks of American Innovation *Federal R&D, Technology, and STEM Education in the 2011 Budget*

“At such a difficult moment, there are those who say we cannot afford to invest in science, that support for research is somehow a luxury at moments defined by necessities. I fundamentally disagree. Science is more essential for our prosperity, our security, our health, our environment, and our quality of life than it has ever been before.”

- President Barack Obama
April 27, 2009

Scientific discovery and technological innovation are indispensable for promoting economic growth and jobs, protecting the environment, advancing toward a clean energy future, improving the health of the population and safeguarding our national security in the technologically-driven 21st century. **The President’s 2011 Budget proposes \$147.7 billion for Federal research and development (R&D).** This investment reinforces the Obama Administration’s commitment to science, technology, and innovation that will help the country make progress toward these national goals. The Budget also makes strategic Federal investments in 21st century technology, and in science, technology, engineering, and mathematics (STEM) education.

- **The Budget encourages American innovation.** The 2011 Budget proposes a substantial increase in nondefense R&D to \$66.0 billion, an increase of \$3.7 billion or 5.9 percent over the 2010 enacted level, to move the United States toward the President’s goal of investing 3 percent of Gross Domestic Product on public and private R&D.
- **The Budget provides incentives for U.S. industry to keep investing in American innovation.** The 2011 Budget proposes to make the Research and Experimentation (R&E) Tax Credit permanent.
- **The Budget invests in scientific discovery to meet our challenges in the economy, health, energy, climate, and security.** The Federal research portfolio (comprising basic and applied research) totals \$61.6 billion, up \$3.3 billion or 5.6 percent compared to the 2010 enacted level.
- **The Budget sustains the President’s commitment to double the budgets of three key science agencies.** The Budget proposes \$13.3 billion for the National Science Foundation (NSF), the Department of Energy (DOE) Office of Science, and the National Institute of Standards and Technology (NIST) laboratories, an increase of \$824 million or 6.6 percent above 2010.
- **The Budget reflects the President’s firm commitment to American leadership in biomedical research.** The 2011 Budget proposes \$32.1 billion in appropriations for the National Institutes of Health (NIH), an increase of \$1.0 billion.
- **The Budget proposes an expanded commitment to global change research.** The 2011 Budget proposes \$2.6 billion for the U.S. Global Change Research Program (USGCRP), an increase of \$439 million or 21 percent over the 2010 enacted level.
- **The Budget invests in the skills and education of the American people.** The Budget proposes \$3.7 billion for the Federal investment in science, technology, engineering, and mathematics (STEM) education to prepare our students for the future, including a historic \$1 billion investment in K-12 STEM education.
- **The Budget invests in technology to spur economic growth.** The Budget reflects the President’s commitment to target strategic investments in technology to spur innovation in the public and private sectors; and does so in a manner that changes the way Washington works. It proposes over \$1 billion in

additional investments to accelerate job creation through R&D commercialization, deliver broadband for all Americans, instill a culture of open government, and promote open data standards in national priorities.

These investments are a cornerstone of *A Strategy for American Innovation: Driving Towards Sustainable Growth and Quality Jobs*, announced by President Obama in September 2009 as a comprehensive Administration strategy to lay the foundation for the innovation economy of the future. They are also key to moving toward President Obama's goal that as a nation, the United States should invest at least three percent of our Gross Domestic Product (GDP) in public and private R&D. Investments in the 2011 Budget build on recent investments in the American Recovery and Reinvestment Act (P.L. 111-5), the 2009 Omnibus Appropriations Act, and recently enacted 2010 appropriations.

Priorities for Federal Research and Development in the 2011 Budget

The President's Fiscal Year (FY) 2011 Budget proposes \$147.7 billion for the Federal investment in research and development (R&D; see Table 1). Consistent with an overall spending freeze covering most discretionary programs, Federal R&D increases \$343 million or 0.2 percent over the 2010 enacted level. The 2011 Budget sets priorities and makes tough choices within tight fiscal constraints to make room for high-priority investments. In that spirit, the 2011 Budget proposes a decline in defense-related R&D because of reductions in weapons development programs but a **substantial increase in nondefense R&D to \$66.0 billion, an increase of \$3.7 billion or 5.9 percent over the 2010 enacted level**. Even after adjusting for projected inflation of 1.1 percent over the coming year, there would be substantial increases for key nondefense R&D programs.

