Federal Research and Development Funding: FY2012

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Summary

President Obama has requested $147.911 billion for research and development (R&D) in FY2012, a $772 million (0.5%) increase from the FY2010 actual R&D funding level of $147.139 billion. Congress will play a central role in defining the nation's R&D priorities, especially with respect to two overarching issues: the extent to which the federal R&D investment can grow in the context of increased pressure on discretionary spending and how available funding will be prioritized and allocated. Low or negative growth in the overall R&D investment may require movement of resources across disciplines, programs, or agencies to address priorities.

On November 17, 2011, Congress completed action on the Consolidated and Further Continuing Appropriations Act, 2012 (P.L. 112-55) which combined into a single measure three regular appropriations bills: the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Act; Commerce, Justice, State and Related Agencies Act; and Transportation, Housing and Urban Development, and Related Agencies Act. President Obama signed the bill into law two days later. The act also amends an earlier continuing appropriations act (P.L. 112-36), extending funding through December 16, 2011, for all agencies covered under the other nine appropriations bills at 1.503% below the FY2011-enacted levels, until enactment of an appropriation for any project or activity provided for in the act, or until enactment of the applicable appropriations act for FY2012 without any provision for such project or activity. P.L. 112-36 provided continuing appropriations for all agencies through November 18, 2011; P.L. 112-33 had previously extended agency funding through October 4, 2011.

At the time the President's FY2012 budget was released, action had not been completed on FY2011 full-year funding. In the absence of FY2011 appropriations data, the President's budget compares his FY2012 request to FY2010 appropriations. On April 15, 2011, the Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10) was signed into law. Division A of the act provides FY2011 appropriations for the Department of Defense; Division B provides full-year continuing funding for FY2011 for all other agencies at their FY2010 levels unless other provisions in the act specify otherwise. With respect to federal R&D funding overall and to several agencies in particular, it is not possible yet to assess the level of funding provided under the act. Therefore this report compares the President's FY2012 funding request to FY2011 levels, where possible, and to FY2010 levels elsewhere. This report will be updated as additional information about FY2011 R&D funding becomes available and as Congress acts on FY2012 appropriations bills. Comparison of the President's request to enacted funding levels is complicated by several factors, including the omission of congressionally directed spending from the President's FY2012 budget request.

President Obama's request includes increases in the R&D budgets of the three agencies targeted for doubling over 7 years by the America COMPETES Act, and over 10 years by the America COMPETES Reauthorization Act of 2010 and by President Bush under his American Competitiveness Initiative, as measured using FY2006 funding as the baseline. Although President Obama supported a 10-year doubling in his FY2010 budget, his FY2012 budget is intentionally silent on a timeframe.

For more than a decade, federal R&D has been affected by mechanisms used to continue appropriations in the absence of enactment of regular appropriations acts and to complete the annual appropriations process. Completion of appropriations after the beginning of each fiscal year may cause agencies to delay or cancel some planned R&D and equipment acquisition.

Contents

Figures

Tables

Contacts

Overview

The 112th Congress continues to take a strong interest in the health of the U.S. research and development (R&D) enterprise and in providing support for federal R&D activities. However, widespread concerns about the federal debt and recent and projected federal budget deficits are driving difficult decisions involving prioritization of R&D within the context of the entire federal budget and among competing priorities within the federal R&D portfolio. The U.S. government supports a broad range of scientific and engineering research and development. Its purposes include addressing specific concerns such as national defense, health, safety, the environment, and energy security; advancing knowledge generally; developing the scientific and engineering workforce; and strengthening U.S. innovation and competitiveness in the global economy. Most of the R&D funded by the federal government is performed in support of the unique missions of the funding agencies. The federal government has played an important role in supporting R&D efforts that have led to scientific breakthroughs and new technologies, from jet aircraft and the Internet to communications satellites and defenses against disease.

Status of FY2011 Appropriations and Its Effect on the Analysis in This Report

During the 111th Congress, 2 of the 12 regular appropriations bills passed the House (the Transportation, Housing and Urban Development, and Related Agencies Appropriations Act, 2011, and the Military Construction and Veterans Affairs and Related Agencies Appropriations Act, 2011); none passed the Senate. For nearly half of FY2011, federal departments and agencies were funded under a series of interim continuing resolutions (CRs).[1] On April 14, 2011, the House and Senate passed H.R. 1473, the Department of Defense and Full-Year Continuing Appropriations Act, 2011, providing funding to federal agencies for the remaining portion of FY2011. The bill was signed into law (P.L. 112-10) by President Obama on April 15, 2011. Because this bill was passed after the release of the President's FY2012 budget request and agency budget justifications, these documents did not include the enacted full-year FY2011 appropriations figures. Instead, in these documents, comparisons that typically would have been made between the FY2012 budget request and the FY2011 enacted appropriations were instead made between the FY2012 budget request and the FY2010 enacted appropriations. Aside from the appropriations provided for the Department of Defense in Division A of the law, the appropriations included in P.L. 112-10 adopt the FY2010 agency appropriations except as specifically noted. Many of the changes from the FY2010 level affect budget accounts that include both R&D and non-R&D funding with no specificity as to how the changes are to be allocated among activities within the account. As a result, it is unclear how much the funding changes in these accounts will affect R&D levels of the agencies. Where it is possible to discern the effects of P.L. 112-10 on federal R&D funding, these figures are included in this report; where it is not possible, this report notes that the levels will be included as additional information becomes available. In many cases, provisions in P.L. 112-10 require agencies to submit spending plans providing such information.

Congress will play a central role in defining the nation's R&D priorities as it makes decisions with respect to the size and distribution of aggregate, agency, and programmatic R&D funding. Some Members of Congress have expressed concerns about the level of federal funding in light of the current federal fiscal condition, deficit, and debt. As Congress acts to complete the FY2012 appropriations process it faces two overarching issues: the extent to which the federal R&D investment can grow in the context of increased pressure on discretionary spending and how available funding will be prioritized and allocated. Low or negative growth in the overall R&D investment may require movement of resources across disciplines, programs, or agencies to address priorities.

[1] For more detailed discussion of recent continuing resolutions as well as information on the history, nature, scope, and duration of continuing resolutions, see CRS Report RL30343, *Continuing Resolutions: Latest Action and Brief Overview of Recent Practices*, by Sandy Streeter.

President Obama's proposed FY2012 budget, released on February 14, 2011, includes $147.911 billion for R&D in FY2012, a 0.5% increase over the actual FY2010 R&D funding level of $147.139 billion.[2] Adjusted for inflation, the President's FY2012 R&D request represents a decrease of 2.2% from the FY2010 level.[3] This report provides government-wide, multi-agency, and individual agency analyses of the President's FY2012 request as it relates to R&D and related activities.

Among its provisions, the President's proposed FY2012 R&D funding maintains an emphasis on increasing funding for the physical sciences and engineering, an effort consistent with the intent of the America COMPETES Act (P.L. 110-69) and the America COMPETES Reauthorization Act of 2010 (P.L. 111-358). These acts seek to achieve this objective by authorizing increased funding for three agencies with a strong R&D emphasis in these disciplines: the Department of Energy Office of Science, the National Science Foundation, and the Department of Commerce National Institute of Standards and Technology's core laboratory research and R&D facilities construction funding. Appropriations provided to these agencies have fallen short of the levels authorized in P.L. 110-69. (See "Multiagency R&D Initiatives" for detailed information.)

More broadly, in a 2009 speech before members of the National Academy of Sciences, President Obama put forth a goal of increasing the national investment in R&D to more than 3% of the U.S. gross domestic product (GDP). President Obama did not provide details on how this goal might be achieved (e.g., how much would be funded through increases in direct federal R&D funding or through indirect mechanisms such as the research and experimentation (R&E) tax credit[4]); however, doing so likely would require a substantial increase in public and private investment. In 2008, total U.S. R&D expenditures were $397.629 billion,[5] or approximately 2.77% of GDP.[6] Based on 2008 figures, reaching President Obama's 3% goal would require an 8.4% real increase (above inflation) in national R&D funding. Increasing direct federal R&D funding by 8.4% in FY2012 would have required an increase of $12.4 billion above President Obama's request.

In addition, advocates for increased federal R&D funding—including President Obama's science advisor, John Holdren—have raised concerns about the potential harm of a "boom-bust" approach to federal R&D funding (i.e., rapid growth in federal R&D funding followed by much slower growth, flat funding, or even decline).[7] The biomedical research community experienced a variety of challenges resulting from such a circumstance following the five-year doubling of the NIH

[2] Funding levels included in this document are in current dollars unless otherwise noted. Inflation diminishes the purchasing power of federal R&D funds, so an increase that does not equal or exceed the inflation rate may reduce real purchasing power.

[3] As calculated by CRS using the GDP (chained) price index from Table 10.1, Gross Domestic Product and Deflators Used In The Historical Tables: 1940–2016, from the President's FY2012 budget. Available at http://www.whitehouse.gov/sites/default/files/omb/budget/fy2012/assets/hist10z1.xls.

[4] The research and experimentation tax credit is frequently referred to as the research and development tax credit or R&D tax credit, through the credit does not apply to development expenditures. For additional information about the R&E tax credit, see CRS Report RL31181, *Research Tax Credit: Current Law, Legislation in the 112th Congress, and Policy Issues* , by Gary Guenther.

[5] Preliminary estimate of 2009 U.S. R&D expenditures, National Science Foundation, *National Patterns of R&D Resources:2008*, NSF 10-314, Arlington, VA, March 2010, http://www.nsf.gov/statistics/nsf10314/.

[6] Based on 2009 U.S. GDP of $14,369.1 billion as reported by the U.S. Department of Commerce Bureau of Economic Analysis, *National Income and Product Accounts Table*, Table 1.1.5, http://www.bea.gov/national/nipaweb/TableView.asp?SelectedTable=5&Freq=Qtr&FirstYear=2007&LastYear=2009.

[7] Jennifer Couzin and Greg Miller, "NIH Budget: Boom and Bust," *Science*, vol. 316, no. 5823 (April 2007), pp. 356-361, at http://www.scienceonline.org/cgi/content/full/316/5823/356.

budget that was completed in FY2003. With the NIH doubling came a rapid expansion of the nation's biomedical research infrastructure (e.g., buildings, laboratories, equipment), as well as rapid growth in university faculty hiring, students pursuing biomedical degrees, and grant applications to NIH. After the doubling, however, the agency's budget fell each year in real terms from FY2004 to FY2009. Critics assert there have been a variety of damages from this boom-bust cycle, including interruptions and cancellations of promising research, declining share in the number of NIH grant proposals funded, decreased student interest in pursuing graduate studies, and reduced employment prospects for the large number of biomedical researchers with advanced degrees. According to then-NIH Director Elias Zerhouni, the damages have been particularly acute for early- and mid-career scientists seeking a first or second grant.[8]

Analysis of federal R&D funding is complicated by several factors, including the Obama Administration's omission of congressionally directed spending from the FY2012 budget request and inconsistency among agencies in the reporting of R&D. As a result of these and other factors, the R&D agency figures reported by the White House Office of Management and Budget (OMB) and White House Office of Science and Technology Policy (OSTP), and shown in **Table 1**, may differ somewhat from the agency budget analyses that appear later in this report.

Another factor complicating analysis of the President's FY2012 budget request is the inclusion of the Wireless Innovation (WIN) Fund, a part of the Administration's Wireless Innovation and Infrastructure Initiative. The WIN Fund would receive $3 billion over seven years (FY2012-FY2018) from receipts generated through electromagnetic spectrum auctions. According to the President's request, the WIN funds would support research, test beds, and applications development to support leading-edge wireless technologies and applications for public safety, Smart Grid, telemedicine, distance learning, and other broadband capabilities and to facilitate spectrum relocation. Under the President's budget, if the WIN Fund is established, several agencies would receive funding for these purposes, among them the Department of Defense, the Department of Energy, the Department of Commerce, and the National Science Foundation.

Federal R&D Funding Perspectives

Federal R&D funding can be analyzed from a variety of perspectives that provide unique insights.

Agency Perspective

The authorization and appropriations process views federal R&D funding primarily from agency and program perspectives. **Table 1** provides data on R&D by agency for FY2010 (actual) and FY2012 (request) as reported by OMB, and has a column for FY2011 that will be updated as additional information becomes available.

Under President Obama's FY2012 budget request, six federal agencies would receive 94.8% of total federal R&D funding: Department of Defense (DOD), 51.8%; Department of Health and Human Services (HHS) (primarily the National Institutes of Health, NIH), 21.9%; Department of Energy (DOE), 8.8%; National Aeronautics and Space Administration (NASA), 6.6%; National

[8] Ibid. For additional information on NIH R&D funding issues, see CRS Report R41705, *The National Institutes of Health (NIH): Organization, Funding, and Congressional Issues*, by Judith A. Johnson and Pamela W. Smith.

Science Foundation (NSF), 4.3%; and Department of Agriculture (USDA), 1.5%. This report provides an analysis of the R&D budget requests for these agencies, as well as for the Departments of Commerce (DOC), Homeland Security (DHS), the Interior (DOI), and Transportation (DOT), and the Environmental Protection Agency (EPA). In total, these agencies account for more than 98% of current and requested federal R&D funding.

The largest agency R&D increases in the President's FY2012 request are for DOE, $2.153 billion (19.9%); HHS, $919 million (2.9%, due entirely to a $1.019 billion increase in R&D funding for NIH); NSF, $875 million (16.1%); NASA, $559 million (6.0%); and DOC, $376 million (28.0%). Under President Obama's FY2012 budget request, DOD R&D funding would be reduced by $3.969 billion (-4.9%), USDA R&D by $461 million (-17.7%), Department of Veterans Affairs R&D by $144 million (-12.4%), and EPA R&D by $11 million (-1.9%).

Table 1. Federal Research and Development Funding by Agency, FY2010-FY2012

(Budget authority, dollar amounts in millions)

Department/Agency	FY2010 Actual	FY2011[a]	FY2012 Request	Dollar Change, 2010 to 2012	Percent Change, 2010 to 2012
Agriculture	2,611		2,150	-461	-17.7
Commerce	1,344		1,720	376	28.0
Defense	80,602		76,633	-3,969	-4.9
Energy	10,836		12,989	2,153	19.9
Environmental Protection Agency	590		579	-11	-1.9
Health and Human Services	31,424		32,343	919	2.9
Homeland Security	887		1,054	167	18.8
Interior	776		727	-49	-6.3
NASA	9,262		9,821	559	6.0
National Science Foundation	5,445		6,320	875	16.1
Transportation	1,069		1,215	146	13.7
Veterans Affairs	1,162		1,018	-144	-12.4
Other	1,131		1,342	211	18.7
Total[b]	**147,139**		**147,911**	**772**	**0.5**

Sources: Executive Office of the President, OMB, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2012,* Table 22-1.

a. P.L. 112-10 provides funding, including R&D funding, for all agencies for the remainder of FY2011. As more detailed information becomes available, this column will be updated.

b. Totals may differ from the sum of the components due to rounding.

Character of Work, Facilities, and Equipment Perspective

Federal R&D funding can also be examined by the character of work it supports—basic research, applied research, and development—and funding provided for facilities and acquisition of major R&D equipment. (See **Table 2**.) President Obama's FY2012 request includes $32.895 billion for basic research, up $3.498 billion (11.9%) from FY2010; $33.182 billion for applied research, up $3.383 billion (11.4%); $79.414 billion for development, down $3.891 billion (-4.7%); and $2.420 billion for facilities and equipment, down $2.218 billion (-47.8%). It is important to note that with the projected completion of construction of the International Space Station (ISS) in FY2011, beginning in FY2012 NASA funding for operation of the facility is accounted for as research; previously, NASA ISS funding was accounted for as "facilities and equipment."

Table 2. Federal Research and Development Funding by Character of Work, Facilities, and Equipment, FY2010-FY2012

(Budget authority, dollar amounts in millions)

	FY2010 Actual	FY2012 Request	Dollar Change, 2010 to 2012	Percent Change, 2010 to 2012
Basic research	29,937	32,895	3,498	11.9
Applied research	29,799	33,182	3,383	11.4
Development	83,305	79,414	-3,891	-4.7
Facilities and equipment	4,638	2,420	-2,218	-47.8
Total[a]	**147,139**	**147,911**	**772**	**0.5**

Source: Executive Office of the President, Office of Science and Technology Policy, *Innovation, Education, and Infrastructure*, Table 1, February 14, 2011.

a. Totals may differ from the sum of the components due to rounding.

Combined Perspective

Combining these perspectives, federal R&D funding can be viewed in terms of each agency's contribution to basic research, applied research, development, and facilities and equipment. (See **Table 3**.) The federal government is the nation's largest supporter of basic research, funding 57.0% of U.S. basic research in 2008,[9] primarily because the private sector asserts it cannot capture an adequate return on long-term fundamental research investments. In contrast, industry funded only 17.7% of U.S. basic research in 2008 (with state governments, universities, and other non-profit organizations funding the remaining 25.3%). In the President's FY2012 budget request, the Department of Health and Human Services, primarily the National Institutes of Health (NIH), accounts for more than half of all federal funding for basic research.[10]

[9] National Science Foundation, *New NSF Estimates Indicate that U.S. R&D Spending Continued to Grow in 2008*, NSF 10-312, January 2010, http://www.nsf.gov/statistics/infbrief/nsf10312/#fn.http://www.nsf.gov/statistics/nsf08318/.

[10] Executive Office of the President, Office of Management and Budget, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2012,* Table 22-1, February 14, 2011.

In contrast to basic research, industry is the primary funder of applied research in the United States, accounting for an estimated 60.8% in 2008, while the federal government accounted for an estimated 32.4%.[11] Among federal agencies, HHS is the largest funder of applied research, accounting for nearly half of all federally funded applied research in the President's FY2012 budget request.[12] Industry also provides the vast majority of funding for development. Industry accounted for an estimated 84.1% in 2008, while the federal government provided an estimated 14.9%.[13] DOD is the primary federal agency funder of development, accounting for 87.7% of total federal development funding in the President's FY2012 budget request.[14]

Table 3. Top R&D Funding Agencies by Character of Work, Facilities and Equipment, FY2010-FY2012

(Budget authority, dollar amounts in millions)

	FY2010 Actual	FY2012 Request	Dollar Change, 2010 to 2012	Percent Change, 2010 to 2012
Basic Research				
Health and Human Services	16,082	16,614	532	3.3
National Science Foundation	4,636	5,310	674	14.5
Energy	3,971	4,200	229	5.8
Applied Research				
Health and Human Services	15,177	15,559	382	2.5
Energy	3,407	4,830	1,423	41.8
Defense	4,984	4,787	-197	-4.0
Development				
Defense	73,734	69,664	-4,070	-5.5
NASA	5,461	5,135	-326	-6.0
Energy	2,520	2,859	339	13.5
Facilities and Equipment				
Energy	938	1,100	162	17.3
National Science Foundation	482	443	-39	-8.1
Commerce	269	282	13	4.8

Source: Executive Office of the President, OMB, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2012, February 14, 2011*.

Note: Top funding agencies based on FY2012 request.

[11] National Science Foundation, *National Patterns of R&D Resources: 2007 Data Update*, NSF 08-318, 2008, http://www.nsf.gov/statistics/nsf08318/.

[12] Executive Office of the President, Office of Management and Budget, *Analytical Perspectives,* Table 22-1, February 14, 2011, http://www.whitehouse.gov/sites/default/files/omb/budget/fy2012/assets/spec.pdf.

