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.

Congress incorporated all the regular appropriations acts into two bills, the Consolidated and Further Continuing Appropriations Act, 2012 (P.L. 112-55) and the Consolidated Appropriations Act, 2012 (P.L. 112-74). P.L. 112-55, incorporating three regular appropriations acts—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—was passed by Congress on November 17, 2011, and signed into law two days later. P.L. 112-74, incorporating the nine remaining regular appropriations acts, was passed by Congress on December 17, 2011, and signed into law by President Obama on December 23, 2011.

Prior to enactment of these bills, Congress had continued government operations into FY2012 through a series of continuing appropriations acts. P.L. 112-33 provided agency funding initially through October 4, 2011. P.L. 112-36 extended funding for all agencies through November 18, 2011. P.L. 112-55 extended funding through December 16, 2011, for agencies not covered under its provisions. 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 a fiscal year may cause agencies to delay or cancel some planned R&D and equipment acquisition.

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 compared 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 provided FY2011 appropriations for the Department of Defense; Division B provided full-year continuing funding for FY2011 for all other agencies at their FY2010 levels unless otherwise specified in the act. 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. 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 included 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 was intentionally silent on a timeframe.

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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]

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,

[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.

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

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.

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.

[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.

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):
  - 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.

[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.

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

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.

(...continued)

[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	4,889
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	12,544

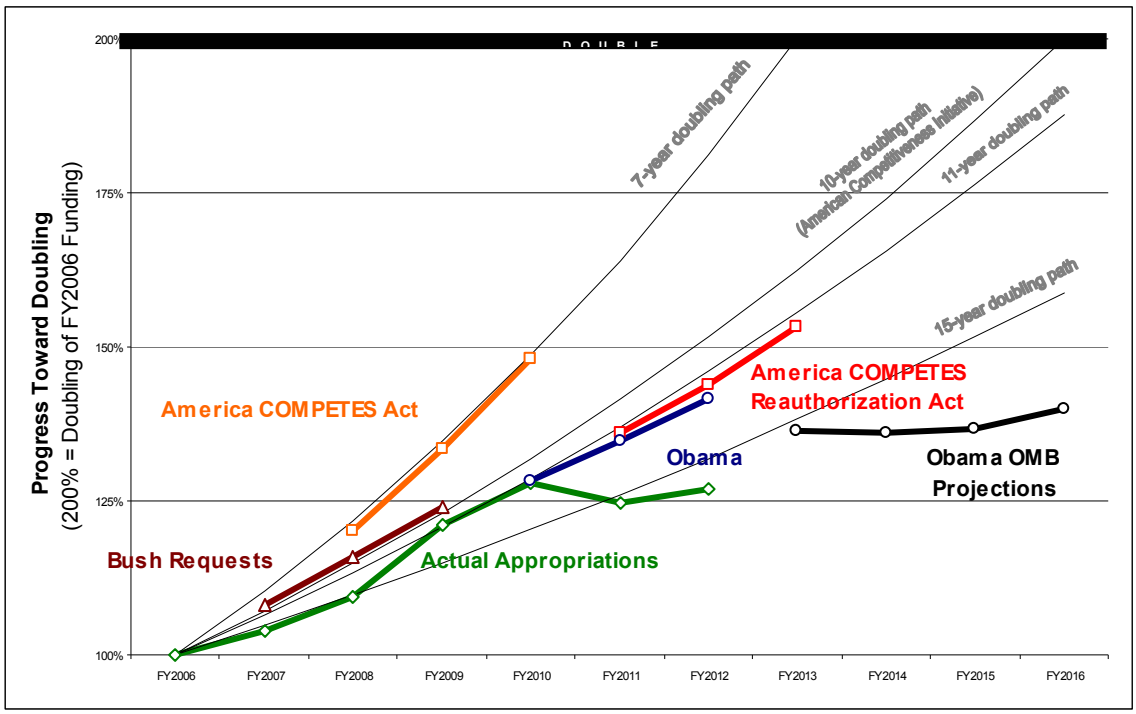
Source: NIST, budget requests for FY2008-FY2012, available at http://www.nist.gov/public_affairs/budget/index.cfm; DOE, budget requests for FY2008-FY2012, available at http://www.cfo.doe.gov/crorgcf30.htm; NSF, budget requests for FY2008-FY2012 available at http://www.nsf.gov/about/budget; P.L. 112-55; and H.Rept. 112-284. TBD = to be determined. FY2011 data from P.L. 112-10 and H.Rept. 112-118; and FY2012 data from P.L. 112-74 and H.Rept. 112-331.