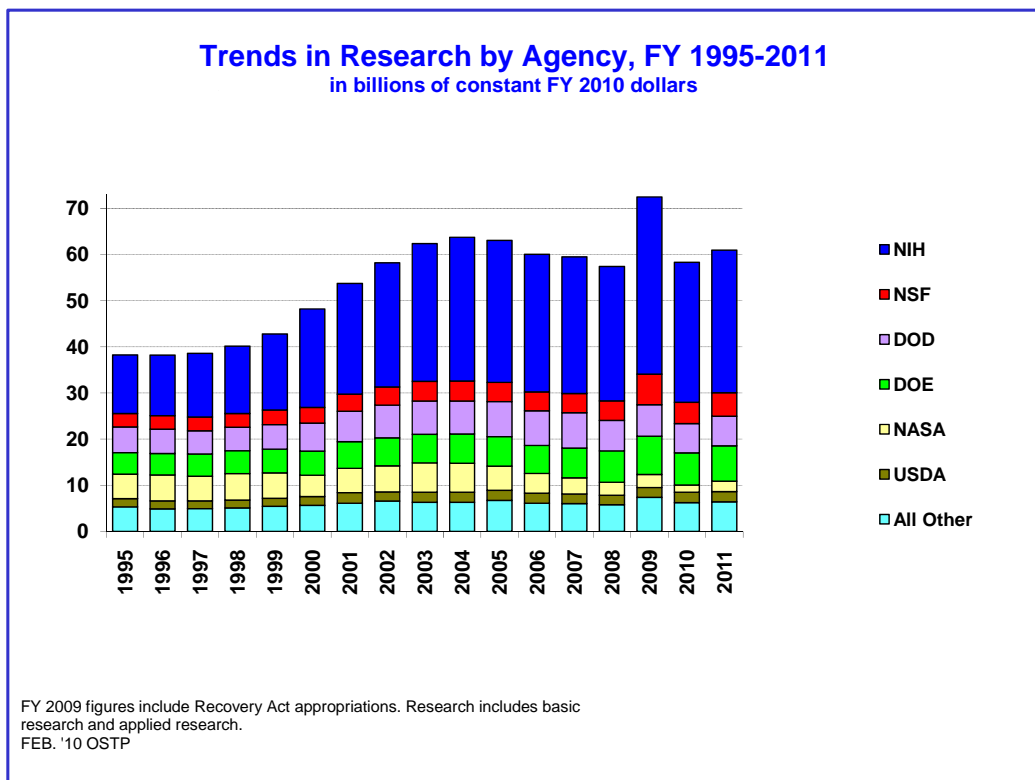


Figure 1.

The 2011 Budget recognizes the role of government in fostering groundbreaking scientific and technological breakthroughs with a special emphasis on **basic and applied research** to fundamentally improve our understanding of nature, revolutionize key fields of science, and to boost long-term economic growth and quality of life. **The Federal research portfolio (comprising basic and applied research) totals \$61.6 billion in the 2011 Budget (see Table 3), up \$3.3 billion or 5.6 percent compared to the 2010 enacted level.** After four years of decline in real terms (see Figure 1) from 2004 to 2008, the 2009 and 2010 enacted levels (including Recovery Act funding) and the

**The President's Plan for Science and Innovation:
Doubling Funding for Key Science Agencies in the 2011 Budget**

The 2011 Budget sustains the President's commitment to double the budgets of three key science agencies. Building on investments in the Recovery Act, the 2009 Omnibus Appropriations Act, and 2010 appropriations, the 2011 Budget provides substantial increases in funding for the National Science Foundation (NSF), the Department of Energy's Office of Science (DOE SC), and the National Institute of Standards and Technology (NIST) laboratories toward completing the doubling effort in 2017. These investments will expand the frontiers of human knowledge and create the foundations for the jobs and industries of the future.

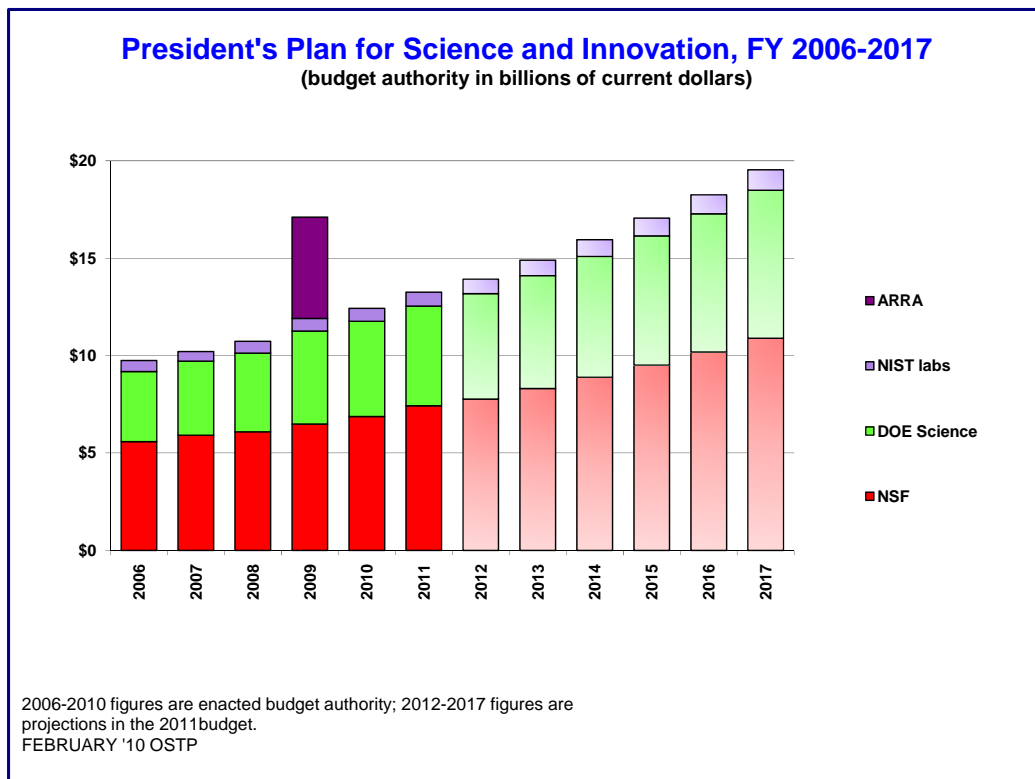


Figure 2.

The Obama Administration is committed to scientific discovery and continued American leadership in innovation. The President's Plan for Science and Innovation and the America COMPETES Act have identified NSF, DOE SC, and NIST as key to our nation's prosperity and to preserving America's place as the world leader in innovation. Although the Bush Administration voiced support for efforts to double these agencies' budgets, these efforts fell short in 2007 and 2008. In 2009, the American Recovery and Reinvestment Act and the 2009 Omnibus Appropriations Act signed by President Obama finally put these agencies on a doubling trajectory; the recently enacted 2010 appropriations keep these agencies on that trajectory. The President's Plan for Science and Innovation is part of *A Strategy for American Innovation* announced in September 2009 and is key to the President's long-term goal for the United States to invest 3 percent of its Gross Domestic Product (GDP) in research and development (R&D).