[13] National Science Foundation, *National Patterns of R&D Resources*, 2008, http://www.nsf.gov/statistics/nsf08318/.

[14] Executive Office of the President, Office of Management and Budget, *Analytical Perspectives,* Table 22-1, February 14, 2011.

Multiagency R&D Initiatives

Federal R&D funding can also be viewed in terms of multiagency efforts, such as the National Nanotechnology Initiative and presidential initiatives.

Presidential Initiatives

In 2006, President Bush announced his American Competitiveness Initiative which, in part, sought to increase federal funding for physical sciences and engineering research by doubling funding over 10 years (FY2006-2016) for targeted accounts at three agencies—NSF, all; DOE, Office of Science only; and NIST, the scientific and technical research and services (STRS) and construction of research facilities (CRF) accounts.

In 2007, Congress authorized substantial increases for these targeted accounts under the America COMPETES Act (P.L. 110-69), setting aggregate authorization levels for FY2008-FY2010 consistent with a more aggressive seven-year doubling pace.[15] However, funding provided for these agencies in the Consolidated Appropriations Act, 2008 (P.L. 110-161), the Omnibus Appropriations Act, 2009 (P.L. 111-8), and the Consolidated Appropriations Act, 2010 (P.L. 111-117) fell below these targets.[16] (See **Table 4** for individual and aggregate agency appropriations.)

In 2010, Congress passed the America COMPETES Reauthorization Act of 2010 (P.L. 111-358) which, among other things, authorized appropriations levels for the targeted accounts for FY2011-FY2013.[17] The aggregate authorization levels in this act for the targeted accounts are consistent with an 11-year doubling path, slower than the America COMPETES Act's 7-year doubling path. Moreover, aggregate FY2011 funding for the targeted accounts was approximately $12.280 billion, $1.101 billion less than authorized in the act, setting a pace to double over 16 years from the FY2006 level—more than twice the length of time originally envisioned in the 2007 America COMPETES Act and about a third longer than the doubling period established by the America COMPETES Reauthorization Act of 2010.[18]

In FY2012 President Obama sought funding for the targeted accounts that would have increased aggregate funding to $13.947 billion, an increase of $1.667 billion (13.6%) above the estimated FY2011 aggregate funding level of $12.280 billion. However, funding provided by the Consolidated and Further Continuing Appropriations Act, 2012 (P.L. 112-55) for the NSF and NIST accounts falls short of the President's request:

- President Obama requested $7.767 billion for NSF; P.L. 112-55 provides $7.033 billion.
- With respect to the targeted accounts at the National Institute of Standards and Technology (NIST):

[15] For additional information, see CRS Report RL34328, *America COMPETES Act: Programs, Funding, and Selected Issues*, by Deborah D. Stine.

[16] In 2009, the American Recovery and Reinvestment Act of 2009 (P.L. 111-5) provided supplemental funding for several targeted accounts (approximately $5.202 billion).

[17] For additional information, see CRS Report R41231, *America COMPETES Reauthorization Act of 2010 (H.R. 5116) and the America COMPETES Act (P.L. 110-69): Selected Policy Issues*, coordinated by Heather B. Gonzalez.

[18] All doubling path calculations in this report use FY2006 as the baseline.

- The President requested $678.9 million for core laboratory research;[19] P.L. 112-55 provides $567.0 million.
- The President requested $84.6 million for construction of research facilities;[20] P.L. 112-55 provides $55.4 million.

President Obama also requested $5.416 billion for DOE's Office of Science; Congress has not completed the appropriations process for this account.

In light of budget constraints, the future of the doubling path appears to be in question. In his FY2010 *Plan for Science and Innovation,* President Obama stated that he, like President Bush, would seek to double funding for basic research over 10 years (FY2006 to FY2016) at the ACI agencies.[21] In his FY2011 budget documents, President Obama extended the period over which he intended to double these agencies' budgets to 11 years (FY2006 to FY2017).[22] In his FY2012 budget request, President Obama reiterated his intention to double the federal investment for these agencies from their FY2006 levels, though the request did not specify the timeframe during which this is to take place.[23] In addition, the Historical Tables of the President's FY2012 budget—which not only provide retrospective agency data, but also projections of future agency budget authority—show aggregate budget authority for the targeted accounts remaining essentially flat through FY2015, with a small uptick in FY2016.

The Administration's September 1, 2011, *Mid-Session Review* acknowledged that the doubling goal would be delayed:

> [T]he new funding levels set in [the Department of Defense and Full-Year Continuing Appropriations Act, 2011] mean delaying the goal of doubling funding for key research and development (R&D) agencies... [24]

Figure 1 shows aggregate funding for the agencies as a percentage of their FY2006 funding level, and illustrates how actual (FY2006-FY2011) and authorized appropriations (FY2008-FY2013) compare to different doubling rates using FY2006 as the base year. The thick black line at the top of the chart is at 200%, the doubling level. The data used in **Figure 1** is in current dollars, not constant dollars, therefore the effect of inflation on the purchasing power of these funds is not taken into consideration.

[19] NIST core laboratory research is the Scientific and Technical Research and Services (STRS) account.

[20] Executive Office of the President, Office of Science and Technology Policy, *Innovation, Education, and Infrastructure*, February 14, 2011, http://www.whitehouse.gov/sites/default/files/microsites/ostp/FY12-rd-fs.pdf.

[21] Executive Office of the President, Office of Science and Technology Policy, *The President's Plan for Science and Innovation: Doubling Funding for Key Basic Research Agencies in the 2010 Budget*, May 7, 2009, http://www.whitehouse.gov/files/documents/ostp/budget/doubling.pdf.

[22] Executive Office of the President, Office of Science and Technology Policy, *The President's Plan for Science and Innovation: Doubling Funding for Key Basic Research Agencies in the 2011 Budget*, February 1, 2010, http://www.whitehouse.gov/sites/default/files/doubling%2011%20final.pdf.

[23] Telephone conversation with OSTP staff, May 23, 2011.

[24] Executive Office of the President, Office of Management and Budget, *Mid Session Review,* September 1, 2011, p. 2, http://www.whitehouse.gov/sites/default/files/omb/budget/fy2012/assets/12msr.pdf.

Table 4. Funding for Targeted Accounts
FY2006-FY2010 (Actual), FY2011 (Enacted), and FY2012 (Request)

(in millions of current dollars)

Agency	FY2006 Actual	FY2007 Actual	FY2008 Actual	FY2009 Actual	FY2009 ARRA	FY2010 Actual	FY2011 Enacted	FY2012 Request	FY2012 Enacted
NSF	5,646	5,884	6,084	6,469	2,402	6,972	6,860[a]	7,767	7,033
DOE/Office of Science	3,632	3,837	4,083	4,807	1,633	4,964	4,843	5,416	TBD
NIST/core research[b]	395	434	441	472	220	515	507	679	567
NIST/facilities	174	59	161	172	360	147	70	85	55
Total[c]	9,846	10,214	10,768	11,920	4,615	12,538	12,280	13,947	TBD

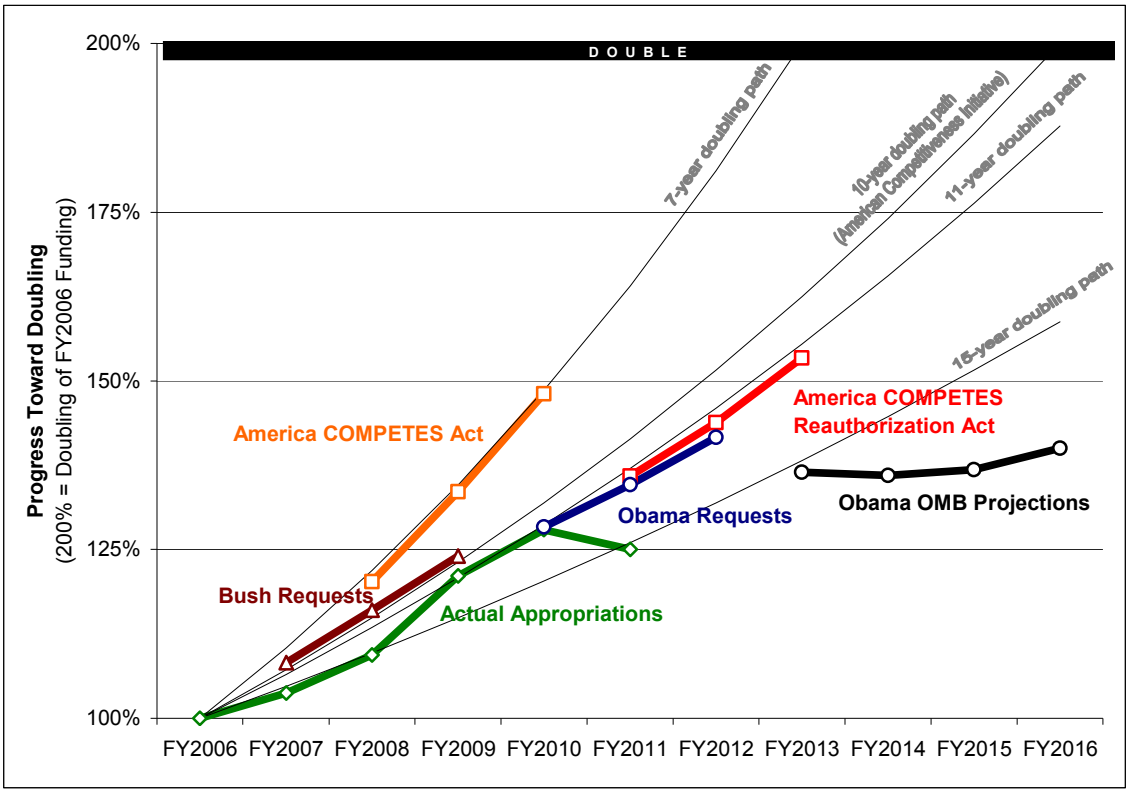
Source: NIST, budget requests for FY2008-FY2012, available at http://www.nist.gov/public_affairs/budget/index.cfm; DOE, budget requests for FY2008-FY2012, available at http://www.cfo.doe.gov/crorgcf30.htm; NSF, budget requests for FY2008-FY2012 available at http://www.nsf.gov/about/budget; P.L. 112-55; and H.Rept. 112-284. TBD = to be determined.

a. Includes $54.0 million transferred to the U.S. Coast Guard for icebreaking services (per P.L. 112-10).

b. NIST core research is performed under its scientific and technical research and services (STRS) account.

c. Totals may differ from the sum of the components due to rounding.

Figure 1. Doubling of Research Funding for Targeted Accounts: Appropriations and Authorizations versus Selected Rates



Source: Prepared by the Congressional Research Service (CRS) using agency budget justifications for fiscal years 2008, 2009, 2010, 2011, and 2012; the President's FY2012 budget request; P.L. 112-10; and agency authorization

levels from the America COMPETES Act (P.L. 110-69) and the America COMPETES Reauthorization Act of 2010 (P.L. 111-358).

Notes: The 7-year doubling pace represents annual increases of 10.4%, the 10-year doubling pace represents annual increases of 7.2%, the 11-year doubling pace represents annual increases of 6.5%, and the 15-year doubling represents annual increases of 4.7%. Through compounding, these rates achieve the doubling of funding in the specified time period. The lines connecting aggregate appropriations for the targeted accounts are for illustration purposes only. With respect to "Actual Appropriations," aggregate data for FY2006-FY2011 is based on regular appropriations (funding provided under the American Recovery and Reinvestment Act of 2009 (P.L. 111-5) is not included). America COMPETES Act figures are based on aggregate funding for the target accounts as authorized by the act. America COMPETES Reauthorization Act of 2010 figures for FY2011-FY2013 are based on aggregate funding for the target accounts as authorized by the act.

National Nanotechnology Initiative

President Obama's FY2012 budget request provides funding for three multiagency R&D initiatives. Funding for the National Nanotechnology Initiative (NNI) is requested in the amount of $2.130 billion for FY2012, $217 million (11.3%) above the FY2010 actual level of $1.931 billion. The overall increase in the FY2012 NNI funding request is due, in part, to funding for what the administration refers to as "signature initiatives:" Nanoelectronics for 2020 and Beyond; Sustainable Manufacturing: Creating the Industries of the Future; and Nanotechnology for Solar Energy Collection and Conversion. Under the Administration's FY2012 request, nanotechnology funding would increase at the Department of Energy by $237 million (63.3%) over its FY2010 funding level, at the Department of Health and Human Services by $24 million (5.0%), at NASA by $13 million (64.0%), and at the National Science Foundation by $11 million (2.5%). Funding for FY2012 would fall for the Department of Defense by $71 million (-16.2%), the Department of Homeland Security by $12 million (-53.4%), and the Department of Agriculture by $4 million (-18.2%). Nanotechnology funding for other NNI agencies would remain flat in FY2012.[25]

Networking and Information Technology Research and Development Program

President Obama has requested $3.868 billion in FY2012 funding for the Networking and Information Technology Research and Development (NITRD) program, $74 million (2.0%) above the FY2010 actual level. The NITRD request includes reductions of $261 million (-19.9%) in DOD funding and $21 million (-3.1%) for HHS funding, and increases of $153 million (13.8%) for NSF, $108 million (24.1%) for DOE, $53 million (49.3%) for DOC, $35 million (69.7%) for DHS, and $9 million for NASA (11.0%).[26]

[25]National Science and Technology Council, The White House, *The National Nanotechnology Initiative: Research and Development Leading to a Revolution in Technology and Industry, Supplement to the President's FY2012 Budget*, February 2011. For additional information on the NNI, see CRS Report RL34401, *The National Nanotechnology Initiative: Overview, Reauthorization, and Appropriations Issues*, by John F. Sargent Jr.

[26] Executive Office of the President, Office of Science and Technology Policy, *Innovation, Education, and Infrastructure*, Table 2, February 14, 2011.

U.S. Global Change Research Program

President Obama has proposed $2.633 billion for the U.S. Global Change Research Program (USGCRP) in FY2012, $446 million (20.4%) above the FY2010 actual level of $2.187 billion. Four agencies would receive the bulk of the FY2010 USGCRP funding increase: NASA (up $215 million, 19.1%); NSF (up $106 million, 33.0%); DOC, including the National Oceanic and Atmospheric Administration and NIST (up $56 million, 15.4%); and DOE (up $54 million, 31.5%).[27]

FY2012 Appropriations Status

On November 17, 2011, Congress completed action on the Consolidated and Further Continuing Appropriations Act, 2012 (P.L. 112-55), which combined into a single measure three regular appropriations bills: the Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Act, as H.R. 2112, Division A; Commerce, Justice, State and Related Agencies Act, as H.R. 2112, Division B; and Transportation, Housing and Urban Development, and Related Agencies Act, as H.R. 2112, Division C. President Obama signed the bill into law two days later. Division D of the act amends an earlier continuing appropriations act (P.L. 112-36) providing funding through December 16, 2011, for all agencies covered under the other nine appropriations bills at 1.503% below the FY2011-enacted levels, or until enactment of an appropriation for any project or activity provided for in the act or enactment of the applicable appropriations act for fiscal year 2012 without any provision for such project or activity.

Previously, Congress passed and the President signed two bills, both titled the Continuing Appropriations Act, 2012, that provided continuing appropriations for all agencies for FY2012. P.L. 112-33 extended agency funding through October 4, 2011; P.L. 112-36 extended funding through November 18, 2011.

The remainder of this report provides a more in-depth analysis of R&D in 12 federal departments and agencies that, in aggregate, receive more than 98% of federal R&D funding. Annual appropriations for these agencies are provided through 8 of the 12 regular appropriations bills. For each agency covered in this report, **Table 5** shows the corresponding regular appropriations bill that provides funding for the agency, including its R&D activities.

In addition to this report, CRS produces individual reports on each of the appropriations bills. These reports can be accessed via the CRS website at http://crs.gov/Pages/clis.aspx?cliid=73. Also, the status of each appropriations bills is or will be available on the CRS webpage, *FY2012 Status Table of Appropriations*, available at http://www.crs.gov/Pages/appover.aspx. This report will be updated as relevant appropriations bills are passed by the House or the Senate.

[27] Executive Office of the President, Office of Science and Technology Policy, *Innovation, Education, and Infrastructure*, Table 2, February 14, 2011. For additional information on the USGCRP, see CRS Report RL33817, *Climate Change: Federal Program Funding and Tax Incentives*, by Jane A. Leggett.

Table 5. Alignment of Agency R&D Funding and Regular Appropriations Bills

Department/Agency	Regular Appropriations Bill
Department of Defense	Department of Defense Appropriations Act
Department of Homeland Security	Department of Homeland Security Appropriations Act
National Institutes of Health	Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act
Department of Energy	Energy and Water Development and Related Agencies Appropriations Act
National Science Foundation	Commerce, Justice, Science, and Related Agencies Appropriations Act
Department of Commerce National Institute of Standards and Technology National Oceanic and Atmospheric Administration	Commerce, Justice, Science, and Related Agencies Appropriations Act
National Aeronautics and Space Administration	Commerce, Justice, Science, and Related Agencies Appropriations Act
Department of Agriculture	Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act
Department of the Interior	Department of the Interior, Environment, and Related Agencies Appropriations Act
Environmental Protection Agency	Department of the Interior, Environment, and Related Agencies Appropriations Act
Department of Transportation	Transportation, Housing and Urban Development, and Related Agencies Appropriations Act

Source: CRS website, FY2011 Status Table of Appropriations, available at http://www.crs.gov/Pages/appover.aspx.

Department of Defense[28]

Congress supports research and development in the Department of Defense (DOD) primarily through its Research, Development, Test, and Evaluation (RDT&E) appropriation. The appropriation supports the development of the nation's future military hardware and software and the technology base upon which those products rely.

Nearly all of what DOD spends on RDT&E is appropriated in Title IV of the defense appropriation bill. (See **Table 6**.) However, RDT&E funds are also appropriated in other parts of the bill. For example, RDT&E funds are appropriated as part of the Defense Health Program, the Chemical Agents and Munitions Destruction Program, and the National Defense Sealift Fund. The Defense Health Program supports the delivery of health care to DOD personnel and their families. Program funds are requested through the Operations and Maintenance appropriation. The program's RDT&E funds support congressionally directed research in such areas as breast, prostate, and ovarian cancer and other medical conditions. Congress appropriates funds for this program in Title VI (Other Department of Defense Programs) of the defense appropriations bill. The Chemical Agents and Munitions Destruction Program supports activities to destroy the U.S.

[28] This section was written by John Moteff, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

inventory of lethal chemical agents and munitions to avoid future risks and costs associated with storage. Funds for this program have been requested through the Procurement appropriation. Congress appropriates funds for this program also in Title VI. The National Defense Sealift Fund supports the procurement, operation and maintenance, and research and development of the nation's naval reserve fleet and supports a U.S. flagged merchant fleet that can serve in time of need. Requests for this fund are made as part of the Navy's Procurement appropriation. Congress appropriates funds for this program in Title V (Revolving and Management Funds) of the defense appropriations bill.

The Joint Improvised Explosive Device Defeat Fund (JIEDDF) also contains RDT&E monies. However, the fund does not contain an RDT&E line item as do the three programs mentioned above. The Joint Improvised Explosive Device Defeat Office, which now administers the fund, tracks (but does not report) the amount of funding allocated to RDT&E. The JIEDDF funding is not included in the table below.

RDT&E funds also have been requested and appropriated as part of DOD's separate funding to support efforts in what the Bush Administration had termed the Global War on Terror (GWOT), and what the Obama Administration refers to as Overseas Contingency Operations (OCO). Typically, the RDT&E funds appropriated for GWOT/OCO activities go to specified Program Elements (PEs) in Title IV. However, they are requested and accounted for separately. The Bush Administration requested these funds in separate GWOT emergency supplemental requests. The Obama Administration, while continuing to identify these funds uniquely as OCO requests, has included these funds as part of the regular budget, not in emergency supplementals. However, the Obama Administration will ask for additional OCO funds in supplemental requests, if the initial OCO funding is not enough to get through the fiscal year.

In addition, GWOT/OCO-related requests/appropriations often include money for a number of transfer funds. These include the Iraqi Freedom Fund (IFF), the Iraqi Security Forces Fund, the Afghanistan Security Forces Fund, the Mine Resistant and Ambush Protected Vehicle Fund (MRAPVF), and the Pakistan Counterinsurgency Capability Fund. Congress typically makes a single appropriation into each of these funds, and authorizes the Secretary to make transfers to other accounts, including RDT&E, at his discretion.

For FY2012, the Obama Administration requested $75.325 billion for DOD's baseline Title IV RDT&E and another $397 million in OCO RDT&E. The FY2012 request is $5.330 billion (nearly 7%) below the actual total obligational authority available in FY2010, but only $90 million below the total Title IV and OCO RDT&E provided for in FY2011. In addition to the $75.325 billion baseline request, the Administration requested $100 million as DOD's share of the proposed Wireless Innovation Fund. This fund (approximately $3 billion that would be distributed through various departments) is part of the President's initiative to expand coverage and usage of the nation's wireless networks and to encourage innovation in wireless devices. The Defense Advanced Research Projects Agency (DARPA) would manage the $100 million for DOD, if the fund is established.

The House voted to appropriated $72.993 billion for Title IV RDT&E. This included floor action that reduced the Defensewide RDT&E account $16 million below what the House Appropriation Committee recommended, offsetting an increase approved for peer-reviewed prostate cancer research in the Defense Health Program. The House appropriation was $2.432 billion below the Administration's request. Major program decreases included reductions to the Army's Patriot/MEADS ($149 million) and Manned Ground Vehicles ($116 million) programs, the Air

Force's National Polar-Orbiting Operational Environment Satellite ($220 million), Rocket System Launch ($125 million) programs and the Missile Defense Agency's Prompt Strike Capability ($100 million), and the Office of the Secretary's Precision Tracking Space System ($161 million). Major increases were made to the Air Force's Next Generation Bomber ($100 million) and the Office of the Secretary's U.S.-Israeli Cooperative R&D ($130 million). Also, DARPA's budget request was reduced by $100 million, the Committee citing efficiency gains in programming. The House made no mention of DOD's involvement in the Wireless Innovation Fund.

The Senate Appropriations Committee recommended $71.034 billion for Title IV RDT&E, nearly $2 billion less than what the House provided and over $4 billion less than what the Administration requested. The committee recommended more than $1 billion less for Army RDT&E than either the Administration requested or the House approved. Major program decreases included the Army's Warfighter Information Network ($115 million), which was not cut by the House, the Manned Ground Vehicle ($644 million), and Logistics and Engineering Equipment ($160 million), cutting these last two more than the House did. Cuts were also made to the Air Force's National Polar-Orbiting Operational Environment Satellite ($295 million), also cut by the House, and the Next Generation Refueling Aircraft ($135 million), which was not cut by the House. The Senate committee also cut the Chemical Biological Defense Engineering and Manufacturing program ($186 million), which the House fully funded. Major program increases included funds for a new Air Force Weather Satellite Follow-on program ($250 million) to continue technology developed associated with the National Polar-Orbiting Operational Environment Satellite, funds for the Office of the Secretary to support the Defense Rapid Innovation Fund ($200 million) and the Office of the Secretary's U.S.-Israeli Cooperative R&D ($130 million). Aside from cutting where the House did not, the Senate committee also did not go along with a number of House cuts, providing all the funds requested for the Army's Patriot/MEADS, the Air Force's Rocket System Launch, the Office of the Secretary's Precision Tracking Space System, and the Missile Defense Agency's Prompt Strike Capability. The Senate also did go along with the general reduction to DARPA's program, nor did it increase funding for the Air Force's Next Generation Bomber.

For FY2012, the Administration requested an additional $664 million in RDT&E through the Defense Health Program, $407 million in RDT&E through the Chemical Agents and Munitions Destruction program, and $48 million in RDT&E through the National Defense Sealift Fund. To support overseas contingencies, the Administration requested $397 million in OCO-related RDT&E. The Administration also requested $2 million in RDT&E for DOD's Office of the Inspector General.

The House voted to increase RDT&E in the Defense Health Program to $1.217 billion. This included an additional $30 million added on the House floor. The House approved the amount requested for the Chemical Agents and Munitions Destruction program and the National Defense Sealift Fund. The House appropriated $5 million for RDT&E in the Inspector General's Office. The Senate Appropriations Committee recommended $1.018 billion for RDT&E in the Defense Health Program and the amount requested for RDT&E in the Chemical Agents and Munitions Destruction Program.

For OCO-related RDT&E, the House appropriated $437 million, supporting much of the Administration's request. It provided $10 million less than requested for the Air Force's Unmanned Endurance UAV program, but provided $50 million in funding the Air Force's Intelligence, Surveillance, and Reconnaissance Innovation program. The Senate Appropriations Committee recommended $582 million for OCO-related RDT&E, nearly $200 million more than

requested. $105 million of that increase was a result of transferring the Navy's MQ-4 UAV Title IV funding to the OCO funding.

RDT&E funding can be broken out in different ways. Each of the military departments request and receive their own RDT&E funding. So, too, do various DOD agencies (e.g., the Missile Defense Agency and the Defense Advanced Research Projects Agency), collectively aggregated within the Defensewide account. RDT&E funding also can be characterized by budget activity (i.e., the type of RDT&E supported). Those budget activities designated as 6.1, 6.2, and 6.3 (basic research, applied research, and advanced technology development, respectively) constitute what is called DOD's Science and Technology Program (S&T) and represent the more research-oriented part of the RDT&E program. Budget activities 6.4 and 6.5 focus on the development of specific weapon systems or components (e.g., the Joint Strike Fighter or missile defense systems), for which an operational need has been determined and an acquisition program established. Budget activity 6.6 provides management support, including support for test and evaluation facilities. Budget activity 6.7 supports system improvements in existing operational systems.

Congressional policymakers are particularly interested in S&T funding since these funds support the development of new technologies and the underlying science. Ensuring adequate support for S&T activities is seen by some in the defense community as imperative to maintaining U.S. military superiority. The knowledge generated at this stage of development can also contribute to advances in commercial technologies.

The FY2012 Title IV baseline S&T funding request was $12.246 billion (not including the $100 million for the Wireless Innovation Fund), about $1.060 billion (8%) less than the total obligational authority available for Title IV baseline S&T in FY2010, but $113 million above that available in FY2011. Given the unspecified reductions to DARPA and the Defensewide account in general, it is not possible to determine how much the House actions supported S&T. However, without these reductions, the House Appropriations Committee had recommended $12.180 billion for S&T, less than the Administration's request. The Senate Appropriations Committee recommended $12.193 billion for S&T.

Within the S&T program, basic research (6.1) receives special attention, particularly by the nation's universities. DOD is not a large supporter of basic research, when compared to NIH or NSF. However, over half of DOD's basic research budget is spent at universities and represents the major contribution of funds in some areas of science and technology (such as electrical engineering and material science). The FY2012 request for basic research ($2.078 billion) is roughly $263 million (14%) more than what was available for Title IV basic research in FY2010. The House appropriated $2.098 billion, a net increase of $20 million above the request. Much of this went to increases for university research. However, the House appropriated $15 million less than requested for the National Defense Education Program. The Senate Appropriations Committee recommended $2.081 billion for basic research.

Table 6. Department of Defense RDT&E

(in millions of dollars)

	FY2011	FY2012 Request		FY2012 House		FY2012 Senate	
Budget Account	**Base + OCO Enacted**	**Base**	**OCO**	**Base**	**OCO**	**Base**	**OCO**
Army	9,854	9,684	9	9,381	9	8,311	19
Navy	17,841	17,956	54	17,799	54	17,407	158
Air Force	27,001	27,738	142	26,313	182	26,008	208
Defensewide	21,020	19,856[a]	192	19,309[b]	192	19,117	197
Dir. Test & Eval.	195	191		191		191	
Total Title IV - By Account[c]	**75,912**	**75,425**	**397**	**72,993**	**437**	**71,034**	**582**
Budget Activity							
6.1 Basic Research	1,947	2,078		2,098[f]		2,081	
6.2 Applied Research	4,497	4,687		4,657[f]		4,734	
6.3 Advanced Dev.	5,669	5,581[a]		5,425[f]		5,378	
6.4 Advanced Component Dev. and Prototypes	14,443	13,727	2	13,434[f]	2	13,693[g]	12
6.5 Systems Dev. and Demo	14,578	15,664	11	14,770[f]	11	13,029	11
6.6 Management Support[d]	4,569	4,175	18	4,146[f]	18	4,357[g]	18
6.7 Op. Systems Dev.[e]	30,209	29,512	366	28,580[f]	406	27,759[g]	542
Total Title IV—by Budget Activity[c]	**75,912**	**75,425**	**397**	**73,109[f]**	**437**	**71,034**	**582**
Title V—Revolving and Management Funds							
National Defense Sealift Fund	28	48		48		48	
Title VI—Other Defense Programs							
Office of Inspector General		2		5		5	
Defense Health Program	1,176	664		1,217[h]		1,018	
Chemical Agents and Munitions Destruction	393	407		407		407	
Grand Total[c]	**77,509**	**76,546**	**397**	**74,671[i]**	**437**	**72,512**	**582**

Source: CRS, adapted from the Department of Defense Budget, Fiscal Year 2012, RDT&E Programs (R-1), February 2011; H.R. 2219; and H.Rept. 112-10; S.Rept. 112-77.

a. For FY2012, this figure includes the $100 million for DARPA's Wireless Innovation Fund.

b. Includes $16 million reduction voted on the House floor which offset an increase in peer-reviewed prostate cancer research in the Defense Health Program.

c. Totals may differ from the sum of the components due to rounding.

d. Includes funding for the Director of Test and Evaluation.

e. Includes funding for classified programs.

f. Does not include $16 million reduction in Defensewide RDT&E voted on House floor that offset an increase in peer-reviewed prostate cancer research in the Defense Health Program nor the general $100 million reduction in Defense Advanced Research Projects Agency RDT&E. Therefore, the number is larger than the Total Title IV-by Account figure.

g. Does not include $50 million transferred from the Army's 6.4, 6.5, and 6.7 activities to the Army's 6.6 activity and $50 million transferred from the Air Force's 6.4, 6.5 and 6.7 activities to the Air Force's 6.6 activity, per Sec. 8072 of the Senate version of H.R. 2219 as reported by the Senate Appropriations Committee (S.Rept. 112-77).

h. Includes total $30 million increase in Defense Health Program RDT&E voted on the House floor.

i. The Grand Total uses the "Total Title IV - by Account" figure.

Department of Homeland Security[29]

The Department of Homeland Security (DHS) has requested $1.528 billion for R&D and related programs in FY2012, a 36% increase from FY2011. This total includes $1.176 billion for the Directorate of Science and Technology (S&T), $332 million for the Domestic Nuclear Detection Office (DNDO), and $20 million for Research, Development, Test, and Evaluation (RDT&E) in the U.S. Coast Guard. The bill passed by the House would provide $889 million, including $539 million for S&T, $337 million for DNDO, and $13 million for Coast Guard RDT&E. The bill reported by the Senate Committee on Appropriations would provide $1.076 billion, including $780 million for S&T, $268 million for DNDO, and $28 million for Coast Guard RDT&E. (See **Table 7**.)

The S&T Directorate is the primary DHS R&D organization.[30] Headed by the Under Secretary for Science and Technology, it performs R&D in several laboratories of its own and funds R&D performed by the DOE national laboratories, industry, universities, and others. The Administration has requested $1.176 billion for the S&T Directorate for FY2012. This is 53% more than the net FY2011 appropriation of $767 million.[31] The request for Laboratory Facilities includes $150 million to support the beginning of construction at the National Bio and Agro-Defense Facility (NBAF). About $109 million of the request for Research, Development, and Innovation is for radiological and nuclear R&D activities currently conducted in DNDO.

The House bill provided $539 million for S&T. For Research, Development, and Innovation, it provided $106 million, just 16% of the request. In Laboratory Facilities, it provided $75 million, or half the request, for NBAF construction. It rejected the proposed transfer of activities from DNDO. The committee report stated that "S&T must demonstrate how its R&D efforts are timely, with results relatively well-defined, and above all, make investment decisions based on clear and sensible priorities." It stated the committee's expectation that "the proposed funding levels will force S&T to make more focused, high-return investment decisions."

[29] This section was written by Daniel Morgan, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

[30] For more information, see CRS Report RL34356, *The DHS Directorate of Science and Technology: Key Issues for Congress*, by Dana A. Shea and Daniel Morgan.

[31] The Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10) rescinded $61 million in unobligated S&T Directorate funds from prior fiscal years. Not including this rescission, the FY2011 appropriation was $828 million, and the increase requested for FY2012 is 42%.

The Senate-reported bill provided $800 million for S&T. For Research, Development, and Innovation, it provided $440 million. It approved the proposed transfer from DNDO. It provided no funding for NBAF construction. The committee report described the amount requested for NBAF as "not a useable construction segment" and directed S&T to provide an updated cost schedule for the project.

In late 2010, the S&T Directorate announced a reorganization and released a new strategic plan. The reorganization reduced the number of direct reports to the Under Secretary and was accompanied by a change in budget structure, with most of the previous budget lines combined into two new categories: Research, Development, and Innovation and Acquisition and Operations Support. According to DHS, the new strategy and organization will result in more robust partnerships with other DHS components, a smaller number of larger projects, and more emphasis on transitioning technology into the field rather than long-term research. The House and Senate committee reports both objected to the new budget structure. The House report described the Research, Development, and Innovation budget category as "all-encompassing ... too large and vague." The Senate report stated that the new structure "reduces transparency and accountability."

The construction of NBAF will likely result in increased congressional oversight over the next several years. For construction of NBAF and decommissioning of the Plum Island Animal Disease Center (PIADC), which NBAF is intended to replace, DHS expects to need further appropriations of $541 million between FY2013 and FY2017, in addition to the $150 million requested for FY2012. In the appropriations acts for FY2009 through FY2011, Congress authorized DHS to use receipts from the sale of Plum Island, subject to appropriation, to offset NBAF construction and PIADC decommissioning costs.[32] The House-passed and Senate-reported bills for FY2012 would continue this authorization. According to DHS, however, the likely value of such receipts "has been found to be considerably overestimated."[33]

The Domestic Nuclear Detection Office is the primary DHS organization for combating the threat of nuclear attack, responsible for all DHS nuclear detection research, development, testing, evaluation, acquisition, and operational support. Under the Administration's FY2012 budget, however, much of DNDO's research role would be transferred to the S&T Directorate. The Administration has requested $332 million for DNDO for FY2012, approximately the same as the FY2011 appropriation of $331 million. The request for Research, Development, and Operations is $58 million less than the FY2011 appropriation; it includes no funds for Transformational R&D, which the Administration proposes to transfer to the S&T Directorate. The request for Systems Acquisition is $84 million, versus $30 million in FY2011. The request includes $27 million for the Securing the Cities program, which was previously funded at congressional direction and limited to the New York region; the request proposes expanding it to an additional city in FY2012.

The House bill provided $337 million for DNDO. It rejected the transfer of Transformational R&D to the S&T Directorate, but provided only $45 million for that program, versus $96 million in FY2011. It provided $52 million for Systems Acquisition, $32 million less than the request. It

[32] Department of Homeland Security Appropriations Act, 2009 (P.L. 110-329, Div. D, §540) and Department of Homeland Security Appropriations Act, 2010 (P.L. 111-83, §540). The FY2010 provision was continued for FY2011 under the Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10).

[33] DHS FY2012 budget justification, p. S&T RDA&O 24. For more information on NBAF, see CRS Report RL34160, *The National Bio- and Agro-Defense Facility: Issues for Congress*, by Dana A. Shea, Jim Monke, and Frank Gottron.

provided $22 million for Securing the Cities, of which only $2 million was for expansion to a new city.

The Senate-reported bill provided $268 million for DNDO. It approved the proposed transfer of Transformational R&D. It provided $40 million for Systems Acquisition. Like the House bill, it provided $22 million for Securing the Cities, including $2 million for expansion to a new city.

Congressional attention has focused in recent years on the testing and analysis DNDO has conducted to support its planned purchase and deployment of Advanced Spectroscopic Portals (ASPs), a type of next-generation radiation portal monitor.[34] Congress included a requirement for secretarial certification before full-scale ASP procurement in each homeland security appropriations act from FY2007 through FY2011. The House-passed and Senate-reported bills for FY2012 included a similar requirement. In February 2010, DHS decided that it would no longer pursue the use of ASPs for primary screening, although it will continue developing and testing them for use in secondary screening.[35] The FY2012 request includes funds to purchase and deploy 44 ASPs for secondary screening. The director of DNDO subsequently stated, however, that although DNDO will deploy 13 ASPs that it has already purchased, it will "end the ASP program as originally conceived."[36] The House committee report expressed an expectation that DNDO will not deploy ASPs prior to certification, even for secondary screening, but noted that radiation portal monitor funding in the House-passed bill "is not restricted" to previous-generation systems. The Senate report stated that "the request to procure and deploy 44 [ASPs] is denied."

The global nuclear detection architecture (GNDA) overseen by DNDO remains an issue of congressional interest.[37] The Systems Engineering and Architecture activity includes a GNDA development program as well as programs to develop and assess GNDA activities in various mission areas. The Senate-reported bill directed DNDO to prepare and submit "a strategic plan of investments necessary to implement the Department of Homeland Security's responsibilities under the domestic component of the global nuclear detection architecture." It identified specific items that should be included in the required plan.

The mission of DNDO, as established by Congress in the SAFE Port Act (P.L. 109-347, Title V), includes serving as the primary federal entity "to further develop, acquire, and support the deployment of an enhanced domestic system" for detection of nuclear and radiological devices and material (6 U.S.C. 592). The same act eliminated any explicit mention of radiological and nuclear countermeasures from the statutory duties and responsibilities of the Under Secretary for S&T. Congress may consider whether the proposed transfer of DNDO's research activities to the S&T Directorate is consistent with its intent in the SAFE Port Act. Congress may also choose to consider the acquisition portion of DNDO's mission. Most of DNDO's funding for Systems

[34] For more information, see CRS Report RL34750, *The Advanced Spectroscopic Portal Program: Background and Issues for Congress*, by Dana A. Shea, John D. Moteff, and Daniel Morgan.

[35] Letter from Dr. William K. Hagan, Acting Director, DNDO, to Senator Lieberman, February 24, 2010, http://hsgac.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=11f7d1f0-c4fe-4105-94e6-bb4a0213f048.

[36] Warren M. Stern, Director, Domestic Nuclear Detection Office, Department of Homeland Security, testimony before the House Committee on Homeland Security, Subcommittee on Cybersecurity, Infrastructure Protection, and Security Technologies, July 26, 2011, http://homeland.house.gov/sites/homeland.house.gov/files/Testimony%20Stern.pdf.