The 2011 Budget sustains the Administration's commitment with \$13.3 billion total for NSF, DOE SC, and the NIST labs, an increase of \$824 million or 6.6 percent above the 2010 enacted total. These substantial increases keep the agencies on track for the fifth year of a doubling path. In addition, the 2011 Budget establishes a path to completing the doubling effort with \$19.5 billion for the three agencies in 2017, double the \$9.7 billion they received in 2006, with a special emphasis on encouraging high-risk, high-payoff research and supporting researchers at the beginning of their careers.

2011 Budget represent a sustained real-dollar turnaround in Federal research investments across the spectrum of the sciences and engineering and across both nondefense and defense programs.

The 2011 Budget provides \$81.5 billion for development, a decline compared to the 2010 level because of cuts in lower-priority weapons development programs. R&D facilities and capital equipment funding totals \$4.6 billion.

Highlights of Key R&D Funding Agencies in the 2011 Budget

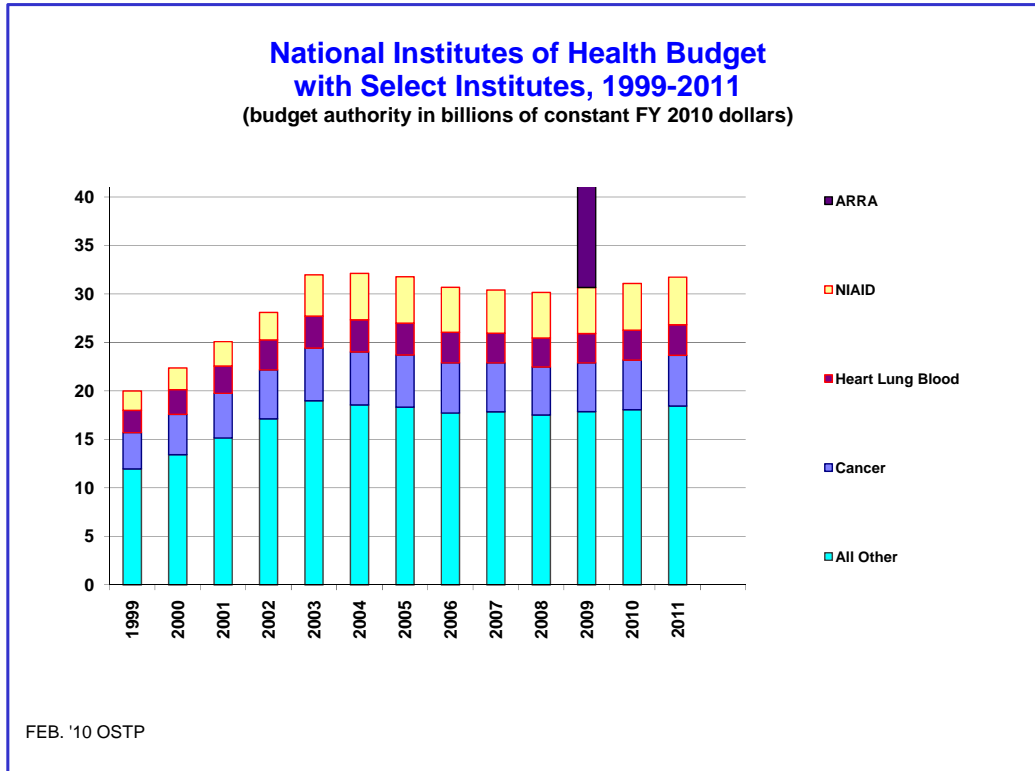


Figure 3.

- The **National Institutes of Health (NIH)** supports the discovery of knowledge and therapies that will lead to better health outcomes for all Americans. NIH accomplishes this goal through a robust program of intramural and extramural research, education, and training conducted or sponsored by 27 Institutes and Centers. The 2011 Budget provides \$32.1 billion in appropriations for NIH (see Figure 3), an increase of \$1.0 billion or 3.2 percent above the 2010 enacted level. The 2011 Budget continues to support biomedical research across a broad range of scientific and health opportunities. Investments will focus on five strategic priorities with great promise: applying genomics and other high-throughput technologies; translating basic science discoveries into new and better treatments and diagnostics; using science to enable health care reform; global health; and reinvigorating and empowering the biomedical research community. NIH will also continue to award and oversee the \$10.4 billion provided in the Recovery Act. In 2011, the NIH Common Fund (CF) will invest \$562 million, an increase of \$18 million over 2010, to support cross-cutting, trans-NIH programs that require participation by at least two NIH Institutes or Centers (ICs) or that would otherwise benefit from strategic planning and coordination. Elsewhere within the **Department of Health and Human Services (HHS)**, the 2011 Budget accelerates the development of new medicines, vaccines, and diagnostics for biodefense by investing \$476 million in Advanced Research and Development, \$171 million more than the 2010 enacted level. The Agency for Healthcare Research and Quality (AHRQ) receives \$286 million in the 2011 Budget for patient-centered health research.

- The **National Science Foundation (NSF)** is the primary source of support for academic research for most non-biomedical disciplines, integrating fundamental research and education across the entire spectrum of the sciences and engineering. The increase in NSF funding to \$7.4 billion in 2011, or 8.0 percent more than the 2010 enacted

level, will support many more researchers, students, post-doctoral fellows, and technicians. The 2011 Budget expands NSF's efforts in climate and energy research and education, networking and information technology research, and environmental and economic sustainability. The 2011 Budget also sustains the President's commitment to triple the number of new NSF Graduate Research Fellowships to 3,000 by 2013.

- The 2011 Budget sustains the **Department of Defense's (DOD's)** critical role in supporting technological advances with \$3.1 billion for the Defense Advanced Research Projects Agency (DARPA) for its support of longer-term breakthrough research. The Budget maintains scientific and technological preeminence for our armed forces with a total R&D investment of \$77.5 billion. This figure represents a decrease of \$3.5 billion from the 2010 enacted level due in large part to planned transitions of later-stage development programs to production, termination of poorly performing programs, and the end of one-time congressionally-designated projects. The 2011 Budget sustains DOD's basic research ("6.1") with a record commitment of \$2.0 billion, and provides increases for research in high priority areas such as night vision, cybersecurity, enhanced GPS, deployable force protection, nano-manufacturing, and advanced distributed learning. Funding for the National Defense Education Program (NDEP) increases from \$79 million in 2010 to \$110 million in 2011.