[37] For more information, see CRS Report RL34574, *The Global Nuclear Detection Architecture: Issues for Congress*, by Dana A. Shea.

Acquisition was eliminated in FY2010, and that year's budget stated that "funding requests for radiation detection equipment will now be sought by the end users that will operate them."[38] In contrast, the FY2012 request for Systems Acquisition includes funding for ASPs that would be operated by Customs and Border Protection, as well as human-portable radiation detectors for the Coast Guard, Customs and Border Protection, and the Transportation Security Administration. The reasons for this apparent reversal of policy are not provided in either the FY2011 or the FY2012 DNDO budget justification.

Table 7. Department of Homeland Security R&D and Related Programs

(in millions of dollars)

	FY2011 Enacted	FY2012 Request	FY2012 House	FY2012 Senate
Directorate of Science and Technology	**$767**	**$1,176**	**$539**	**$780**
Management and Administration	141	149	141	143
R&D, Acquisition, and Operations	626	1,027	398	657
Research, Development, and Innovation	*n/a*	*660*	*106*	*440*
Laboratory Facilities	*140*	*276*	*202*	*127*
Acquisition and Operations Support	*n/a*	*54*	*54*	*54*
University Programs	*40*	*37*	*37*	*37*
Rescission of Prior-Year Unobligated Balances	*(61)*	—	—	*(20)*
Domestic Nuclear Detection Office	**331**	**332**	**337**	**268**
Management and Administration	37	41	40	37
Research, Development, and Operations	264	206	245	191
Systems Engineering and Architecture	*33*	*32*	*30*	*31*
Systems Development	*53*	*70*	*69*	*60*
Transformational R&D	*96*	—	*45*	—
Assessments	*38*	*43*	*40*	*40*
Operations	*33*	*37*	*36*	*35*
Forensics	*22*	*25*	*25*	*25*
Rescission of Prior-Year Unobligated Balances	*(11)*	—	—	—
Systems Acquisition	30	84	52	40
Radiation Portal Monitors Program	—	*37*	*20*	*8*
Securing the Cities	*20*	*27*	*22*	*22*
Human Portable Radiation Detection Systems	*10*	*20*	*10*	*10*
U.S. Coast Guard RDT&E	**24**	**20**	**13**	**28**
TOTAL	**1,122**	**1,528**	**889**	**1,076**

[38] Executive Office of the President, FY2010 Budget, Appendix, p. 560.

Source: FY2011 from P.L. 112-10 and DHS FY2011expenditure plan. FY2012 request from DHS FY2012 budget justification, online at http://www.dhs.gov/xabout/budget/. FY2012 House from H.R. 2017 as passed by the House and H.Rept. 112-91. FY2012 Senate from H.R. 2017 as reported in the Senate and S.Rept. 112-74.

Notes: Totals may differ from the sum of their components due to rounding. Amounts shown as not available (n/a) were categorized differently in FY2011.

National Institutes of Health[39]

For FY2012 the Obama Administration requested discretionary budget authority of $31.8 billion for NIH, an increase of $1,062 million (3.3%) over FY2011 (see **Table 8)**.[40] The Department of Defense and Full-Year Continuing Appropriations Act, 2011, P.L. 112-10, provided $30.8 billion for the agency in FY2011.[41] Congress has not yet taken final action on FY2012 appropriations covering NIH. Bills from the Senate Appropriations Committee would provide total discretionary funding of $30.6 billion, slightly below the FY2011 level, while House bills would provide $31.8 billion, equal to the request. Further details on pending legislation follow the discussion of the request below.

FY2012 President's Budget Request. Under the FY2012 request, NIH intends to focus on implementing a new translational medicine program[42] as well as emphasize three other broad scientific areas including advanced technologies, comparative effectiveness research, and support for young investigators. For the new program, NIH proposed to create the National Center for Advancing Translational Sciences (NCATS) to catalyze the development of new diagnostics and therapeutics. To do so, NIH would abolish the existing National Center for Research Resources (NCRR) and transfer its programs to various other parts of NIH, including transferring the Clinical and Translational Science Awards (CTSA) program to NCATS.[43] The FY2012 request proposed $485 million for CTSA, a program which funds a national consortium of medical research institutions that work together to accelerate treatment development, engage communities in clinical research efforts, and train clinical and translational researchers. Another component of NCATS would be the Therapeutics for Rare and Neglected Diseases (TRND) program; the request would double support for TRND in FY2012 to $50 million. TRND is currently funded on an NIH-wide basis.

NCATS may also incorporate the new Cures Acceleration Network (CAN), which was authorized but not funded in the Patient Protection and Affordable Care Act (ACA, P.L. 111-148, P.L. 111-

[39] This section was written by Judith A. Johnson, Specialist in Biomedical Policy, CRS Domestic Social Policy Division. It was updated by Pamela W. Smith, Analyst in Biomedical Policy.

[40] For further information on NIH, see CRS Report R41705, *The National Institutes of Health (NIH): Organization, Funding, and Congressional Issues*, by Judith A. Johnson and Pamela W. Smith.

[41] P.L. 112-10 provided FY2011 funding for NIH as follows: from the base of the FY2010 funding level enacted in P.L. 111-117, the amount for NIH was reduced by $50 million (Buildings and Facilities), $210 million (pro rata reduction in all NIH accounts for institutes and centers and the Office of the Director), and by a 0.2% across-the-board rescission. See **Table 8** Note a for details.

[42] Translational medicine focuses on converting basic research discoveries into clinical applications that benefit patients.

[43] NIH, *Justification of Estimates for Appropriations Committees, FY2012, Vol. I, Overview*, p. ES-12, available at http://officeofbudget.od.nih.gov/pdfs/FY12/Tab%201%20Executive%20Summary.pdf. The tables in the justification documents (released February 14, 2011) did not reflect the proposed transfer of NCRR programs to NCATS and other components of NIH. Later in the spring, NIH sent Congress detailed materials and revised tables reflecting the proposed realignment. The proposal was not submitted as an official budget amendment.

152, as amended). The purpose of CAN is to support the development of high need cures and facilitate their FDA review. The ACA authorized $500 million for FY2010 and such sums as may be necessary for subsequent fiscal years for CAN. The law also specified that other funds appropriated under the Public Health Service Act may not be allocated to CAN. The NIH request proposed $100 million for CAN in FY2012. If CAN receives funding, NIH would determine which medical products are "high need cures," and then make awards to research entities or companies in order to accelerate the development of such high need cures.

In addition to the new program, NIH emphasized three scientific areas in its plans for FY2012:

1. Technologies to Accelerate Discovery. NIH would continue to support development and application of advanced technologies (such as DNA sequencing, microarray technology, nanotechnology, new imaging modalities, and computational biology) to increase understanding of complex diseases, such as cancer and Alzheimer's disease, and enable development of more effective therapies.
2. Enhancing the Evidence Base for Health Care Decisions. NIH plans to use comparative effectiveness research methodologies to assist in developing individually-tailored treatments (personalized medicine) by testing candidate therapies in a group of Health Maintenance Organizations (HMOs) caring for more than 13 million patients.
3. New Investigators, New Ideas. NIH would emphasize two of its programs that support young scientists. The NIH Director's New Innovator Award program provides first-time independent awards to outstanding investigators; the Administration requested $80 million to support these awards in FY2012. The second program, called the NIH Director's Early Independence Program, supports talented junior scientists, allowing them to by-pass the traditional postdoctoral training period and move directly to an independent research career. NIH requests $8.4 million for this program in FY2012.

Funding for NIH comes primarily from the annual appropriations bill for the Departments of Labor, Health and Human Services, and Education, and Related Agencies (Labor/HHS), with an additional amount for Superfund-related activities from the appropriations bill for the Department of the Interior, Environment, and Related Agencies (Interior/Environment). Those two bills provide NIH's discretionary budget authority. In addition, NIH receives mandatory funding of $150 million annually that is provided in the Public Health Service (PHS) Act for a special program on diabetes research, and also receives $8.2 million annually for the National Library of Medicine from a transfer within PHS. Each year since FY2002, Congress has provided that a portion of NIH's Labor/HHS appropriation be transferred to the Global Fund to Fight HIV/AIDS, Tuberculosis, and Malaria. The transfer, usually about $300 million, is part of the U.S. contribution to the Global Fund. The total funding available for NIH activities, taking account of add-ons and transfers, is the program level. Because the "NIH program level" cited in the Administration's FY2012 budget documents does not reflect the Global Fund transfer, **Table 8** shows the program level both before and after the transfer. Discussions in this section refer to the program level after the transfer.

The agency's organization consists of the Office of the NIH Director and 27 institutes and centers. The Office of the Director (OD) sets overall policy for NIH and coordinates the programs and activities of all NIH components, particularly in areas of research that involve multiple institutes. The institutes and centers (collectively called ICs) focus on particular diseases, areas of

human health and development, or aspects of research support. Each IC plans and manages its own research programs in coordination with the Office of the Director. As shown in **Table 8**, Congress provides a separate appropriation to 24 of the 27 ICs, to OD, and to a Buildings and Facilities account. (The other three centers, not included in the table, are funded through the NIH Management Fund.)

Research Project Grants. Of the funds appropriated to NIH each year, more than 80% go out to the extramural research community in the form of grants, contracts, and other awards. The funding supports research performed by more than 325,000 scientists and technical personnel who work at more than 3,000 universities, hospitals, medical schools, and other research institutions around the country and abroad. The primary funding mechanism for support of the full range of investigator-initiated research is competitive, peer-reviewed research project grants (RPGs).

In the FY2012 request, total funding for RPGs, at $16.9 billion, represents about 53% of NIH's budget. The request proposes to support an estimated 36,852 RPG awards, 248 more grants than in FY2011.[44] Within that total, 9,158 would be competing RPGs, 441 more than in FY2011. ("Competing" awards means new grants plus competing renewals of existing grants.) For noncompeting (continuation) RPGs, the FY2012 budget provides an inflation-adjustment increase of 1%.

Other Funding Mechanisms. The FY2012 request includes an increase over FY2011 for training stipends for individuals supported by the Ruth L. Kirschstein National Research Service Awards program. The budget request would raise funding for the program by $13 million to $794 million, a 1.7% increase, which would allow NIH to support 16,831 full-time training positions, 29 more than in FY2011. Changes proposed in the request for other funding mechanisms within the NIH budget include an increase in support for research centers compared to the FY2011 level, up $42 million (1.4%) to $3.036 billion; an increase of $7 million (0.4%) for other research grants for a total of $1.820 billion; a $151 million (4.9%) increase to $3.245 billion for R&D contracts (excluding the funding to be transferred for the Global HIV/AIDS Fund); $94 million more (2.8%) for the NIH intramural research program, for a total of $3.382 billion; an increase of $19 million (1.2%) to a total of $1.538 billion for research management and support; and an increase of $118 million (15.9%) for the operations of the Office of the Director, for a total of $742 million. The appropriation for Buildings and Facilities would increase by almost $76 million (60.3%) to $126 million.

Also funded through the OD account is the NIH Common Fund, which supports research in emerging areas of scientific opportunity, public health challenges, or knowledge gaps that deserve special emphasis and might benefit from collaboration between two or more institutes or centers. For FY2012, the President requested $557 million for the Common Fund, up $14 million (2.5%) from FY2011.

NIH and other HHS agencies and programs that are authorized under the PHS Act are subject to a budget tap called the PHS Program Evaluation Set-Aside. Section 241 of the PHS Act (42 U.S.C. § 238j) authorizes the Secretary to use a portion of eligible appropriations to assess the

[44] For this discussion of RPGs, as well as for the other funding mechanisms discussed in the next section, figures for FY2012 giving amounts of funding and number of awards come from the NIH budget justification cited in the previous footnote. Amounts and awards for FY2011 under the NIH Operating Plan come from a mechanism table obtained by CRS from the NIH Budget Office.

effectiveness of federal health programs and to identify ways to improve them. The set-aside has the effect of redistributing appropriated funds for specific purposes among PHS and other HHS agencies. Section 205 of the FY2010 Labor/HHS appropriations act capped the set-aside at 2.5%, instead of the 2.4% maximum that had been in place for several years. The provision was carried forward for FY2011 under P.L. 112-10. The FY2012 budget proposed to increase the set-aside to 3.2%. NIH, with the largest budget among the PHS agencies, becomes the largest "donor" of program evaluation funds, and is a relatively minor recipient. By convention, budget tables such as **Table 8** do not subtract the amount of the evaluation tap, or of other taps within HHS, from the agencies' appropriations.

Congressional Action on FY2012 Appropriations. The Senate Appropriations Committee reported S. 1599, its FY2012 Labor/HHS/Education bill, on September 22, 2011 (S.Rept. 112-84). The bill would provide $30.5 billion for NIH, a decrease of $190 million (-0.6%) from the FY2011 level of $30.7 billion and $1,250 million below the request. In addition, the committee released a draft bill for Interior/Environment appropriations that would provide $80 million for NIH (see Note g on **Table 8**). The committee approved NIH's plan to abolish NCRR and create NCATS, though funding for NCATS and all the other components would be lower than requested under the realignment. The NCATS appropriation would include $20 million for the Cures Acceleration Network and would maintain level funding for the Clinical and Translational Science Awards. The committee criticized NIH for not providing a formal, timely request for the restructuring proposal. Funding for the PHS Evaluation Set-Aside was maintained at 2.5%.

The House Appropriations Committee has not reported a Labor/HHS bill for FY2012, but the chairman of the subcommittee introduced H.R. 3070 on September 29, 2011, accompanied by a detailed funding table (see Note c on **Table 8**). The bill would provide $31.7 billion for NIH, the same level as the request and an increase of $1,160 million (3.8%) over FY2011. In addition, the House committee included $79 million for NIH in its Interior/Environment appropriations bill (see Note g on **Table 8**). H.R. 3070 does not provide for the creation of NCATS or the elimination of NCRR. It would fund all the existing NIH components at the same level as the request, except that $100 million would be shifted from Office of the Director to NCRR. The Director is told to ensure that at least $488 million is provided for the CTSA program, and that up to $2 million may be used for an advisory board to plan for the Cures Acceleration Network. The bill would require support of at least 9,150 new and competing RPGs, maintenance of an allocation of 90% to 10% in support of extramural and intramural activities, funding for the PHS Evaluation Set-Aside at 2.4%, and would prohibit any funding of patient-centered outcomes research (comparative effectiveness research).

Table 8. National Institutes of Health Funding

(in millions of dollars)

Component	FY2011 Enacted[a]	FY2012 Request[b]	FY2012 House Bill[c]	FY2012 Senate Comm.[d]
Cancer (NCI)	5,059	5,196	5,196	5,002
Heart/Lung/Blood (NHLBI)	3,070	3,148	3,148	3,036
Dental/Craniofacial Research (NIDCR)	410	420	420	405
Diabetes/Digestive/Kidney (NIDDK)	1,792	1,838	1,838	1,772
Neurological Disorders/Stroke (NINDS)	1,622	1,664	1,664	1,604
Allergy/Infectious Diseases (NIAID)[e]	4,776	4,916	4,916	4,725
General Medical Sciences (NIGMS)	2,034	2,102	2,102	2,347
Child Health/Human Development (NICHD)	1,318	1,352	1,352	1,303
Eye (NEI)	701	719	719	693
Environmental Health Sciences (NIEHS)	684	701	701	676
Aging (NIA)	1,100	1,130	1,130	1,088
Arthritis/Musculoskeletal/Skin (NIAMS)	534	548	548	528
Deafness/Communication Disorders (NIDCD)	415	426	426	410
Nursing Research (NINR)	144	148	148	143
Alcohol Abuse/Alcoholism (NIAAA)	458	469	469	453
Drug Abuse (NIDA)	1,051	1,080	1,080	1,039
Mental Health (NIMH)	1,477	1,517	1,517	1,461
Human Genome Research (NHGRI)	511	525	525	506
Biomedical Imaging/Bioengineering (NIBIB)	314	322	322	334
Research Resources (NCRR)	1,258	1,298	1,398	0
Complementary/Alternative Medicine (NCCAM)	128	131	131	126
Minority Health/Health Disparities (NIMHD)[f]	210	215	215	273
Fogarty International Center (FIC)	69	71	71	69
Advancing Translational Sciences (NCATS)	0	0	0	582
National Library of Medicine (NLM)	337	387	387	359
Office of Director (OD)	1,167	1,298	1,198	1,439
Common Fund (non-add)	*(543)*	*(557)*	*(557)*	*(538)*
Buildings & Facilities (B&F)	50	126	126	126
Subtotal, Labor/HHS Appropriation	30,688	31,748	31,748	30,498
Superfund (Interior appropriation to NIEHS)[g]	79	81	79	80
Total, NIH discretionary budget authority	30,767	31,829	31,827	30,578
Pre-appropriated Type 1 diabetes funds[h]	150	150	150	150
PHS Evaluation Tap funding[i]	8	8	8	8

Component	FY2011 Enacted[a]	FY2012 Request[b]	FY2012 House Bill[c]	FY2012 Senate Comm.[d]
Total, NIH program level	30,926	31,987	31,985	30,737
Total, NIH program level (less Global Fund)	30,628	31,687	31,985	30,438

Sources: FY2011 Enacted column is based on NIH operating plan at http://www.hhs.gov/asfr/ob/docbudget/2011operatingplan_nih.pdf. FY2012 Request column is adapted by CRS from NIH, *Justification of Estimates for Appropriations Committees, Fiscal Year 2012*, ST-2, at http://officeofbudget.od.nih.gov/pdfs/FY12/Tab%203%20-%20Supplementary%20Tables.pdf. FY2012 House and Senate columns are based on texts of H.R. 3070 as introduced and S. 1599 as reported. Details may not add to totals due to rounding.

a. P.L. 112-10 provided FY2011 funding for NIH as follows: from the base of the FY2010 funding level enacted in P.L. 111-117 ($31,009 million in the Labor/HHS title and $79 million in the Interior/Environment title), the amount for NIH was reduced by $50 million (Buildings and Facilities), $210 million (pro rata reduction in all NIH accounts for institutes and centers and the Office of the Director), and by a 0.2% across-the-board rescission. The FY2011 level reflects real transfer of $998 thousand from HHS/Office of the Secretary to NIMH.

b. The FY2012 request reflects amounts as proposed in the original President's budget released February 14, 2011. Later in the spring, NIH sent Congress revised tables reflecting the transfer of NCRR programs to NCATS and some other ICs. The proposed realignment was not submitted as an official budget amendment.

c. H.R. 3070, making appropriations for Labor/HHS/Education for FY2012, was introduced on September 29, 2011, by the chairman of the House Appropriations Labor/HHS subcommittee, and a detailed funding table was posted on the committee's website at http://appropriations.house.gov/UploadedFiles/FY12LH_Detail_SC_10_Rev_with_comparable.pdf. The bill has not been considered by the subcommittee or the full committee and has not been reported.

d. The Senate Appropriations Committee reported its FY2012 Labor/HHS/Education bill, S. 1599, S.Rept. 112-84, on September 22, 2011, after subcommittee markup on September 20.

e. Except in the House bill, the NIAID appropriation includes funds for transfer to the Global Fund for HIV/AIDS, Tuberculosis, and Malaria ($297 million in FY2011, $300 million in the FY2012 request, and $299 million in the Senate bill). The House bill did not provide for the transfer.

f. Section 10334(c) of P.L. 111-148 redesignated the Center as an Institute.

g. Separate account in the Interior/Environment appropriations for NIEHS research activities related to Superfund. The House Appropriations Committee reported H.R. 2584 on July 12, 2011 (H.Rept. 112-151). The Senate committee released the text of a draft bill and a detailed table on October 14, 2011, available at http://appropriations.senate.gov/news.cfm?method=news.view&id=3f4832f4-6adb-4be8-9c6f-eabff62cc056.

h. Funds available to NIDDK for diabetes research under PHS Act § 330B (provided by P.L. 110-275 and P.L. 111-309). Funds have been appropriated through FY2013.

i. Additional funds for NLM from PHS Evaluation Set-Aside (§ 241 of PHS Act).

Department of Energy[45]

The Administration has requested $14.447 billion for Department of Energy (DOE) R&D and related programs in FY2012, including activities in three major categories: science, national security, and energy. This request is 24.4% more than the FY2011 appropriation of $11.610 billion. The House-passed bill would provide $11.256 billion. The Senate-reported bill would provide $11.552 billion. (See **Table 9** for details.)

The request for the DOE Office of Science is $5.416 billion, an increase of 12% from the FY2011 appropriation of $4.843 billion. The Administration's stated goal is to double the funding of the Office of Science. This continues a plan initiated by the Bush Administration in January 2006. The original target under both Administrations was to achieve the doubling goal in the decade from FY2006 to FY2016. The current policy no longer specifies a completion date. The FY2012 request is 49% more than the FY2006 baseline. The America COMPETES Reauthorization Act of 2010 (P.L. 111-358) authorized $5.614 billion for the Office of Science in FY2012. The House bill would provide $4.800 billion. The Senate bill would provide $4.843 billion.

The Office of Science includes six major research programs. In the largest program, basic energy sciences, the request includes $34 million for a new energy innovation hub on materials for batteries and energy storage and $24 million for the existing hub on fuels from sunlight (currently funded by the DOE Office of Energy Efficiency and Renewable Energy).[46] The biological and environmental research program would receive $103 million for foundational genomics research (versus $34 million in FY2010). In the high energy physics program, operations would end at the Tevatron facility in Illinois. In fusion energy sciences, the U.S. contribution to the International Thermonuclear Experimental Reactor (ITER) would drop to $105 million (from $135 million in FY2010). Despite a slip of several years in the expected start-up date for ITER, DOE budget documents for FY2012 state that "the costs associated with the schedule delays to date ... are manageable within the existing ... [total project] cost range" of $1.45 billion to $2.2 billion.[47] This statement, however, predated the March 2011 Fukushima earthquake and tsunami, which damaged component test facilities in Japan and may result in additional delays.[48] The House bill would provide $297 million less than the request for basic energy sciences and $171 million less than the request for biological and environmental research. The Senate bill would provide $291 million less than the request for basic energy sciences and $96 million less than the request for biological and environmental research. The House and Senate bills would both provide about $55 million less than the request for nuclear physics. Both bills would provide $20 million for the new energy innovation hub and the requested amount for the existing one. The House bill would

[45] This section was written by Daniel Morgan, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

[46] The Administration proposed to initiate eight energy innovation hubs in FY2010; Congress funded three. The FY2012 budget request would fund six hubs. The three new hubs would focus on batteries and energy storage, critical materials, and Smart Grid technologies and systems. The aim of the hubs is "to address basic science and technology hindering the nation's secure and sustainable energy future" by assembling multidisciplinary teams of researchers "spanning science, engineering, and other disciplines, but focused on a single critical national need identified by the Department." (DOE FY2011 budget justification, vol. 4, p. 86)

[47] DOE FY2012 congressional budget justification, vol. 4, p. 234.

[48] Geoff Brumfiel, "Japan Quake Rocks Fusion Project: Damaged Facilities Force Further Delay to ITER Experiment," *Nature*, May 31, 2011.

provide $6 million more than the request for fusion energy sciences, while the Senate bill would provide $65 million less than the request.

The request for DOE national security R&D is $4.175 billion, a 12.3% increase from $3.718 billion in FY2011. A $195 million increase for the naval reactors program would accelerate the continuing design of reactors for the Ohio-class ballistic missile submarine, modernization of the land-based prototype reactor, and recapitalization of program infrastructure. The requests for nuclear weapons R&D and nonproliferation and verification R&D include $168 million and $56 million respectively to fund contractor pension payments resulting from the transition of management contracts at Los Alamos and Lawrence Livermore National Laboratories. The House bill would provide $3.725 billion for national security R&D, including $123 million less than the request for the naval reactors program and $76 million less than the request for advancing the science of weapons certification. It would provide a total of $147 million for the Los Alamos and Livermore pension liabilities. The Senate bill would provide $54 million less than the request for naval reactors. The Senate report directs DOE not to fund design, preparation, or execution of a "scaled experiment," one element of the Administration's proposal for advanced weapons certification.

The request for DOE energy R&D is $4.856 billion, up 59.2% from $3.050 billion in FY2011. Most energy efficiency and renewable energy subprograms would increase by between 50% and 200%, with the exception of R&D on hydrogen and fuel cell technologies, which would increase by just 2.5%. "Consistent with the Administration's policy to phase out fossil fuel subsidies," the request includes no funds for natural gas technologies or unconventional fossil energy technologies.[49] The request for nuclear energy is a 4% increase from FY2011. The request would more than triple the funding of the Advanced Research Projects Agency–Energy (ARPA-E) to $650 million (including $100 million in mandatory funding from a proposed Wireless Innovation Fund supported by the proceeds of spectrum auctions). The House bill would provide $2.731 billion for DOE energy R&D, including $1.570 billion less than the request for energy efficiency and renewables and $25 million more than the request for fossil energy R&D. The Senate bill would provide $2.755 billion, including $1.245 billion less than the request for efficiency and renewables, $195 million less than the request for fossil energy R&D, and $170 million less than the request for nuclear energy. Both bills would provide about half the request for electricity delivery and reliability R&D and less than half the request for ARPA-E.

[49] DOE FY2012 budget justification, vol. 3, pp. 513 and 517.

Table 9. Department of Energy R&D and Related Programs

(in millions of dollars)

	FY2011 Enacted	FY2012 Request	FY2012 House	FY2012 Senate
Science	**$4,843**	**$5,416**	**$4,800**	**$4,843**
Basic Energy Sciences	1,678	1,985	1,688	1,694
High Energy Physics	795	797	797	780
Biological and Environmental Research	612	718	547	622
Nuclear Physics	540	605	552	550
Advanced Scientific Computing Research	422	466	427	442
Fusion Energy Sciences	375	400	406	335
Other	420	445	382	420
National Security	**3,718**	**4,175**	**3,725**	**3,955**
Weapons Activities[a]	2,379[b]	2,572	2,338	2,426
Naval Reactors	959	1,154	1,031	1,100
Nonproliferation and Verification R&D	361	418	346	418
Defense Environmental Cleanup Technol. Development	19	32	10	11
Energy	**3,050**	**4,856**	**2,731**	**2,755**
Energy Efficiency and Renewable Energy[c]	1,594	2,806	1,237	1,561
Fossil Energy R&D	445	453	477	258
Nuclear Energy	726	754	734	584
Electricity Delivery & Energy Reliability R&D	105	193	104	101
Advanced Research Projects Agency–Energy	180	650[d]	180	250
Total	**11,610**	**14,447**	**11,256**	**11,552**

Source: FY2011 enacted from P.L. 112-10, H.Rept. 112-118, and S.Rept. 112-75. FY2012 request from DOE FY2012 budget justification, online at http://www.cfo.doe.gov/budget/12budget/index12.html. FY2012 House from H.R. 2354 as passed by the House and H.Rept. 112-118. FY2012 Senate from H.R. 2354 as reported in the Senate and S.Rept. 112-75.

Notes: Totals may differ from the sum of their components due to rounding. All amounts are reduced for use of prior-year balances.

a. Including Stockpile Services R&D Support, Stockpile Services R&D Certification and Safety, Science, Engineering except Enhanced Surety and Enhanced Surveillance, Inertial Confinement Fusion, Advanced Simulation and Computing, National Security Applications, and a prorated share of Readiness in Technical Base and Facilities (and Legacy Contractor Pensions in the House bill). Additional R&D activities may take place in the subprograms of Directed Stockpile Work that are devoted to specific weapon systems, but these funds are not included in the table because detailed funding schedules for those subprograms are classified.

b. Estimated by CRS. Some sub-account amounts in this category were not specified by P.L. 112-10 or stated in the House or Senate committee reports.

c. Excluding Weatherization and Intergovernmental Activities.

d. Includes $100 million in proposed mandatory funding.

National Science Foundation[50]

The National Science Foundation (NSF) supports basic research and education in the non-medical sciences and engineering. Congress established the Foundation as an independent federal agency in 1950 and directed it to "promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes."[51] The NSF is a primary source of federal support for U.S. university research, especially in certain fields such as mathematics and computer science. It is also responsible for significant shares of the federal science, technology, engineering, and mathematics (STEM) education program portfolio and federal STEM student aid and support.

The President's FY2012 budget request for the NSF was $7.767 billion, a $961.1 million increase (14.1%) over NSF's FY2011 Current Plan level of $6.806 billion.[52] Most of the Administration's requested increase would have gone to the main research conduct account. The remainder would have gone to other Foundation accounts, including those that primarily support education, agency operations, and research facilities and equipment. Overall, the distribution of the Administration's FY2012 requested increase was largely consistent with the previously existing distribution of funds across the NSF.

P.L. 112-55 provides $7.033 billion to the NSF in FY2012. This amount is $227.2 million (3.3%) more than the FY2011 Current Plan level and $733.9 million (9.4%) less than the President's request. (See **Table 10** for details.) Compared to the distribution of funding across NSF accounts under the FY2011 Current Plan, P.L. 112-55 shifts about 1.0% of the Foundation's budget to research and construction activities from education and agency operations in FY2012. This change appears to reflect the position of the House Appropriations Committee's recommendation, which favored the research account, combined with the Senate's position, which favored the construction account.

A primary concern in the congressional debate about FY2012 funding for NSF centered on the so-called "doubling path" policy. Since 2006 federal policymakers have sought to increase support for research in the physical sciences and engineering. To that end, they sought to double aggregate funding for the NSF, NIST laboratories and construction accounts, and the DOE Office of Science (collectively, the "targeted accounts"), which many policymakers perceive as key to U.S. innovation and competitiveness.[53] The current status of the doubling path is discussed in detail in this report in the "Presidential Initiatives" section.

[50] This section was written by Heather B. Gonzalez, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division. Numbers are rounded. Data available upon request.

[51] The National Science Foundation Act of 1950 (P.L. 81-507).

[52] National Science Foundation, *FY2012 Budget Request to Congress*, February 14, 2011, http://www.nsf.gov/about/budget/fy2012/pdf/00a_fy2012.pdf; and NSF "FY2011 Current Plan, By Program Activity" as per e-mail communication between CRS and Karen Pearce, senior legislative policy analyst, Office of Legislative and Public Affairs, National Science Foundation, July 21, 2011. The NSF FY2011 Current Plan excludes a $54.0 million transfer to the U.S. Coast Guard for icebreaking services.

[53] For additional information on the doubling effort, see CRS Report R41951, *An Analysis of Efforts to Double Federal Funding for Physical Sciences and Engineering Research*, by John F. Sargent Jr.

Another issue raised in the general debate about funding for NSF focused on the Foundation's ability to effectively manage its grants. This is relevant to R&D policy because much of the Foundation's R&D funding is distributed via the grant process. In a House hearing, NSF's Inspector General Allison C. Lerner testified that—among other issues—the Foundation faced ongoing challenges in ensuring that grant recipients comply with grant terms and conditions. According to Lerner's testimony, the NSF attributes this problem, at least in part, to staffing constraints. Lerner postulated that, "If the Foundation's budget continues to grow, the resulting increase in awards to monitor will compound this challenge."[54]

Research and Related Activities (RRA) is the largest account at the NSF. It is also the largest source of R&D grants and funding at the Foundation. The Administration requested $6.254 billion for RRA in FY2012, a $743.7 million (13.5%) increase over the FY2011 Current Plan level of $5.510 billion. The Administration's FY2012 request for RRA highlighted research in cyber-infrastructure, clean energy, nanotechnology, robotics, and the SEES (Science, Engineering, and Education for Sustainability) portfolio, among others.

P.L. 112-55 provides $5.719 billion for RRA in FY2012. This amount is $209.1 million (3.8%) more than the FY2011 Current Plan level and $534.5 million (8.5%) less than the President's request. Among other things, P.L. 112-55 allows the NSF to transfer up to $50.0 million from RRA to the Foundation's main construction account and permits the NSF to use RRA funds to reimburse other federal agencies for support of the U.S. Antarctic program. If the NSF exercises this authority, the actual amount available to RRA activities in FY2012 would be reduced. The House Appropriations Committee recommended increasing the RRA account by $91.5 million (1.7%) over the FY2011 Current Plan level.[55] As initially passed by the Senate, H.R. 2112 would have reduced the RRA account by $66.9 million (1.2%) from the FY2012 Current Plan level.

In addition to the provisions specifically included in the conference report on the bill (H.Rept. 112-284), the report also approves report language included in H.Rept. 112-169 or S.Rept. 112-78 that is not changed by the conference in its report. The conference report on H.R. 2112 (which became P.L. 112-55) endorses Administration-proposed reductions to RRA programs in FY2012—except for the proposed changes to the Radio Astronomy program. It also adopts language from H.Rept. 112-169 supporting planned NSF activities in advanced manufacturing and agreed to language from S.Rept. 112-78 providing $165.6 million for cybersecurity research. Provisions in one or more of the reports include encouraging the Foundation to sustain and increase investments in neuroscience; directing the NSF to report on its plans to offer innovation prizes and on ways to balance access to, and protection of, scientific data; and attending to the Foundation's astronomy activities, as well as its support for scientific facilities and instrumentation.

P.L. 112-55 also provides $150.9 million in RRA funds for the Experimental Program to Stimulate Competitive Research (EPSCoR) program in FY2012. This amount is $4.1 million more than the FY2011 enacted funding level of $146.8 million and $9.6 million less than the Administration's FY2012 request. The EPSCoR program seeks to improve the research

[54] Testimony of NSF Inspector General Allison C. Lerner, in U.S. Congress, House Committee on Appropriations, Subcommittee on Commerce, Justice, Science, and Related Agencies, *Oversight of the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA)*, hearings, 112th Cong., 1st sess., February 11, 2011, p. 3, http://appropriations.house.gov/_files/NSFIGAllisonCLerner.pdf.

[55] The House Committee on Appropriations' recommendation for RRA included $54.0 million that in prior years was transferred to the U.S. Coast Guard for icebreaking services.

competitiveness of states with historically low federal research funding rates. NSF's FY2012 budget documents indicate that the Foundation plans to have EPSCoR independently evaluated.[56]

Other accounts that support R&D at the National Science Foundation include the Major Research Equipment and Facilities Construction (MREFC) and the Education and Human Resources (EHR) accounts. Although EHR primarily funds STEM education programs, the Foundation indicates that it supports R&D in this account as well.

The Administration's FY2012 MREFC request for $224.7 million was a $107.6 million increase (91.9%) over the FY2011 Current Plan level of $117.1 million. The MREFC request included funding for the National Ecological Observatory Network (NEON, $87.9 million), Ocean Observatories Initiative (OOI, $102.8 million), and other projects. The Administration requested no new MREFC funds for the Alaska Region Research Vessel or IceCube Neutrino Observatory in FY2012, both of which are now fully funded.

P.L. 112-55 provides $167.1 million for the MREFC account in FY2012, which is $50.0 million (42.8%) more than the FY2011 Current Plan level and $57.6 million (25.6%) less than the Administration's FY2012 budget request. In addition, P.L. 112-55 gives the Foundation the option of transferring as much as $50.0 million from RRA to MREFC. The conference report on H.R. 2112 directs the NSF to prioritize projects that are near completion and raises concerns about construction funding management at the Foundation (particularly the management of contingency funds). S.Rept. 112-78 states that its recommendation includes funding for certain ongoing projects (e.g., Atacama Large Millimeter Array) and for continued construction of the OOI. S.Rept. 112-78 also indicates that the NSF may use funds transferred from the RRA account to fully fund OOI or begin work on NEON.

The President requested $911.2 million for EHR in FY2012, a $50.2 million increase (5.8%) over the FY2011 Current Plan level of $861.0 million. Relative to the FY2011, the FY2012 request would have shifted (by 1.2%) the EHR portfolio in the direction of graduate support.[57] This is relevant to R&D policy because (1) graduate students are a significant component of the U.S. R&D workforce, and (2) because graduate student enrollment in science and engineering (S&E) fields appears to be increasing, which may increase demand for the Graduate Research Fellowship (GRF) and thereby increase caseload pressure on this account. The Administration's FY2012 request also proposed program changes in EHR including reorganization, addition, and elimination of programs.

P.L. 112-55 provides $829.0 million for EHR in FY2012. This amount is $32.0 million (-3.7%) less than the FY2011 Current Plan level and $82.2 million (-9.1%) less than the Administration's request. The conference report on H.R. 2112 endorses the Administration's proposed terminations and reductions in EHR—except for proposed reductions to the Math and Science Partnership and Robert Noyce Scholarship programs. The conference report also adopts FY2011 funding levels for NSF's Broadening Participation at the Core programs (e.g., the Tribal Colleges and Universities Program), directs the NSF to report on how it will address the needs of Hispanic-Serving Institutions, and provides $20.0 million more than the requested level of funding for the Federal Cyber Service: Scholarships for Service program ($45.0 million, total)—among other

[56] National Science Foundation, "Integrative Activities," *FY2012 Budget Request to Congress*, February 14, 2011, p. IA-4, http://www.nsf.gov/about/budget/fy2012/pdf/00a_fy2012.pdf.IA-4.

[57] Budget data as per e-mail communication between CRS and House Appropriations Committee staff, July 19, 2011.

things. Both H.Rept. 112-169 and S.Rept. 112-78 urge the NSF to ensure that GRF applicants are not rejected for reasons unrelated to the merits of their proposed research (e.g., the applicant's major). S.Rept. 112-78 strongly encourages NSF to continue support for undergraduate STEM education and the Professional Science Master's program.

The Administration requested $357.7 million for the Agency Operations and Award Management (AOAM) account, a $58.3 million (19.5%) increase over NSF's FY2011 Current Plan level of $299.4 million. The FY2012 request included funding for a new NSF headquarters. The Administration also sought increases of $1.0 million and $0.3 million, respectively, for NSF's Office of the Inspector General (OIG) and the National Science Board (NSB). P.L. 112-55 provides $299.4 million for the AOAM account, $14.2 million for the OIG ($200,000 increase over the FY2011 Current Plan level), and $4.4 million for the NSB. S.Rept. 112-78 states that the purpose of the increase for the OIG is to enhance accountability. H.Rept. 112-169 encourages the OIG to focus specifically on oversight activities with potential monetary ramifications (such as grantee oversight and management).

The Administration's FY2012 budget request proposed funding for certain NSF-wide investments that draw from more than one Foundation account, including the interagency Networking and Information Technology Research and Development (NITRD) and National Nanotechnology Initiative (NNI) efforts, and NSF's Science, Engineering, and Education for Sustainability (SEES) portfolio. For FY2012 the Administration requested $1.258 billion for NITRD[58] and $456.0 million for the NNI.[59] (NSF is a principal funding agency for both of these efforts.) The Administration also asked for $998.2 million for the SEES portfolio.[60] FY2012 Congressional funding bills and related documents do not specify funding for these accounts as such.