- The **National Aeronautics and Space Administration (NASA)** 2011 Budget provides \$1.8 billion in 2011 (an increase of \$391 million from the 2010 enacted level) and \$7.9 billion over five years for NASA, in part to continue a robust Earth science research program in support of the President's commitment to deploy a global climate change research and monitoring system. The Administration remains committed to a robust program of space exploration involving humans and robots, the completion of the Space Shuttle manifest, continued use of the International Space Station, and a renewed commitment to aeronautics research. NASA's R&D portfolio totals \$11.0 billion in the 2011 Budget, an increase of \$1.7 billion or 18.3 percent over the 2010 enacted level (see Table 1).

- The **Department of Energy (DOE)** R&D portfolio totals \$11.2 billion in the 2011 Budget, an increase of \$526 million or 4.9 percent over the 2010 enacted level (see Table 1). DOE's Office of Science (DOE SC) delivers discoveries and scientific tools that transform our understanding of energy and matter through a wide range of research in economically significant areas such as nanotechnology, high-end computing, energy, and climate change. The 2011 DOE SC Budget of \$5.1 billion, 4.6 percent more than the 2010 enacted level, increases funding for both research and cutting-edge facilities as part of the President's commitment to double funding for key science agencies (see text box: The President's Plan for Science and Innovation). These investments improve our understanding of climate science, continue the U.S. commitment to international science and energy experiments, and expand Federal support at the frontiers of energy research. The Energy Frontier Research Centers (EFRC) program will be expanded in the 2011 Budget to capture emerging opportunities in new materials and basic research for energy needs. The 2011 Budget invests in DOE's clean energy R&D programs to reduce dependence on foreign oil and to accelerate the transition to a low-carbon economy, including \$2.4 billion for Energy Efficiency and Renewable Energy (EERE; an increase of 5 percent). DOE will continue to fund the three Energy Innovation Hubs introduced in 2010 and proposes a new Hub on batteries and energy storage. The 2011 Budget provides \$300 million for the Advanced Research Projects Agency – Energy (ARPA-E) within DOE to support transformational discoveries and accelerate solutions in the development of clean energy. In DOE's defense-related R&D portfolio, the Budget includes \$352 million for DOE's nonproliferation and verification R&D portfolio, an increase of 11 percent over the 2010 level.

- **Department of Homeland Security (DHS)** R&D totals \$1.0 billion in the 2011 Budget, down \$104 million or 9.0 percent from the 2010 enacted level. The 2011 Budget transfers the Domestic Nuclear Detection Office's (DNDO) Transformational and Applied Research (TAR) portfolio to DHS' Science and Technology (S&T) Directorate to consolidate R&D activities department wide.

- R&D in the **U.S. Department of Agriculture (USDA)** falls to \$2.4 billion in the 2011 Budget, but after adjusting for 2010 congressionally designated projects that would not be renewed, USDA R&D funding increases in 2011. The newly launched National Institute of Food and Agriculture's (NIFA) key competitive research program, the Agriculture Food and Research Initiative (AFRI), is funded at \$429 million in the 2011 Budget, 63 percent more than the \$262 million enacted 2010 level.

- The Department of Commerce's **National Institute of Standards and Technology (NIST)** invests in technological innovation through research, advanced measurement, and standards development. The 2011 Budget of \$709 million for NIST's intramural laboratories will improve NIST's research capabilities by providing high-performance laboratory research and facilities for a diverse portfolio of research in areas such as advanced manufacturing, health information technology, cybersecurity, interoperable smart grid, and advanced solar energy technology. NIST's 2011 Budget is part of the President's commitment to double funding for key science agencies (see text box: The President's Plan for Science and Innovation). Commerce's **National Oceanic and Atmospheric Administration (NOAA)** is a leading sponsor of oceanic and atmospheric research and is one of the key sponsors of climate science capabilities in the Federal government. The 2011 Budget provides a substantial increase for NOAA R&D programs within a total NOAA Budget of \$5.55 billion. NOAA's Oceanic and Atmospheric Research (OAR) account receives \$465 million in the 2011 Budget, a 3.5 percent increase over the 2010 funding level to support expanding efforts in competitively awarded climate research grants and a robust Climate Data and Information effort. The 2011 Budget also provides \$1.1 billion for the Joint Polar Satellite System, NOAA's contribution to the newly restructured multi-agency National Polar-Orbiting and Operational Environmental Satellite System (NPOESS) to provide continuous weather and climate data. The new direction for NPOESS will ensure continuity of polar-orbiting satellite measurements.

- The **Department of Veterans Affairs (VA)** 2011 Budget provides \$1.2 billion for R&D programs, an increase of \$18 million or 1.5 percent over the 2010 enacted level. VA research focuses on biomedical topics of special relevance to the wounded warrior and supports a robust program of clinical and translational research.

- The 2011 Budget provides \$772 million for R&D in the **Department of the Interior**. The 2011 Budget provides \$679 million for R&D in Interior's lead science agency, the **U.S. Geological Survey (USGS)**, a 2.9 percent increase. The total USGS Budget of \$1.1 billion is a \$27 million increase over the 2010 enacted level. USGS efforts in biological and geological carbon sequestration assessments, regional climate change impacts, and water-use assessments all increase in the 2011 Budget. The Budget also provides increases to fund USGS support for the Landsat Data Continuity Mission Ground System.

- **Environmental Protection Agency (EPA)** R&D funding increases in the 2011 Budget. The Budget provides \$121 million for clean water research, an increase of \$6 million over the 2010 level, and \$17 million for endocrine disruptor research, an increase of \$6 million over the 2010 level.

- The 2011 Budget provides \$1.0 billion for **Department of Transportation (DOT)** R&D, an increase of \$6 million or 0.6 percent over the 2010 enacted level. The Budget sustains aviation R&D investments in the Federal Aviation Administration (FAA) and highway R&D investments in the Federal Highway Administration (FHWA).

-The **Department of Education** R&D portfolio of \$383 million in the 2011 Budget is a \$35 million or 10.1 percent increase over the 2010 enacted level. The Budget calls for a 30 percent increase in funding for the National Center for Education Research, part of the Department's Institute of Education Sciences (IES). These funds will support much-needed R&D investments to generate solutions to critical problems in education.

- The 2011 Budget provides \$236 million for R&D programs in the **Smithsonian Institution**, up \$28 million or 13.5 percent. The additional resources will allow the Smithsonian to expand its research efforts in science and the humanities in line with its new strategic plan. Specific investments include expanding climate change-related research, DNA barcoding, Encyclopedia of Life, and strengthening the maintenance, digitization, and research uses of scientific collections, as well as renovation of critical research infrastructure.

Multi-agency initiatives

A number of R&D investments are being addressed through multi-agency activities coordinated through the National Science and Technology Council (NSTC) and other interagency forums. Table 2 shows details of three such efforts: global change research, networking and information technology R&D, and nanotechnology R&D.

U.S. Global Change Research Program: The 2011 Budget includes an expanded commitment to global change research as part of a government-wide effort to mitigate U.S. greenhouse gas emissions and move toward a clean

energy economy. Investments in climate science over the past several decades have contributed to an improved understanding of global climate. To continue to assist the government and society to understand, predict, project, mitigate, and adapt to climate change, **the 2011 Budget provides \$2.6 billion for the multi-agency U.S. Global Change Research Program (USGCRP), an increase of 21 percent or \$439 million over the 2010 enacted level** (see Table 2). After several years of declining funding, the Obama Administration has revitalized the USGCRP. The 2009 Omnibus Appropriations Act signed by President Obama reversed the downward funding trends in the USGCRP, and the Recovery Act provided an additional \$604 million one-time boost for key climate programs; the recently enacted 2010 appropriations keep USGCRP on an upward trajectory, and the 2011 Budget sustains the commitment.

Besides enhancing research and modeling of the physical climate system, the Budget will allow for a comprehensive, coordinated focus on four areas of particular need: Earth observations, adaptation research, integrated assessment, and climate services. Reports and general information about the USGCRP are available at www.globalchange.gov/.

Networking and Information Technology R&D: The 2011 Budget proposes \$4.3 billion for the multi-agency Networking and Information Technology Research and Development (NITRD) Program. Although this represents a decrease of \$9 million from the 2010 enacted level, most participating agencies will see substantial increases for most participating agencies offset by cuts in congressionally directed DOD projects. NITRD programs also received \$862 million in Recovery Act funding. NITRD plans and coordinates agency research efforts in cyber security, high-end computing systems, advanced networking, software development, high-confidence systems, information management, and other information technologies.

Networking and computing capabilities are more critical than ever for national and homeland security, reforming the health care system, understanding and responding to environmental stresses, increasing energy efficiencies and developing renewable energy sources, strengthening the security of our critical infrastructures including cyberspace, and revitalizing our educational system for the jobs of tomorrow. The 2011 Budget retains an important focus on investment in high-end computing research for both national security and large-scale scientific applications, particularly in advanced scalable simulations. The 2011 Budget also continues to emphasize foundations for assured computing and secure hardware, software, and network design and engineering to address the goal of making Internet communications more secure and reliable. Reports and general information about NITRD are available at www.nitrd.gov/.

National Nanotechnology Initiative: The 2011 Budget proposes \$1.8 billion for the multi-agency National Nanotechnology Initiative (NNI). This is a \$5 million decrease from the 2010 enacted level, reflecting large increases in DOE and HHS contributions offset by the elimination of 2010 congressionally directed DOD projects in 2011. NNI programs also received \$494 million in Recovery Act funding. The NNI focuses on R&D that creates materials, devices, and systems that exploit the fundamentally distinct properties of matter as it is manipulated at the nanoscale (roughly 1 to 100 nanometers). The results of NNI-supported R&D enable breakthroughs in biomedical diagnosis and treatment; manufacturing at or near the nanoscale; environmental monitoring and protection; energy conversion, usage and storage; and novel and more powerful electronic devices, among many others.

Guided by the NNI Strategic Plan, participating agencies will continue to support nanoscience and nanotechnology development through investigator-led research; multidisciplinary centers of excellence; education and training; and infrastructure and standards development, including user facilities and networks that are broadly available to support research and innovation. In addition, consistent with the NNI Strategy for Nanotechnology-Related Environmental Health and Safety (EHS) Research, agencies continue to maintain a focus on the responsible development of nanotechnology with attention to the human health and environmental impacts, as well as ethical, legal, and other societal issues. Participating agencies provide \$119 million for nano EHS research in the 2011 Budget, 22 percent more than the enacted 2010 level. The 2011 Budget also supports a focus on nanomanufacturing with \$87 million across several agencies. Reports and general information about the NNI are available at www.nano.gov/.

Science, Technology, Engineering, and Mathematics (STEM) Education in the 2011 Budget

The 2011 Budget makes a strong commitment to education in science, technology, engineering, and mathematics (STEM) fields, with an unprecedented set of investments in K-12 STEM education. President Obama believes that it is imperative for our economic competitiveness to increase participation and performance of all students in science, technology, engineering and mathematics, and that America improve its international performance from the middle of the pack to the top of the pack over the next decade.