Finally, the Administration's FY2012 request proposed eliminating six NSF programs: Deep Underground Science and Engineering Laboratory, Graduate STEM Fellow in K-12 Education, National STEM Distributed Learning Program, Research Initiation Grants to Broaden Participation in Biology, Science Learning Centers, and the Synchrotron Radiation Center. Funds from these activities would be redirected to other Foundation accounts.

Table 10. National Science Foundation

(in millions of dollars)

	FY2011 Current Plan	FY2012 Request	H.R. 2596 As Reported in House	H.R. 2112 As Passed in Senate	FY2012 Enacted P.L. 112-55
Biological Sciences	711.6	794.5	n/d	n/d	n/d
Computer & Information Science & Engineering	635.1	728.4	n/d	n/d	n/d
Engineering	762.7	908.3	n/d	n/d	n/d
Geosciences	884.8	979.2	n/d	n/d	n/d

[58] For more information on NITRD, see CRS Report RL33586, *The Federal Networking and Information Technology Research and Development Program: Background, Funding, and Activities*, by Patricia Moloney Figliola.

[59] For more information on the NNI, see CRS Report RL34401, *The National Nanotechnology Initiative: Overview, Reauthorization, and Appropriations Issues*, by John F. Sargent Jr.

[60] The SEES portfolio focuses on sustainability, including fundamental climate and energy science research.

	FY2011 Current Plan	FY2012 Request	H.R. 2596 As Reported in House	H.R. 2112 As Passed in Senate	FY2012 Enacted P.L. 112-55
Mathematical and Physical Sciences	1,308.3	1,432.7	n/d	n/d	n/d
Social, Behavioral & Economic Sciences	247.2	301.1	n/d	n/d	n/d
Office of Cyberinfrastructure	209.9	236.0	n/d	n/d	n/d
Office of International Science & Engineering	49.0	58.0	n/d	n/d	n/d
U.S. Polar Programs	439.4	477.4	n/d	n/d	n/d
Integrative Activities	260.3	336.3	n/d	n/d	n/d
U.S. Arctic Research Comm.	1.6	1.6	n/d	n/d	n/d
Subtotal Research & Related Activities	**5,509.9**	**6,253.5**	**5,601.4**	**5,443.0**	**5,719.0**
Education & Human Resources	861.0	911.2	834.2	829.0	829.0
Major Research Equipment & Facilities Construction	117.1	224.7	99.9	117.1	167.1
Agency Ops. & Award Mgmt.	299.4	357.7	299.1	290.4	299.4
National Science Board	4.5	4.8	4.5	4.4	4.4
Office of Inspector General	14.0	15.0	14.0	14.2	14.2
Total NSF	**6,805.9**	**7,767.0**	**6,853.0**	**6,698.1**	**7,033.1**

Source: National Science Foundation, *FY2012 Budget Request to Congress,* Arlington, VA, February 14, 2011; and NSF "FY2011 Current Plan, By Program Activity" as per e-mail communication between the author and Karen Pearce, senior legislative policy analyst, Office of Legislative and Public Affairs, National Science Foundation, July 21, 2011.

Notes: The totals do not include carryovers or retirement accruals. Totals may differ from the sum of the components due to rounding. FY2011 enacted levels may differ. U.S. Polar Programs funding levels in the FY2011 Current Plan column *exclude* $54.0 million transferred to the U.S. Coast Guard for icebreaking services (per P.L. 112-10). The term "n/d" means "not defined."

Department of Commerce

National Institute of Standards and Technology[61]

The National Institute of Standards and Technology (NIST) is a laboratory of the Department of Commerce with a mandate to increase the competitiveness of U.S. companies through appropriate support for industrial development of precompetitive, generic technologies and the diffusion of government-developed technological advances to users in all segments of the American economy. NIST research also provides the measurement, calibration, and quality assurance techniques that

[61] This section was written by Wendy H. Schacht, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

underpin U.S. commerce, technological progress, improved product reliability, manufacturing processes, and public safety.

The final FY2012 appropriation for NIST totals $750.8 million, essentially the same as the $750.1 million provided in FY2011. This amount is 25.0% below the Administration's request; 7.1% above H.R. 2596, as reported from the House Committee on Appropriations; and 10.4% more than H.R. 2112, as originally passed by the Senate. Support for research and development under the Scientific and Technical Research and Services (STRS) account increases 14.0% from the FY2011 figure of $497.4 million to $567.0 million. This figure represents a 16.5% decrease from the President's proposal, but is 9.7% more than that contained in H.R. 2596 and is 13.4% above the amount in the Senate-passed version of H.R. 2112. Under the Industrial Technology Services (ITS) account, the Manufacturing Extension Partnership (MEP) program receives $128.4 million, the same appropriation as FY2011, 10.0% less than the budget request, identical to the support included in H.R. 2596, and 7.0% above H.R. 2112 as first passed by the Senate. No funding is provided for the Technology Innovation Program (TIP), the Baldrige National Quality Program, or a new program proposed in the President's budget called the Advanced Manufacturing Technology Consortia (AMTech). The construction budget is $55.4 million, 20.7% less than FY2011, 34.5% below the budget proposal, the same as in H.R. 2596, and 7.7% less than the original Senate-passed version of H.R. 2112.

The Administration's FY2012 budget proposed $1.001 billion in funding for NIST, a 33.4% increase over the FY2011 appropriation. The STRS account would have expanded 36.5% to $678.9 million (excluding the Baldrige National Quality Program which has been transferred out of STRS). Budgeted under the ITS account, the MEP program would have received $142.6 million, 11.1% more than FY2011, while funding for TIP would have increased to $75.0 million, 67.4% over the FY2011 figure. Also under ITS, support for the Baldrige program would have decreased 19.8% to $7.7 million. A new program, AMTech, would have been created and funded at $12.3 million. The construction budget would have increased 21.0% to $84.6 million. (See **Table 11**.)

H.R. 2596, as reported from the House Committee on Appropriations, would have provided $700.8 million for NIST, 6.6% below the FY2011 appropriation and 30.0% below the President's request. The $517.0 million in funding for the STRS account represented a 3.9% increase over FY2011, but would have been 23.8% below the proposed budget number. Support for MEP at $128.4 million was the same as FY2011, but would have been 10.0% less than the Administration's request. Construction funding of $55.4 million reflected a 20.7% decrease from the FY2011 figure and was 34.5% below the budget proposal. No appropriations were provided for TIP, the Baldrige program, or AMTech.

The FY2012 consolidated appropriations bill covering the Department of Commerce (among other agencies) originally passed by the Senate, H.R. 2112, would have funded NIST at $680.0 million, 2.9% below the amount in H.R. 2596, 32.1% below the Administration's budget request, and 9.3% below the FY2011 appropriation. Funding for the STRS account totaled $500.0 million, 3.2% below the figure in H.R. 2596, 26.4% less than the budget request, and 1.4% below the amount appropriated in FY2011. Under the ITS account, $120.0 million would be provided for the MEP program. This amount was 6.5% less than that recommended in H.R. 2596 and that appropriated for FY2011, as well as 15.8% less than the Administration's budget figure. No funding was provided for TIP, the Baldrige National Quality Program, or AMTech. Construction support would have totaled $60.0 million, 8.3% more than the amount included in the House bill, 29.1% below the President's budget number, and 14.2% below the FY2011 appropriation.

NIST's extramural programs (currently the Manufacturing Extension Partnership and the Technology Innovation Program), which are directed toward increased private sector commercialization, have been a source of contention. The Administration's FY2012 budget would have established and provided support for an additional extramural program, AMTech. Some Members of Congress have expressed skepticism over a "technology policy" based on providing federal funds to industry for the development of "pre-competitive generic" technologies. This approach, coupled with pressures to balance the federal budget, has led to significant reductions in appropriations for several of these NIST activities. The Advanced Technology Program (ATP) and the MEP, which accounted for more than 50% of the FY1995 NIST budget, were proposed for elimination. In 2007, ATP was terminated and replaced by the Technology Innovation Program. The final FY2012 appropriations legislation does not provide any funding for TIP or the AMTech program requested by the President.[62]

Increases in spending for NIST laboratories that perform the research essential to the mission responsibilities of the agency have tended to remain small. As part of the American Competitiveness Initiative, announced by former President Bush in the 2006 State of the Union address, the Administration stated its intention to double funding over 10 years for "innovation-enabling research" done, in part, at NIST through its "core" programs (defined as the STRS account and the construction budget). In April 2009, President Obama indicated his decision to double the budget of key science agencies, including NIST, over the next 10 years. In President Obama's FY2011 budget the timeframe for doubling slipped to 11 years and his FY2012 budget was intentionally silent on a timeframe for doubling. While the FY2012 appropriations do not include an increase in support for NIST, there is a substantial (14.0%) increase in funding for R&D under the STRS account. [63]

Table 11. NIST

(in millions of dollars)

NIST Program	FY2011 Enacted	FY2012 Request	H.R. 2596 As Reported	H.R. 2112 As Passed by Senate	FY2012 Enacted P.L. 112-55
STRS[a]	497.4	678.9	517.0	500.0	567.0
ITS					
TIP	44.8	75.0	0	0	0
MEP	128.4	142.6	128.4	120.0	128.4
Baldrige Program	9.6	7.7	0	0	0
AMTech		12.3	0	0	0
Construction	69.9	84.6	55.4	60.0	55.4
NIST Total[b]	**750.1**	**1001.1**	**700.8**	**680.0**	**750.8**

[62] For additional information on the MEP and TIP programs, see CRS Report RS22815, *The Technology Innovation Program*, and CRS Report 97-104, *Manufacturing Extension Partnership Program: An Overview*, both by Wendy H. Schacht.

[63] For additional information on NIST, see CRS Report 95-30, *The National Institute of Standards and Technology: An Appropriations Overview*.

Sources: NIST website (available at http://www.nist.gov/public_affairs/budget.htm), P.L. 111-117, P.L. 112-10, and Administration's FY2012 Budget Request.

a. Excludes FY2011 funding for the Baldrige National Quality Program; funding for this program is included in FY2011 Enacted columns under ITS for comparison purposes.

b. Totals may differ from the sum of the components due to rounding.

National Oceanic and Atmospheric Administration[64]

The Commerce Department's National Oceanic and Atmospheric Administration (NOAA) conducts scientific research in areas such as ecosystems, climate, global climate change, weather, and oceans; supplies information on the oceans and atmosphere; and manages coastal and marine organisms and environments. NOAA was created in 1970 by Reorganization Plan No. 4.[65] The reorganization was intended to unify certain of the nation's environmental activities and to provide a systematic approach for monitoring, analyzing, and protecting the environment.

NOAA's R&D efforts focus on three areas: climate; weather and air quality; and ocean, coastal, and Great Lakes resources. For FY2012, President Obama requested $736.9 million in R&D funding for NOAA, a 17.1% increase in funding from the FY2011 level of $629.2 million. R&D accounted for 13.4% of NOAA's total FY2012 discretionary budget request of $5.486 billion. The R&D request consisted of $490 million for research (66.5%), $85 million for development (11.5%), and $162 million for R&D equipment (22.0%). Excluding equipment, about $412 million (71.6%) of the R&D request would have funded intramural programs and $163 million (28.3%) would have funded extramural programs.[66]

NOAA's administrative structure has evolved into five line offices that reflect its diverse mission, including the National Ocean Service (NOS); National Marine Fisheries Service (NMFS); National Environmental Satellite, Data, and Information Service (NESDIS); National Weather Service (NWS); and Office of Oceanic and Atmospheric Research (OAR). In addition to NOAA's five line offices, Program Support (PS), a cross-cutting budget activity, includes the Office of Marine and Aviation Operations (OMAO). NOAA's FY2012 budget request proposed a budget neutral reorganization of its administrative structure by establishing a Climate Service (CS) line office. The conference agreement did not establish a NOAA Climate Service as requested by the Administration and recommended by the Senate.

Table 12 provides R&D funding levels by line office for FY2010, FY2011, and the FY2012 request.[67] At this time R&D funding levels by NOAA line office for FY2012 (P.L. 112-55) are not available. NOAA discretionary funding totals are included in **Table 12** to provide context in lieu of specific R&D funding levels.

[64] This section was written by Harold F. Upton, Analyst in Natural Resources Policy, CRS Resources, Science, and Industry Division.

[65] "Reorganization Plan No. 4 of 1970," 35 *Fed. Reg.* 15627-15630, October 6, 1970; also, see http://www.lib.noaa.gov/noaainfo/heritage/ReorganizationPlan4.html.

[66] National Oceanic and Atmospheric Administration, *National Oceanic and Atmospheric Administration FY 2012 Budget Summary*, National Oceanic and Atmospheric Administration, Washington, DC, February 2011, http://www.corporateservices.noaa.gov/nbo/fy12_bluebook/chapter7_Research_Development.pdf.

[67] Stacy Dennery, Budget Analyst, NOAA Budget Office, e-mail, November 15, 2011.

The NOAA Research Council, an internal body composed of scientific personnel, developed the current NOAA 5-Year Research Plan for 2008-2012. The plan identified the most pressing research challenges as a set of six overarching questions. NOAA's research and development portfolio is structured around finding answers to these questions:[68]

> What factors, human and otherwise, influence ecosystem processes and impact our ability to manage marine ecosystems and forecast their future state?
>
> What is the current state of biodiversity in the oceans, and what impacts will external forces have on this diversity and how we use our oceans and coasts?
>
> What are the causes and consequences of climate variability and change?
>
> What improvements to observing systems, analysis approaches, and models will allow us to better analyze and predict the atmosphere, ocean, and hydrological land processes?
>
> How can the accuracy and warning times for severe weather and other high-impact environmental events be increased significantly?
>
> How are uncertainties in our analysis and predictions best estimated and communicated?

Table 12. NOAA R&D

(in millions of dollars)

NOAA Line Office	FY2010 Actual	FY2011 Enacted	FY2012 Request	FY2012 Enacted P.L. 112-55
NOS	$71.9	$71.6	$91.0	
NMFS	54.6	55.4	84.0	
OAR	405.5	390.0	175.1	
CS	N/A	N/A	246.5	
NWS	41.2	21.5	34.1	
NESDIS	25.7	28.9	28.4	
OMAO[a]	85.8	61.8	77.8	
Total R&D[b]	**684.7**	**629.2**	**736.9**	
NOAA Total	**4,737.5**	**4,586.0**	**5,485.7**	**4,893.7**

Sources: Emily Larkin, NOAA Budget Office, e-mail, March 7, 2011.

a. All OMAO R&D funding is for equipment.

b. Totals may differ from the sum of the components due to rounding.

[68] National Oceanic and Atmospheric Administration, *National Oceanic and Atmospheric Administration FY 2012 Budget Summary*, National Oceanic and Atmospheric Administration, Washington, DC, February 2011, http://www.corporateservices.noaa.gov/nbo/fy12_bluebook/chapter7_Research_Development.pdf.

National Aeronautics and Space Administration[69]

The Administration requested $16.637 billion for NASA R&D in FY2012. This amount was an increase of 11.0% over the FY2011 enacted level of $14.991 billion. The House Appropriations Committee recommended $14.941 billion. The Senate Appropriations Committee recommended $15.885 billion. The final appropriation was $15.850 billion. For a breakdown of these amounts, as well as the amounts authorized for NASA in FY2012 by the NASA Authorization Act of 2010 (P.L. 111-267), see **Table 13**.

The increase in NASA R&D funding in FY2012, despite a decrease in funding for NASA as a whole, was made possible by the retirement of the space shuttles. The space shuttle program is classified as an operational expense, not R&D. The last shuttle flight was completed in July 2011.[70]

The Administration's $5.017 billion request for NASA Science in FY2012 was a 2.0% increase from FY2011. The request included continuation of a global climate research initiative first proposed in FY2011 and support for the development and launch of several missions recommended by the National Academies in the 2007 decadal survey.[71] An independent review of the James Webb Space Telescope (JWST) in October 2010 estimated that the project was 15 months behind schedule and $1.4 billion over budget.[72] The revised JWST program that NASA developed in response to this finding has an estimated total lifecycle cost of $8.835 billion and projects a launch date in 2018.[73] The House committee recommended $4.499 billion for Science, including $100 million less than the request for Earth Science and no funding for JWST. The Senate committee recommended $5.100 billion, including $156 million more than the request for JWST, and recommended capping the development portion of the cost of JWST at $8 billion. The final appropriation was $5.090 billion, including the same amount as the Senate for JWST. The final bill capped the formulation and development cost of JWST at $8 billion. The conference report directed the Government Accountability Office to assess the JWST program continuously and provide annual reports on the program's management, cost, schedule, and technical status.

The request for Aeronautics was $569 million, an increase of 6.7% from FY2011. The request included increases for selected research topics, such as the effects of high-altitude ice crystals on aircraft, in categories identified by the 2010 authorization act (P.L. 111-267, Sec. 902). The requested funding for hypersonics was reduced and focused on foundational research. The House committee recommended the requested amount and supported NASA's proposed shifts of emphasis within the program. The Senate committee recommended $501 million. The final appropriation was $570 million.

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[69] This section was written by Daniel Morgan, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

[70] The space shuttle program continued to receive an appropriation in FY2012, mostly to cover a shortfall in the defined benefit pension plan of the contractor that managed space shuttle operations.

[71] National Research Council, *Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond*, 2007, http://www.nap.edu/catalog/11820.html.

[72] Final report of the JWST Independent Comprehensive Review Panel, October 29, 2010, http://www.nasa.gov/pdf/499224main_JWST-ICRP_Report-FINAL.pdf; and GAO, *NASA: Assessments of Selected Large-Scale Projects*, GAO-11- 239SP, March 2011, http://www.gao.gov/new.items/d11239sp.pdf.

[73] S.Rept. 112-284, p. 254. Full details of the JWST replan are expected to be released in February 2012 as part of the FY2013 budget request.

For Space Technology, the Administration requested $1.024 billion. About half of this total ($497 million) was for Crosscutting Space Technology Development (CSTD), a mostly new activity. The request for CSTD was comparable to the amount authorized for Space Technology in FY2012 by the 2010 authorization act ($486 million). Most of the remainder of the request for Space Technology was for two activities transferred from other accounts: Exploration Technology Development from the Exploration account and Small Business Innovation Research from the Cross-Agency Support account. The request proposed roughly doubling the funding for the transferred activities. The House committee recommended a total of $375 million for Space Technology. The House committee report stated that "NASA's proposal to more than triple the size of this program over the course of two fiscal years is premature," but that ongoing program planning during FY2012 "will put the program in a stronger position to seek additional resources in future requests." The Senate committee recommended $637 million, including $210 million for CSTD. The Senate committee report expressed "regret" at "not being able to fund this promising new program more robustly." The final appropriation was $575 million, to be "prioritized toward the continuation of ongoing programs and activities."