The 2011 Budget invests \$3.7 billion in STEM education programs across the federal government (see Table 4), including a historic \$1 billion commitment to improve math and science achievement among K-12 students, an increase of over 40 percent. The impact of these investments will be magnified by “Educate to Innovate,” a campaign launched by the President to motivate and inspire young people to excel in STEM education. This campaign has already mobilized over \$500 million in financial and in-kind support from companies, foundations, philanthropists, universities, non-profit organizations, and grassroots volunteers.

Need for Urgent Action: A growing number of jobs require STEM skills, and America needs a world-class STEM workforce both to expand the frontiers of knowledge and discovery and to address the “grand challenges” of the 21st century, such as developing clean sources of energy that reduce our dependence on foreign oil and discovering cures for diseases. We must improve on our current performance.

Framework for Action: To achieve measurable and rapid results, the Administration will build on its historic investments in K-12 education under the Recovery Act, support a coordinated continuum of federal programs to develop, validate and scale up effective reforms, and expand the coalition of stakeholders working together to improve STEM education as part of the Educate to Innovate campaign.

- **Building on the Historic Investments in STEM in the Recovery Act:** The Recovery Act included the largest investment in education in history, helping to keep employed more than 300,000 educators. In addition, the President’s \$4.35 billion Race to the Top fund provides a competitive advantage to states that commit to a comprehensive strategy to improve STEM education. The 2011 Budget, by providing an additional \$1.35 billion in funding for Race to the Top, builds on these historic investments.
- **Educate to Innovate:** The President is deeply committed to improving STEM education. The President has challenged governors, philanthropists, scientists, engineers, educators, and the private sector to join with him in a national campaign to dramatically improve achievement in STEM subjects. As part of the “Educate to Innovate” campaign, a new set of public-private partnerships have already mobilized \$500 million in private resources to improve STEM education.
- **Coordinated Effort to Scale What Works:** This Administration is committed to investing in and scaling what works, and to improving the coordination of federal STEM education programs. The Department of Education and NSF will lead an effort to increase the impact of Federal STEM investments.

Investing Strategically: Success on the President’s goal will require improving STEM literacy for all students, expanding the pipeline for a strong and innovative STEM workforce, and focusing on opportunities and access for groups such as women and underrepresented minorities. This Administration places a high priority on ensuring opportunities in STEM education to a diverse range of individuals, institutions, and geographic areas, and on investments along each part of the STEM pipeline from K-12 to graduate education.

K-12 Education: The focus of the 2011 Budget’s K-12 STEM investments is on increasing expectations for all students, supporting high-quality resources and professional development for STEM teachers, and developing, validating, and scaling up strategies to improve STEM outcomes. This includes:

- \$300 million to improve the teaching and learning of STEM subjects through the Department of Education’s (ED) proposed Effective Teaching and Learning in STEM program.

- \$150 million in STEM-focused projects funded through ED's Investing in Innovation (i3) program, which under the 2011 request would award a total of \$500 million in competitive awards to provide seed money for fresh ideas, help grow promising programs with a good track record, and scale up programs with proven results to a national level.

Undergraduate Education: The focus of the 2011 Budget's undergraduate STEM investments is on identifying and supporting effective approaches that will increase rates of program completion in STEM areas, and increase the number of graduates prepared for employment in STEM fields. This includes:

- \$19 million in NSF and \$55 million in DOE for the RE-gaining our ENERGY Science and Engineering Edge (RE-ENERGYSE) program, located at the intersection of energy, environment, and human factors. This partnership between DOE and NSF will help the nation retain its leadership position in science and engineering by attracting and educating future scientists in the clean energy field.
- In addition, the President's American Graduation Initiative, which has passed the House and awaits approval in the Senate, will invest over \$10 billion over the next ten years to achieve an additional 5 million community college degrees and certificates by 2020 and take new steps to ensure that those credentials will help graduates get ahead in their careers.

Graduate Fellowships: The focus of the 2011 Budget's graduate STEM investments is on preparing the highly skilled scientists and engineers who will tackle the grand challenges of the 21st century. This includes:

- \$158 million (a 16 percent increase compared to 2010 enacted) for NSF's Graduate Research Fellowship program. This program supports the development of the Nation's future scientists and engineers. This program is on a trajectory to triple awards made each year to 3,000 by FY 2013.
- \$824 million (a 5 percent increase compared to 2010 enacted) for the National Institutes of Health's Ruth L. Kirschstein National Research Service Awards program, which supports basic and applied training in the biomedical and behavioral sciences through institutional awards and fellowships.

Evaluation and Research: The focus of the 2011 Budget's research and evaluation investments is on increasing our knowledge of what works in STEM education.

- \$15 million for the Institute of Education Sciences (IES) and the NSF to evaluate approaches to providing professional development to math and science teachers.

Technology Programs in the 2011 Budget

Invest in the Building Blocks of Innovation: The Budget invests in programs that accelerate job creation through R&D commercialization, deliver broadband for all Americans, and protect American families through digital infrastructure. Examples include:

Promote the commercialization of promising technologies: The Budget proposes \$12 million in NSF for a new Innovation Ecosystem in which universities partner with other institutions to increase the impact of the most promising university innovations through commercialization, industry alliances, and start-up formation. It proposes an additional \$5 million in NIST programs to foster innovation in manufacturing with an emphasis on sustainable nanomanufacturing.

Expand access to broadband: During 2011, the Department of Commerce and USDA will focus on administering the \$7.2 billion program to expand broadband deployment, as well as programs to improve broadband adoption and data collection, which were funded by the Recovery Act. In addition, the Budget expands access to broadband services by offering \$418 million in USDA loans and grants to move rural communities into the modern information economy. The Federal Communications Commission (FCC) is preparing a National Broadband Plan

that will include longer-term policies to expand broadband access and adoption. The Administration, in part through the National Science and Technology Council, will assist in coordinating efforts upon the plan's release.

Unleash a mobile broadband revolution: The Budget directs NTIA and the FCC to collaborate in the development of a plan to make available significant spectrum suitable for both mobile and fixed wireless broadband use over the next ten years. The plan will focus on making spectrum available for exclusive use by commercial broadband providers or technologies, or for dynamic, shared access by commercial and government users, on both a licensed and unlicensed basis. The Budget provides funding to enable NTIA to increase its research capabilities in spectrum sharing techniques.

Spur Productive Entrepreneurship and Promote Efficiency: The Budget invests in programs that foster market conditions to spur entrepreneurship and instill a culture of open government. Examples include:

Help entrepreneurs and small businesses build new and vibrant enterprises that lead to new jobs and economic growth. One of the lingering difficulties of the recession is that it is difficult for many small businesses to access the capital they need to operate, grow, and create new jobs. The Budget provides \$165 million in subsidy costs to support \$17.5 billion in Small Business Administration 7(a) loan guarantees that will help small businesses operate and expand. It also proposes to increase the maximum 7(a) loan size from \$2 million to \$5 million, and provides other incentives for the private sector to invest.

Enhance regional economic competitiveness: Competitive, high-performing regional economies are the building blocks for national growth, and we must step up efforts to cultivate regional economic clusters across the country. The Budget provides at least \$75 million in regional planning and matching grants within the Economic Development Administration (EDA) to support the creation of regional innovation clusters that leverage regions' competitive strengths to boost job creation and economic growth.

Facilitate public sector innovation: The Budget proposes \$35 million in the General Services Administration (GSA) for an Electronic Government (E-Gov) Fund to support interagency electronic government initiatives with special attention to the Open Government Initiative.

Catalyze Breakthroughs for National Priorities: The Budget invests in programs that improve open data standards in national priorities. Examples include:

Build standards and measurements for emerging technologies: Standards and measurements can improve the societal benefits from emerging technologies by allowing for interoperability, promoting efficiencies, and enabling better manufacturing methods. The 2011 Budget of \$585 million for the National Institute of Standards and Technology (NIST)'s Scientific and Technical Research and Services (STRS), an increase of \$70 million over the 2010 enacted level, supports NIST standards and measurements work on health IT, smart grid, green manufacturing and construction, advanced solar energy technology, biologic drugs, nanomaterials and advanced manufacturing to provide strong foundations for these emerging U.S. industries.

Expand the use and furthering the development of Health Information Technology (IT): The Medicare and Medicaid incentive programs for physicians and hospitals who are meaningful users of certified electronic health records will begin in FY 2011. The 2011 Budget provides \$78 million to the Office of the National Coordinator for Health Information Technology to support data standards, policies and tools to support the private and secure exchange of health information across the Internet, with special emphasis on consumer engagement and data privacy.

Invest in 21st Century Schools and Learning: The 2011 Budget makes a strong commitment to technology that transforms how educators teach and how students learn. The President strongly believes that technology, when used creatively and effectively, can transform education and training in the same way that it has transformed the private sector. It makes a broad array of Department of Education programs, including the \$500 million "Investing in Innovation" Fund, eligible for technology-related investments, encouraging the infusion of educational technology across a broad range of programs in order to improve teaching and learning, and build the capacity at the State and local level to support better uses of technology for efficient and effective transfer of knowledge.

Table 1. R&D in the 2011 Budget

Table 1. R&D in the FY 2011 Budget by Agency

(budget authority in millions of dollars)

	FY 2009 Actual	FY 2009 ARRA 1/	FY 2010 Estimate	FY 2011 Budget	Change FY 10-11 Amount	Percent
Total R&D						
Defense (military)	80,821	300	81,090	77,548	-3,542	-4.4%
Health and Human Services	30,595	11,063	31,177	32,156	979	3.1%
<i>Nat'l Institutes of Health</i>	29,289	10,363	30,442	31,398	956	3.1%
<i>All Other HHS R&D</i>	1,306	700	735	758	23	3.1%
NASA	10,887	790	9,286	10,986	1,700	18.3%
Energy	10,301	2,967	10,693	11,219	526	4.9%
<i>Atomic Energy Defense R&D</i>	3,825	0	3,948	4,147	199	5.0%
<i>Office of Science</i>	2/	2/	4,470	4,642	172	3.8%
<i>Energy R&D</i>	2/	2/	2,275	2,430	155	6.8%
Nat'l Science Foundation	5,379	2,197	5,092	5,571	479	9.4%
Agriculture	2,437	176	2,591	2,448	-143	-5.5%
Commerce	1,393	576	1,516	1,727	211	13.9%
NOAA	790	165	872	959	87	10.0%
NIST	552	411	580	706	126	21.7%
Interior	701	74	755	772	17	2.3%
<i>U.S. Geological Survey</i>	614	74	660	679	19	2.9%
Transportation	976	0	1,012	1,018	6	0.6%
Environ. Protection Agency	559	0	622	651	29	4.7%
Veterans Affairs	1,020	0	1,162	1,180	18	1.5%
Education	312	0	348	383	35	10.1%
Homeland Security	1,096	0	1,150	1,046	-104	-9.0%
Smithsonian	216	10	208	236	28	13.5%
All Other	625	0	651	755	104	16.0%
Total R&D	147,318	18,153	147,353	147,696	343	0.2%
Defense R&D	84,646	300	85,038	81,695	-3,343	-3.9%
Nondefense R&D	62,672	17,853	62,315	66,001	3,686	5.9%
Basic Research	29,583	7,794	30,002	31,341	1,339	4.5%
Applied Research	29,054	5,385	28,327	30,276	1,949	6.9%
Total Research	58,637	13,179	58,329	61,617	3,288	5.6%
Development	83,866	1,482	84,373	81,455	-2,918	-3.5%
R&D Facilities and Equipment	4,815	3,492	4,651	4,624	-27	-0.6%

1/ Allocations of Recovery Act (P.L. 111-5) appropriations.

2/ These DOE subtotals are not available at this time.