The Administration's request for Exploration in FY2012 was $3.949 billion, a 0.5% increase over FY2011 but about 25% less than the authorized amount. Before passage of the final FY2011 appropriation, the bulk of this account funded the Constellation program, including the Orion crew vehicle and the Ares I rocket for carrying humans into low Earth orbit and the heavy-lift Ares V cargo rocket and other systems needed for a human mission to the Moon. In FY2012, the account instead funds development of the Multipurpose Crew Vehicle (MPCV) and heavy-lift Space Launch System (SLS) mandated by the 2010 authorization act. Although this is a substantial change, many elements of Orion and Ares are included in the MPCV and SLS. The Exploration request included $2.810 billion for MPCV and SLS in FY2012, compared with "not less than" $2.994 billion in the FY2011 appropriation and $4.050 billion for FY2012 in the authorization act. The request also included $850 million in FY2012 to help companies develop commercial crew transport services to low Earth orbit, compared with $307 million in FY2011 and $500 million for FY2012 in the authorization act.[74] The House committee recommended $3.645 billion for Exploration, including $3.045 billion for MPCV and SLS and $312 million for commercial crew. The Senate committee recommended $3.775 billion, including $3.000 billion for MPCV and SLS and $500 million for commercial crew. The final appropriation was $3.771 billion, including $3.060 billion for MPCV and SLS and $406 million for commercial crew. The conference report directed NASA to develop "a set of science-based exploration goals; a target destination or destinations that will enable the achievement of those goals; a schedule for the proposed attainment of those goals; and a plan for any proposed collaboration with international partners."

The request for the International Space Station (ISS) was $2.842 billion, an increase of 4.7% from FY2011. The request included an additional $60 million for ISS research, as well as increased funding for crew and cargo transportation to and from orbit. Because of the retirement of the space shuttles in FY2011, transportation services in FY2012 will be obtained under contract with international partners and commercial providers. The House committee recommended $2.764 billion for the ISS. The Senate committee recommended $2.804 billion. The final appropriation was $2.830 billion.

[74] Funding for Commercial Spaceflight in FY2011 also included $299 million to develop commercial cargo services.

Table 13. NASA R&D

(in millions of dollars)

	FY2011 Enacted	FY2011 Op. Plan	FY2012 Auth.	FY2012 Request	FY2012 House	FY2012 Senate	FY2012 Final
Science	$4,935.4	$4,919.7	$5,248.6	$5,016.8	$4,499.5	$5,100.0	$5,090.0
Earth Science	*n/a*	*1,721.9*	*1,944.5*	*1,797.4*	*1,697.3*	*1,765.5*	*1,765.7*
Planetary Science	*n/a*	*1,449.2*	*1,547.2*	*1,540.7*	*1,498.5*	*1,500.4*	*1,500.4*
Astrophysics	*n/a*	*1,109.5*	*1,109.3*	*682.7*	*682.3*	*682.2*	*672.0*
James Webb Space Telescope[a]	—	—	—	*373.7*	*0.0*	*529.6*	*529.6*
Heliophysics	*n/a*	*639.2*	*647.6*	*622.3*	*621.4*	*622.3*	*622.3*
Aeronautics	533.9	533.5	584.7	569.4	569.4	501.0	569.9
Space Technology	—	—	486.0	1,024.2	374.6	637.0	575.0
Exploration	3,800.7	3,928.6	5,252.3	3,948.7	3,645.4	3,775.0	3,770.8
Human Exploration Capabilities	*2,994.0*[b]	*2,982.1*	*4,050.0*	*2,810.2*	*3,045.0*	*3,000.0*	*3,060.0*
Commercial Spaceflight	*n/a*	*606.8*	*500.0*	*850.0*	*311.7*	*500.0*	*406.0*
Exploration R&D	*n/a*	*339.7*	*702.3*	*288.5*	*288.7*	*275.0*	*304.8*
International Space Station	n/a	2,713.6	2,952.2	2,841.5	2,764.2	2,803.5	2,830.0
Subtotal R&D	**n/a**	**12,095.4**	**14,523.8**	**13,400.6**	**11,853.1**	**12,816.5**	**12,835.7**
Other NASA Programs[c]	n/a	2,789.0	1,372.8	1,681.4	1,469.9	1,657.2	1,579.3
Cross-Agency Support[d]	3,105.2	3,130.7	3,189.6	3,192.0	3,047.0	3,043.1	2,995.0
Associated with R&D	*n/a*	*2,544.1*	*2,914.2*	*2,836.1*	*2,710.8*	*2,694.7*	*2,666.9*
Associated with Other	*n/a*	*586.6*	*275.4*	*355.9*	*336.2*	*348.4*	*328.1*
Construction & Environ. C&R[d]	393.5	432.8	363.8	450.4	423.6	422.0	390.0
Associated with R&D	*n/a*	*351.7*	*332.4*	*400.2*	*376.8*	*373.7*	*347.3*
Associated with Other	*n/a*	*81.1*	*31.4*	*50.2*	*46.7*	*48.3*	*42.7*
Total R&D	**n/a**	**14,991.2**	**17,770.3**	**16,636.9**	**14,940.7**	**15,884.9**	**15,849.8**
Total NASA	**18,448.0**	**18,448.0**	**19,450.0**	**18,724.3**	**16,793.4**	**17,938.8**	**17,800.0**

Source: FY2011 enacted from P.L. 112-10. FY2011 operating plan from NASA's August 2011 operating plan. FY2012 authorized from P.L. 111-267. FY2012 request from NASA's FY2012 congressional budget justification, http://www.nasa.gov/news/budget/. FY2012 House from H.R. 2596 as reported and H.Rept. 112-169. FY2012 Senate from S. 1572 as reported and S.Rept. 112-78. FY2012 final from P.L. 112-55 and H.Rept. 112-284.

Notes: Totals and subtotals may differ from the sum of their components due to rounding. FY2011 enacted amounts for some items are not available (n/a) because in most cases P.L. 112-10 did not specify how to allocate funds below the account level. FY2012 House amounts are adjusted for the 0.1% general rescission (H.R. 2596, Sec. 543). The rescission of $30 million in unobligated prior-year funds in the House bill (H.R. 2596, Sec. 528(e)) and the final act (P.L. 112-55, Sec. 528(f)) is not shown here.

a. Included in Astrophysics prior to the FY2012 request.

b. P.L. 112-10 provided "not less than" $2,994.0 million for Human Exploration Capabilities.

c. Space Shuttle, Space and Flight Support, Education, and Inspector General.

d. Allocation between R&D and non-R&D is estimated by CRS in proportion to the underlying program amounts in order to allow calculation of a total for R&D. The Cross-Agency Support and Construction and Environmental Compliance and Remediation accounts consist mostly of indirect costs for other programs, assessed in proportion to their direct costs.

Department of Agriculture[75]

U.S. Department of Agriculture research and education activities are included in four organizations: the Agricultural Research Service (ARS), National Institute of Food and Agriculture (NIFA),[76] Economic Research Service (ERS), and National Agricultural Statistics Service (NASS). The Administration's FY2012 request included $2.594 billion for these activities, an increase of 0.3% over FY2011 funding of $2.586 billion. The House-passed funding level for these activities was $2.235 billion; the Senate-passed level was $2.539 billion. Final appropriations for FY2012 provided for in the Consolidated and Further Appropriations Act, FY2012 (P.L. 112-55) was $2.533 billion, $60.6 million below the Administration's request and $52.8 million below the FY2011 enacted level. For a breakdown of these amounts, see **Table 14**.

The Agricultural Research Service is USDA's in-house basic and applied research agency, and operates approximately 100 laboratories nationwide. The ARS also includes the National Agricultural Library, the primary information resource on food, agriculture, and natural resource sciences. The ARS laboratories focus on efficient food and fiber production, development of new products and uses for agricultural commodities, development of effective biocontrols for pest management, and support of USDA regulatory and technical assistance programs. The President requested $1.138 billion for ARS in FY2012, slightly above the FY2011 enacted level. The FY2012 appropriation provides $1.095 billion for the ARS, $38.6 million below the FY2011 enacted level and $43.1 million below the request. The conference report supports the closure of 12 research laboratories at ten locations and directs ARS to submit a report to the House and Senate Appropriation Committees no later than January 20, 2012, concerning the disposition of these laboratories. Neither the FY2011 continuing resolution nor the FY2012 appropriation provide funding for ARS buildings and facilities.

In FY2012, funding from discontinued ARS projects will be redirected to agency research priorities including the conversion of agricultural products into biobased products and biofuels; development of production systems to provide a sustainable balance of crop production, carbon soil sequestration, and net greenhouse gas emissions; development of new measures to control bovine tuberculosis and bovine respiratory diseases; domestic and global market opportunities; new varieties and hybrids of feedstocks; and new healthier foods with decreased caloric density. Other areas of support include funding for research on non-traditional agents and their possible use in food, and for epidemiological and ecologic studies. In addition, the FY2012 appropriation includes support for research at Regional Biofuels Feedstocks Research and Demonstration Centers and for research to develop integrated, sustainable management systems to improve food production and security.

The National Institute of Food and Agriculture was established in Title VII, §7511 of the Food, Conservation, and Energy Act of 2008 (P.L. 110-246, also known as the 2008 farm bill). In the FY2012 appropriation, NIFA is to support larger and longer-term research efforts on issues related to the viability of agriculture. NIFA is responsible for developing partnerships between the federal and state components of agricultural research, extension, and institutions of higher education. NIFA distributes funds to State Agricultural Experiment Stations, State Cooperative

[75] This section was written by Christine M. Matthews, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

[76] NIFA was formerly the Cooperative State Research, Education, and Extension Service (CSREES).

Extension Systems, land-grant universities, and other institutions and organizations that conduct agricultural research, education, and outreach. Included in these partnerships is funding for research at 1862 land-grant institutions, 1890 historically black colleges and universities, 1994 tribal land-grant colleges, and Hispanic-serving institutions. Funding is distributed to the states through competitive awards, statutory formula funding, and special grants. The FY2012 appropriation provides $1.202 billion for NIFA, $12.3 million (-1.0%) below the FY2011 enacted level and approximately equal to the request. Conferees stated that they were not in agreement with the Administration's request concerning the termination of extramural research. Conferees also expressed concern about the focus of research programs supported through the AFRI and maintained that USDA's support should be directed solely on the highest priority agricultural research as determined by Congress.

One of the stated primary goals in the President's FY2012 request was for NIFA to emphasize and prioritize competitive, peer-reviewed allocation of research funding. For this reason, the Administration requested funding for the development of new grant management tools. Funding for FY2012 includes support for grant management, as well as for programs that are more responsive to critical national issues such as agricultural security, local and regional emergencies, zoonotic diseases, climate change, childhood obesity, pest risk management, and development of biofuels that contribute to agricultural productivity and sustainability. The act also provides funding for programs that support minority-serving institutions and their recipients.

NIFA is responsible for administering the agency's primary competitive research grants program, the Agriculture and Food Research Initiative (AFRI). In addition to supporting fundamental and applied science in agriculture, USDA maintains that the AFRI makes a significant contribution to developing the next generation of agricultural scientists by providing graduate students with opportunities to work on research projects. A focus of these efforts is to provide increased opportunities for minority and under-served communities in agricultural science. The FY2012 appropriation provides $264.5 million for AFRI, approximately equal to its FY2011 enacted level. AFRI funding is to be directed towards alternative and renewable energy research to develop cost-effective feedstocks for biofuel production. Funding also includes support for global climate change research to develop mitigation capabilities for agricultural production; support for an integrated food safety research program that would have the potential for improving the understanding of disease-causing microorganisms; and funding for international food security and nutrition and obesity prevention research. The act supports initiatives in agricultural genomics, emerging issues in food and agricultural security, the ecology and economics of biological invasions, and plant biotechnology. In addition, it is anticipated that water research will extend beyond water quality to include water availability, reuse, and conservation.

The FY2012 appropriation provides $77.7 million for the Economic Research Service, $8.3 million below the request and $4.1 million below the FY2011 enacted level. ERS supports economic and social science information analysis on agriculture, rural development, food, and the environment. ERS collects and disseminates data concerning USDA programs and policies to various stakeholders. The FY2012 appropriation provides continued support for the Organic Production and Market Data Initiative.

Funding for the National Agricultural Statistics Service is at $158.6 million in the FY2012 appropriation, $6.8 million below the request and $2.2 million above the FY2011 level. The FY2012 appropriation includes support for improving research efforts in analyzing the impacts of bioenergy production, and for examining concerns pertaining to feedstock storage, transportation networks, and commodity production. Other research areas receiving support include production

and use of biomass materials; stocks and prices of distillers' grains; and current and proposed ethanol production plants. FY2012 NASS funding provides for restoration of the chemical use data series on major row crops; post harvest chemical use; and alternating annual fruit, nuts, and vegetable chemical use. Funding is provided to support the third year of the 2012 Census of Agriculture's five-year cycle, intended to measure trends and identify developments in the agricultural community. On October 4, 2011, NASS stated that it intended to reduce the frequency of its reports. Conferees directed NASS to revisit this decision, identify duplication in their reports and surveys by other programs, and release as many reports as possible.

Table 14. U.S. Department of Agriculture R&D

(in millions of dollars)

	FY2010 Actual[a]	FY2011 Enacted[d]	FY2012 Request	FY2012 House[e]	FY2012 Senate[f]	FY2012 Enacted[g]
Agricultural Research Service						
Product Quality/Value Added	$105.0		107.0			
Livestock Production	81.0		75.0			
Crop Production	234.0		236.0			
Food Safety	108.0		114.0			
Livestock Protection	79.0		80.0			
Crop Protection	203.0		197.0			
Human Nutrition	86.0		89.0			
Environmental Stewardship	202.0		196.0			
National Agricultural Library	22.0		23.0			
Repair, Maint., Trust Funds, & Other Programs	74.0		39.0			
Subtotal	**1,194.0**	**1,133.2**	**1,137.7**	**995.3**	**1,094.6**	**1,094.6**
Buildings and Facilities	71.0	0.0	0.0	0.0	0.0	0.0
Total, ARS	**1,265.0**	**1,133.2**	**1,137.7**	**995.3**	**1,094.6**	**1,094.6**
National Institute of Food and Agriculture[a]						
Hatch Act Formula	215.0	236.8	204.0	207.0	236.3	236.3
Cooperative Forestry Research	29.0	33.0	27.0	30.0	32.9	32.9
Earmarked Projects and Grants	141.0	2.8	0.0	4.5	6.2	5.9
Agriculture & Food Research Initiative	262.0	265.0	325.0	229.5	266.0	264.5
Federal Administration	18.0	18.3	18.0	10.0	11.0	10.5
Higher Education Programs[b]	48.0	51.0	43.0	40.2	66.8	67.4
Other Programs	79.0	93.2	91.0	75.2	90.6	88.2
Subtotal, Research and Education Activities	***792.0***	***698.7***	***708.1***	***596.4***	***709.8***	***705.7***
Extension Activities						
Smith-Lever Sections 3b&c	298.0	295.0	283.0	259.2	295.8	294.0
Extension and Integrated Programs	49.0	28.6	10.0	3.6	4.4	4.3
1890 Colleges, Tuskegee, & West Virginia State	91.0	66.2	91.0	52.7	46.0	62.3

	FY2010 Actual[a]	FY2011 Enacted[d]	FY2012 Request	FY2012 House[e]	FY2012 Senate[f]	FY2012 Enacted[g]
University Colleges						
Other Extension Programs	57.0	90.3	83.0	95.7	132.0	114.6
Subtotal, Extension Activities	***495.0***	***479.1***	***466.8***	***411.2***	***478.2***	***475.2***
Integrated Activities	60.0	36.9	29.9	12.4	25.9	21.5
Mandatory and Other Programs	139.0	0.0	(161.0)	0.0	0.0	0.0
Total, NIFA[c]	**1,486.0**	**1,214.7**	**1,204.8**	**1,020.0**	**1,213.9**	**1,202.4**
Economic Research Service	82.0	81.8	86.0	70.0	77.7	77.7
National Agricultural Statistics Service	162.0	156.4	165.4	149.5	152.6	158.6
Total, Research, Education, and Economics	**2,995.0**	**2,586.1**	**2,593.9**	**2,234.8**	**2,538.8**	**2,533.3**

Sources: U.S. Department of Agriculture, *FY2012 Budget Summary and Annual Performance Plan*; H.Rept. 112-101; S.Rept. 112-73; H.Rept. 112-284; P.L. 112-55.

Note: Totals and subtotals may differ from the sum of the components due to rounding.

a. Funding levels are contained in the U.S. Department of Agriculture FY2012 Budget Summary and Annual Performance Plan, February 2011. Formerly CSREES. NIFA was established in Title VII of the 2008 Farm Bill.

b. Higher Education includes capacity building grants, Hispanic-Serving Institution Education Grants Program, Two-Year Postsecondary, and Agriculture in the K-12 Classroom, Higher Education Challenge Grants, Improve the Quality of Life in Rural America, and others.

c. Program totals may or may not include set-asides (non-add) or contingencies.

d. These funding levels may differ from previously reported. Current funding levels are contained in H.R. 2112.

e. H.Rept. 112-101, to accompany H.R. 2112.

f. S.Rept. 112-73, to accompany H.R. 2112.

g. P.L. 112-55, H.Rept. 112-284.

Department of the Interior[77]

The Administration has requested $784.4 million in R&D funding for the Department of the Interior (DOI) for FY2012, a decrease of $17.7 million (-2.2%) from the FY2011 actual funding of $802.1 million. (See **Table 15**.) The U.S. Geological Survey (USGS) is the most R&D-intensive agency in DOI, with approximately 59% of its FY2011 appropriations devoted to R&D activities; the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) ranks second in R&D intensity at DOI, with approximately 25% of its funding devoted to R&D.

President Obama's FY2012 request includes $607.2 million for USGS R&D in FY2012, a decrease of $32.7 million (-5.1%) from the FY2011 actual level. Nevertheless, USGS would remain the primary supporter of R&D within DOI, accounting for 77.4% of the department's total FY2012 R&D request.[78] USGS R&D is conducted under several activity/program areas that have

[77] This section was written by John F. Sargent, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

[78] Data on the Department of the Interior's R&D funding for FY2012 was provided by the Office of Management and Budget and the DOI's Office of Budget in private communications with CRS. P.L. 112-10 provides full-year funding to (continued...)

been realigned for FY2012. Seven of these areas constitute DOI's Surveys, Investigations, and Research (SIR) portfolio: Ecosystems; Climate and Land Use Change; Energy, Minerals, and Environmental Health; Natural Hazards; Water Resources, Core Science Systems; and Administration and Enterprise Information.

In total, under the request, SIR R&D funding would fall by $37.7 million (-5.9%) in FY2012 over FY2011 actual, with the largest reductions being made to the Land Use Change (-$20.5 million, -4.7%), Water Resources (-$12.4 million, 11.2%), Energy, Minerals, and Environmental Health ($-11.3 million, -11.3%), and Core Science Systems (-$6.8 million, -13.4%) accounts. Funding for R&D would increase for some accounts, including the Climate Variability ($8.6, 13.3%) and Ecosystems ($5.6 million, 3.5%) accounts. Under the President's FY2012 budget request, an eighth account, National Land Imaging, is recommended for funding existing and future Landsat missions. Landsat provides sensing data for space policy and land use and climate change research. The President's request includes $5.0 million in R&D funding under the National Land Imaging account for FY2012.

Under the President's FY2012 request, R&D funding would increase for BOEMRE ($11.4 million, 20.0%), the National Park Service ($3.7 million, 11.1%), the Bureau of Land Management ($1.8 million, 18.6%), and the Fish and Wildlife Service, ($1.0 million, 2.1%), and decrease for the Bureau of Reclamation (-$2.8 million, -18.5%).

Funding for DOI R&D is generally included in line items that also include non-R&D funding. Therefore it is not possible to know precisely how much of the funding provided for in appropriations bills will be allocated to R&D unless funding is provided for at the full level of the request. In general, R&D funding levels are determined only after DOI agencies report on their allocation of appropriations. This report will be update as these figures become available.

In the absence of specific figures for R&D funding in the FY2012 appropriations bills, here is information on overall appropriations for DOI and its agencies.

H.R. 2584, as reported from the House Committee on Appropriations, would provide USGS $1.054 billion, $30.1 million (-2.8%) less than the FY2011 level and $64.3 million (-6.1%) less than the request.[79] The bill funds BOEMRE at $153.5 million, $72.2 million (-32.0%) less than in FY2011 and $17.3 million more than the request (12.7%). In particular, the bill would provide BOEMRE with $14.9 million for its oil spill research account, an amount equal to the request and $3.2 million (27.1%) more than in FY2011. Overall, the bill would provide the Department of the Interior with a total of $9.912 billion, $715.5 million (-6.7%) less than the FY2011 enacted level and $1.200 billion (-10.8%) less than the request.

The October 14, 2011, draft released jointly by the Chairman and Ranking Member of the Senate Appropriations Subcommittee on Interior, Environment, and Related Agencies would provide USGS $1.064 billion, $20.0 million (-1.8%) less than the FY2011 level and $54.2 million (-4.8%) less than the request. Like the House-reported bill, the Senate draft would provide BOEMRE with

(...continued)

the Department of the Interior but does not provide sufficient detail to allow for an analysis of how much R&D funding is included in this appropriation, either for DOI agencies or for the department in total. This section will be updated as additional information becomes available.

[79] For additional detailed information on the USGS FY2012 appropriations, see CRS Report R41896, *Interior, Environment, and Related Agencies: FY2012 Appropriations*, coordinated by Carol Hardy Vincent.

$14.9 million for its oil spill research account, an amount equal to the request and $3.2 million (27.1%) more than in FY2011.

Table 15. Department of the Interior R&D

(in millions of dollars)

	FY2011 (P.L. 112-10)	FY2012 Request	H.R. 2584 As Reported	Senate Subcommittee Draft
U.S. Geological Survey	640.0	607.2	a	a
Bureau of Land Management	9.7	11.5	a	a
Bureau of Reclamation	15.1	12.3	a	a
National Park Service	33.2	36.9	a	a
Fish and Wildlife Service	47.0	48.0	a	a
Bureau of Ocean Energy Management, Regulation, and Enforcement[b]	57.1	68.5	a	a
Total, DOI R&D[c]	**802.1**	**784.4**	**a**	a

Source: Unpublished data provided to CRS by the Department of the Interior.

a. R&D funding for these agencies cannot be determined; R&D funding data for these agencies will be added to the table as additional information becomes available.

b. The agency was previously named the Minerals Management Service.

c. Totals may differ from the sum of the components due to rounding.

Environmental Protection Agency[80]

The U.S. Environmental Protection Agency (EPA), the regulatory agency responsible for carrying out a number of environmental pollution control laws, funds a broad portfolio of R&D activities to provide the necessary scientific tools and knowledge to support decisions relating to preventing, regulating, and abating environmental pollution. Beginning in FY2006, EPA has been funded through the Interior, Environment, and Related Agencies appropriations bill. Most of EPA's scientific research activities are funded within the agency's Science and Technology (S&T) appropriations account. This account is funded by a "base" appropriation and a transfer from the Hazardous Substance Superfund (Superfund) account. These transferred funds are dedicated to research on more effective methods to clean up contaminated sites.

Since the beginning of FY2012 EPA has operated under continuing resolutions (P.L. 112-33 and P.L. 112-36) sequentially extending funding from October 1, 2011, through November 18, 2011. Currently EPA and other departments and agencies funded within the Interior, Environment, and Related Agencies Appropriations bill are operating under a third continuing resolution, the Consolidated and Further Continuing Appropriations Act, 2012 (P.L. 112-55), which provides funding through December 16, 2011.

[80] This section was written by Robert Esworthy, Specialist in Environmental Policy, CRS Resources, Science, and Industry Division.

Title II of H.R. 2584 (H.Rept. 112-151) as reported by the House Appropriations Committee on July 19, 2011, would provide a total of $7.15 billion for the EPA, $1.53 billion (-18%) less than the FY2011 enacted appropriation of $8.68 billion (P.L. 112-10, including rescissions), and $1.82 billion (-20%) less than the President's FY2012 request of $8.97 billion. H.R. 2584 as reported reflected a decrease from FY2011 enacted and FY2012 requested levels for each of EPA's eight regular appropriations accounts. The $777.6 million recommended by the House Committee for the EPA S&T account, including transfers from the Superfund account, would be a decrease of $62.7 million (-7.5%) below the $840.3 million (including a 0.2% across-the-board rescission[81]) FY2011 enacted appropriations, and $71.0 (-8.4%) million less than the President's FY2012 budget request of $848.6 million. If enacted, the amount included in H.R. 2584 as reported for the EPA's S&T account (including transfers) would represent 9.1% of the agency's total $7.15 billion EPA FY2012 appropriations proposed by the House Committee.

H.R. 2584 as reported also included a number of provisions that would restrict or prohibit the use of FY2012 funds by EPA for implementing or proceeding with several recent and pending agency regulatory actions that cut across the various environmental pollution control statutes' programs and initiatives. Certain provisions could affect the use of appropriated funds for certain related research activities. More than 200 amendments, including several regarding EPA, were under consideration during floor debate which was suspended just prior to the recess adjournment by the House on August 3, 2011.

The October 14, 2011, draft released jointly by the Chairman and Ranking Member of the Senate Appropriations Subcommittee on Interior, Environment, and Related Agencies would provide $8.62 billion for EPA, including $832.1 million for EPA's S&T account (includes transfers) under Title II of the draft.[82] The amount included in the Senate Subcommittee draft for the S&T account, although more than the House recommendation, would be a decrease of $8.2 million (-1.0%) below the FY2011 enacted appropriations of $840.3 million (including a 0.2% across-the-board rescission[83]), and $16.5 million (-1.9%) less than the President's FY2012 budget request of $848.6 million for this account. The Senate draft did not include those provisions that would restrict or preclude the use of FY2012 funds for certain EPA actions, as were contained in Title II of House Committee reported H.R. 2584.

As indicated in **Table 16** below, the total FY2012 base appropriations proposed in House-reported H.R. 2584 and the Senate Subcommittee draft for the EPA S&T account, with few exceptions, reflected decreases of varying levels when compared with the enacted FY2011 appropriations for nearly all of the individual EPA research program and activity line items identified within the account. The reductions are less significant when compared to the President's FY2012 budget request for this account.[84] The $23.0 million proposed transfer from the Superfund account for FY2012 in both the House and Senate versions, the same as requested, is $3.8 million less than the $26.8 million transferred in FY2011. There are a few exceptions where the amount proposed in the House-reported bill and the Senate draft remained relatively flat compared to the request and the prior year appropriation. The funding for several program

[81] P.L. 112-10, Section 1119, Title I, Div. B.

[82] The Senate Appropriations Subcommittee on Interior, Environment, and Related Agencies draft bill for FY2012 and accompanying tables are available on the Committee website at http://www.appropriations.senate.gov/sc-interior.cfm.

[83] See footnote 81.

[84] U.S. EPA, *Fiscal Year FY2012 Justification of Appropriation Estimates for the Committee on Appropriations: Science and Technology*, http://www.epa.gov/planandbudget/FY_2012_CJ_VV_rev.pdf, PDF pp. 74-248.

area activities has been reorganized as requested, making direct comparisons with FY2011 enacted levels for these activities irrelevant as reflected in the table. New revised program areas include Clean Air and Climate; Research: Air, Climate and Energy; Research: Chemical Safety; and Research: Sustainability and Healthy Communities.

The activities funded within the S&T account include research conducted by universities, foundations, and other non-federal entities with EPA grants, and research conducted by the agency at its own laboratories and facilities. R&D at EPA headquarters and laboratories around the country, as well as external R&D, is managed primarily by EPA's Office of Research and Development (ORD). A large portion of the S&T account funds EPA's R&D activities managed by ORD, including the agency's research laboratories and research grants. The account also provides funding for the agency's applied science and technology activities conducted through its program offices (e.g., the Office of Water). Many of the programs implemented by other offices within EPA have a research component, but the research is not necessarily the primary focus of the program.

The EPA S&T account incorporates elements of the former EPA Research and Development (R&D) account, as well as a portion of the former Salaries and Expenses, and Program Operations accounts, which had been in place until FY1996.[85] Because of the differences in the scope of the activities included in these accounts, apt comparisons before and after FY1996 are difficult. Although the Office of Management and Budget (OMB) reports[86] historical and projected budget authority (BA) amounts for R&D at EPA (and other federal agencies), OMB documents do not describe how these amounts explicitly relate to the requested and appropriated funding amounts for the many specific EPA program activities. The R&D BA amounts reported by OMB are typically significantly less than amounts appropriated/requested for the S&T account. (BA as reported by OMB is included in **Table 16** below for purposes of comparison.) This is an indication that not all of the EPA S&T account funding is allocated to R&D.

Some Members of Congress and other stakeholders have consistently raised concerns about the adequacy of funding for scientific research at EPA. The adequacy of funding for these activities has been part of a broader question about the adequacy of overall federal funding for a broad range of scientific research activities administered by multiple federal agencies. Some congressional policymakers, scientists, and environmental organizations have expressed concern about the downward trend in federal resources for scientific research over time. The debate continues to center around the question of whether the regulatory actions of federal agencies are based on "sound science," and how scientific research is applied in developing federal policy. Some Members have also raised concerns that EPA's scientific justifications for several of its rules and regulations have been scrutinized recently as a result of apprehensions regarding quality

[85] In recent years, EPA's annual appropriations have been requested, considered, and enacted according to eight statutory appropriations accounts established by Congress during the FY1996 appropriations process.

[86] The Office of Management and Budget (OMB) reports R&D budget authority (BA) amounts in its Analytical Perspectives accompanying the annual President's budget, but amounts for specific programs are not included. For example, for EPA R&D, OMB reported actual BA of $590 million for FY2010, $651 million proposed for FY2011, and $579 proposed for FY2012. The R&D budget authority amounts reported by OMB are typically significantly less than amounts appropriated/requested for the S&T account. This is an indication that not all of the EPA S&T account funding is allocated to R&D. See OMB, *Fiscal Year 2011 Budget of the United States: Analytical Perspectives – Special Topics/Research and Development pgs. 339-344,*and *Fiscal Year 2012 Budget of the United States: Analytical Perspectives – Special Topics/Research and Development pgs. 363-368,* available at http://www.gpoaccess.gov/usbudget/browse.html.

of data, lack of transparency and effective peer review, and other related research planning and process problems.[87]

Additionally, several recent and pending EPA regulatory actions have been the focus of considerable debate during first session of the 112th Congress,[88] including EPA scientific research in support of these actions. Actions under the Clean Air Act, in particular EPA controls on emissions of greenhouse gases, as well as efforts to address conventional pollutants from a number of industries, have received much of the attention. Several actions under the Clean Water Act, Safe Drinking Water Act, Resource Conservation and Recovery Act (RCRA), have also received some attention. Congressional concerns regarding these issues are likely to be prominent areas of debate during oversight and deliberation of EPA's S&T funding levels.

Table 16. Environmental Protection Agency S&T Account

(in millions of dollars)

Environmental Protection Agency	FY2011 Enacted (P.L. 112-10)	FY2012 Request	House Reported H.R. 2584	Senate Subcommittee Draft
Science and Technology Appropriations Account				
Air Toxics and Quality	$120.5	—	—	—
Clean Air and Climate	—	134.4	120.1	129.1
- Climate Protection Program	—	*16.3*	*16.3*	*16.3*
Climate Protection	16.8	—	—	—
Enforcement	15.3	15.3	15.3	15.3
Homeland Security	46.2	42.0	42.0	42.0
Indoor Air and Radiation	1.3	6.8	6.8	6.8
IT/Data Management/Security	3.7	4.1	3.7	3.7
Operations & Admin.	69.7	76.5	70.1	75.5
Pesticide Licensing	6.6	6.8	6.6	6.6
Research: Air, Climate, and Energy	—	108.0	93.0	105.0
Research: Clean Air	102.4	—	—	—
- Research: Global Change	*20.8*	—	—	—
Research: Safe and Sustainable Water	117.3	118.8	108.5	118.8
Research: National Priorities	—	—	5.0	—
Research: Human Health & Ecosystems	243.9	—	—	—
Research: Chemical Safety and Sustainability	—	138.1	125.5	131.6

[87] For example, see November 17, 2011, hearing held by the House Committee on Science, Space, and Technology, Subcommittee on Energy and Environment, entitled "Fostering Quality Science at EPA: The Need for Common Sense Reform," http://science.house.gov/hearing/energy-and-environment-subcommittee-hearing-fostering-quality-science-epa-perspectives.

[88] For a discussion of EPA regulatory actions see CRS Report R41561, *EPA Regulations: Too Much, Too Little, or On Track?*, by James E. McCarthy and Claudia Copeland.

Environmental Protection Agency	FY2011 Enacted (P.L. 112-10)	FY2012 Request	House Reported H.R. 2584	Senate Subcommittee Draft
- Research: Computational toxicology	*21.1*	*21.2*	*21.1*	*21.1*
- Research: Endocrine disruptor	*15.9*	*16.9*	*15.9*	*15.9*
- Research: Fellowships	*16.0*	*17.3*	*0.0*	*Not specified*
Research: Land Protection	13.4	—	—	—
Research: Sustainability	25.5	—	—	—
Research: Pesticides and Toxics	27.3	—	—	—
Research: Sustainable and Healthy Communities	—	*171.0*	*154.3*	*171.0*
Water: Human Health Protection	3.8	*3.8*	*3.8*	*3.8*
—Subtotal S&T Account Base Appropriations	***$813.5***	***$825.6***	***$754.6***	***$809.1***
—Transfer in from Hazardous Substance Superfund Account	***$26.8***	***$23.0***	***$23.0***	***$23.0***
Total Science and Technology	**$840.3**	**$848.6**	**$777.6**	**$832.1**
R&D Budget Authority Reported by OMB	*(CR) $590.0 est*	*$579.0 est*	*N/A*	*N/A*

Source: Prepared by CRS. Amounts in the table are based on the FY2012 Interior, Environment, and Related Agencies appropriations bill (H.R. 2584) as reported by the House Appropriations Committee July 19, 2011, and the accompanying report (H.Rept. 112-151), and the Senate Draft and accompanying table released October 14, 2011, by the Chairman and Ranking Member of the Senate Appropriations Committee on Interior, Environment, and Related Agencies, http://www.appropriations.senate.gov/sc-interior.cfm. FY2011 enacted amounts include the 0.2% across-the-board rescission. OMB amounts are as reported in Office of Management and Budget (OMB) *Fiscal Year 2012 Budget of the United States: Analytical Perspectives—Special Topics/Research and Development pgs. 363-368*, http://www.whitehouse.gov/sites/default/files/omb/budget/fy2012/assets/topics.pdf. Totals may differ from the sum of the components due to rounding. N/A = not available.

Department of Transportation[89]

President Obama has requested $1.215 billion for Department of Transportation (DOT) R&D in FY2012, an increase of $146 million (13.7%) from the FY2010 enacted level. (See **Table 17**.) Two DOT agencies—the Federal Highway Administration (FHWA) and the Federal Aviation Administration (FAA)—account for most of the department's R&D funding (79.4% in the FY2012 request).

The President has requested $417 million for FAA R&D and R&D facilities in FY2012, an increase of $5 million (1.2%) from the FY2010 enacted level. The $190 million requested for Research, Engineering, and Development (RE&D) is essentially unchanged from the FY2010 enacted level. Of these funds, $77 million ($5 million above the FY2010 level) is for the RE&D NextGen R&D portfolio which is focused on the use of alternative and renewable fuels for general aviation aircraft to reduce aviation's effects on the environment. The Environmental and Energy program, including some NextGen research, would be funded at $35.8 million, with R&D

[89] This section was written by John F. Sargent, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

focused on applications such as modeling environmental impacts of aviation and further advancing technologies that reduce aircraft noise and emissions. [90]

The FHWA would receive $548 million in R&D funding in FY2012 under the President's request, an increase of $94.8 million (20.9%). Highway Research and Development funding would increase to $200.0 million, up $33.7 million (20.3%) from FY2010 funding of $166.3 million. Funding for Intelligent Transportation Systems R&D would increase to $96.1 million in FY2012, up $14.8 (18.1%) from its FY2010 funding level. The ITS Multi-modal Research Program and the Competitive University Transportation Center (UTC) Consortia would each receive $20 million in FY2012. In addition, R&D funding for the State Planning and Research program would grow to $206.4 million in FY2012, up $23.4 million (12.8%) over FY2010.

On November 17, 2011, Congress completed action on the Consolidated and Further Continuing Appropriations Act, 2012 (P.L. 112-55), and President Obama signed it into law two days later. This act incorporates, among other things, three regular appropriations bills, including, as Division C, the Transportation, Housing and Urban Development, and Related Agencies Appropriations Act, 2012. It is not possible to discern the total amount of R&D that is provided for in this act since R&D is incorporated in appropriations accounts that include more than just R&D. However, information can be gleaned from the law and accompanying conference report (H.Rept. 112-284) that provides some insights into DOT agencies' R&D funding. For example, the act provides $167.6 million for the FAA's Research, Engineering, and Development account, $22.9 million (-12.0%) less than the FY2010 level, and $22.4 million (-11.8%) less than the request. Airport technology research and airport cooperative research are funded at the FY2012 request levels, $29.3 million and $15.0 million respectively. The Office of the Secretary's Transportation Planning, Research, and Development account is funded at $9.0 million in FY2012, $9.2 million (-50.5%) below the FY2010 level and $0.8 million (-8.4%) below the request. The Federal Railroad Administration's Railroad Research and Development account is funded at $35.0 million, $2.6 million (-6.9%) less than the estimated FY2010 funding level and $5.0 (-12.5%) million less than the request.

Last year, the Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10) provided FY2011 funding for the Department of Transportation, including R&D. In general, the law appropriated funds to the agencies at the FY2010 level unless otherwise specified. In particular, the law reduced the FAA's RE&D account by $20.5 million to $170 million in FY2011. This reduced total FAA funding from $412 million in FY2010 to approximately $391 million in FY2011. The bill also reduced DOT's Planning, Research and Development account by $6 million from its FY2010 funding level. The level of detail in the law, however, did not allow for a complete assessment of how the specified changes affected overall agency and departmental R&D funding for FY2011. This report will be updated as more information becomes available from the department, agencies, or Congressional committees.

[90] Federal Highway Administration, U.S. Department of Transportation, *Budget Estimates Fiscal Year2012*, February 2011.

Table 17. Department of Transportation R&D

(in millions of dollars)

	FY2010 Actual	FY2011 Estimate	FY2012 Request	H.R. 2596 As Reported	H.R. 2112 As Passed by Senate	FY2012 Actual
Federal Highway Administration	453	492	548	[a]	[a]	[a]
Federal Aviation Administration	412	391	417	[a]	[a]	[a]
Other DOT agencies	204	[a]	250	[a]	[a]	[a]
Total, DOT R&D[b]	**1,069**	[a]	**1,215**	[a]	[a]	[a]

Source: DOT FY2011 agency budget justifications; unpublished tables provided by OMB to CRS in February 2010; private communications between OMB and CRS.

a. R&D funding cannot be determined; figures for R&D funding for these agencies will be added to the table as additional information becomes available.

b. Totals may differ from the sum of the components due to rounding.

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