OSTP - February 1, 2010

Table 2. Interagency Science and Technology Investments

Table 2. Interagency Science and Technology Initiatives

(budget authority in millions)

	FY 2009 Actual	FY 2009 ARRA 1/	FY 2010 Estimate	FY 2011 Budget	Change FY 10-11	
					Amount	Percent
National Nanotechnology Initiative (NNI)						
National Science Foundation	409	101	418	401	-17	-4.1%
Defense	459	0	436	349	-87	-20.0%
Energy	333	276	373	438	65	17.4%
NASA	14	0	14	16	2	14.3%
Commerce (NIST)	93	43	114	108	-6	-5.3%
HHS - NIH / CDC / FDA	356	73	378	414	36	9.5%
Agriculture	15	0	15	14	-1	-6.7%
EPA	13	0	18	20	2	11.1%
Homeland Security	9	0	12	12	0	0.0%
DOT - FHWA	1	0	3	2	-1	-33.3%
All Other	1	0	0	2	2	--
Total Nanotechnology	1,703	494	1,781	1,776	-5	-0.3%
Networking and Information Technology R&D (NITRD)						
Commerce	91	167	104	119	15	14.4%
Defense	1,368	0	1,278	1,107	-171	-13.4%
Energy	410	162	495	524	29	5.9%
Environ. Protection Agency	6	0	6	6	0	0.0%
Health and Human Services 2/	1,219	168	1,229	1,267	38	3.1%
NASA	82	18	82	82	0	0.0%
National Science Foundation	1,012	347	1,091	1,171	80	7.3%
All Other	5	0	5	5	0	0.0%
Total IT R&D	4,193	862	4,290	4,281	-9	-0.2%
U.S. Global Change Research Program (USGCRP)						
National Science Foundation	269	121	319	370	51	16.0%
Energy	157	76	165	191	26	15.8%
Commerce (NOAA, NIST)	424	170	360	437	77	21.4%
Agriculture	47	0	109	157	48	44.0%
Interior (USGS)	45	0	63	81	18	28.6%
Environ. Protection Agency	18	0	21	22	1	4.8%
National Institutes of Health	5	0	4	4	0	0.0%
NASA	1,086	237	1,071	1,285	214	20.0%
Smithsonian	6	0	7	11	4	57.1%
DOT	2	0	3	3	0	0.0%
Total USGCRP	2,059	604	2,122	2,561	439	20.7%

1/ Allocations of Recovery Act (P.L. 111-5) appropriations.

2/ Includes funds from offsetting collections for Agency for Healthcare Research and Quality (AHRQ).

USGCRP figures do not include Climate Change International Assistance programs in AID (\$43 million in 2011.)

NNI and NITRD data have been updated, and differ from similar data presented in the Budget of the US Government.

OSTP - February 1, 2010

Table 3. Research in the 2011 Budget

Table 3. Research in the FY 2011 Budget

(budget authority in millions of dollars)

	FY 2009 Actual	FY 2009 ARRA 1/	FY 2010 Estimate	FY 2011 Budget	Change FY 10-11 Amount	Change FY 10-11 Percent
RESEARCH (basic + applied)						
Defense (military)	6,708	85	6,330	6,477	147	2.3%
Health and Human Services	30,413	9,563	31,032	31,981	949	3.1%
<i>Nat'l Institutes of Health</i>	29,156	8,863	30,334	31,265	931	3.1%
NASA	2,668	152	1,567	2,313	746	47.6%
Energy	6,805	1,386	6,993	7,731	738	10.6%
<i>Office of Science</i>	2/	2/	3,822	3,975	153	4.0%
Nat'l Science Foundation	4,770	1,808	4,634	5,119	485	10.5%
Agriculture	2,121	0	2,231	2,234	3	0.1%
Commerce	875	111	954	1,050	96	10.1%
NOAA	460	0	494	517	23	4.7%
NIST	398	111	439	513	74	16.9%
Interior	625	74	674	689	15	2.2%
<i>U.S. Geological Survey</i>	548	74	586	598	12	2.0%
Transportation	726	0	748	781	33	4.4%
Environ. Protection Agency	474	0	527	553	26	4.9%
Veterans Affairs	954	0	1,082	1,106	24	2.2%
Education	192	0	211	232	21	10.0%
Homeland Security	681	0	702	598	-104	-14.8%
Smithsonian	152	0	162	178	16	9.9%
All Other	473	0	482	575	93	19.3%
Total Research	58,637	13,179	58,329	61,617	3,288	5.6%

1/ Allocations of Recovery Act (P.L. 111-5) appropriations.

2/ These DOE subtotals are not available at this time.

OSTP - February 1, 2010

Table 4. Federal STEM Education Program Funding

Table 4. Federal STEM Education Program Funding by Agency
(budget authority in millions)

	FY 2009	FY 2009	FY 2010	FY 2011	Change FY 10-11	
	Enacted	ARRA 1/	Enacted	Budget	Amount	Percent
Corporation for Nat'l & Community Service	7	0	7	8	1	14.3%
Agriculture	47	0	54	59	5	9.3%
Commerce	50	43	57	41	-16	-28.1%
Defense	218	0	98	110	12	12.2%
Education	865	0	904	833	-71	-7.9%
Energy	44	13	53	113	60	113.2%
Health and Human Services	836	33	845	884	40	4.7%
Homeland Security	99	0	99	91	-8	-8.1%
Labor	10	0	0	0	0	--
Interior	24	0	26	26	0	0.0%
Transportation	159	0	173	198	25	14.5%
Environmental Protection Agency	10	0	11	17	6	54.5%
NASA	169	0	184	146	-38	-20.7%
National Science Foundation	1,054	250	1,151	1,177	26	2.3%
Nuclear Regulatory Commission	20	0	20	10	-10	-50.0%
Total STEM Education	3,613	339	3,681	3,713	32	0.9%

1/ Allocations of Recovery Act (P.L. 111-5) appropriations.

OSTP - February 1, 2010

STEM - Science, technology, engineering and mathematics