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). FY2011 data from P.L. 112-10 and H.Rept. 112-118; and FY2012 data from P.L. 112-74 and H.Rept. 112-331.

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]

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

[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.

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 December 17, 2011, Congress completed action on the FY2012 regular appropriations bills with passage of H.R. 2055, the Consolidated Appropriations Act, 2012, which was signed into law (P.L. 112-74) by President Obama on December 23, 2011. P.L. 112-74 includes the nine regular appropriations bills that had yet to be enacted: Department of Defense Appropriations Act, 2012 (as Division A); the Energy and Water Development Appropriations Act, 2012 (as Division B); the Financial Services and General Government Appropriations Act, 2012 (as Division C); the Department of Homeland Security Appropriations Act, 2012 (as Division D); the Department of the Interior, Environment, and Related Agencies Appropriations Act, 2012 (as Division E); the Departments of Labor, Health and Human Services, Education, and Related Agencies Appropriations Act, 2012 (as Division F); the Legislative Branch Appropriations Act, 2012 (as Division G); the Military Construction and Veterans Affairs and Related Agencies Appropriations Act, 2012 (as Division H); and the Department of State, Foreign Operations, and Related Programs Appropriations Act, 2012 (as Division I).

Earlier, 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.[28] President Obama signed the bill into law two days later. Division D of the act amended 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.[29]

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

[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.

[28] The Consolidated and Further Continuing Appropriations Act, 2012 was referred to as a "minibus," as it included only a few of the regular appropriations bills, whereas an "omnibus" bill includes many or all such bills. For example, the Omnibus Appropriations Act, 2009 (P.L. 111-8), included 9 of the 12 regular appropriations bills.

[29] For further information see CRS Report RL30343, *Continuing Resolutions: Latest Action and Brief Overview of Recent Practices*, by Sandy Streeter.

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.

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[30]

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. 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.

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

In addition, GWOT/OCO-related requests/appropriations often include money for a number of transfer funds. These have included in the past the Iraqi Freedom Fund (IFF), the Iraqi Security Forces Fund (which was not requested in FY2012), the Afghanistan Security Forces Fund, the Mine Resistant and Ambush Protected Vehicle Fund (MRAPVF), and the Pakistan Counterinsurgency Capability Fund (transferred to the State Department in FY2012). 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. In the Consolidated Appropriations Act, 2012, Congress established a new Military Intelligence Program Transfer Fund, granting the Secretary similar authority.

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 appropriate $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 development 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 not go along with the general reduction to DARPA's program, nor did it increase funding for the Air Force's Next Generation Bomber.

In the Consolidated Appropriations Act, 2012, Congress approved $72.431 for Title IV RDT&E, roughly splitting the difference between the House and Senate. Reductions made to the Logistics and Engineering Equipment ($77 million), the Prompt Strike ($25 million), the Precision Tracking Space System ($80 million), and the Chemical Biological Defense Engineering and Manufacturing ($84 million) programs were roughly half those sought by either the House or Senate. The Manned Ground Vehicle program was reduced by $435 million. The National Polar-Orbiting Operational Environment Satellite program was terminated. The Rocket Launch System and the Next Generation Refueling Aircraft, which were cut respectively by the House and Senate, were fully funded. Congress also reduced DARPA's RDT&E request by $166 million. Among the programs for which Congress approved increases were the U.S.-Israeli Cooperative R&D ($129 million), the Next Generation Bomber ($100 million), the Rapid Innovation Program ($200 million), and the Weather Satellite ($125 million).

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. The Consolidated Appropriations Act, 2012 provided $1.267 billion in Defense Health Program RDT&E; $407 million, as requested, for the Chemical Agents and Munitions Destruction Program; and $5 million for RDT&E by the Inspector General's Office.

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. In the Consolidated Appropriations Act, 2012, Congress appropriated $526 million for OCO-related RDT&E. This included a $59 million transfer from JIEDDO to the Air Force for the continued development of an endurance unmanned aerial vehicle and a $50 million increase for Intelligence, Surveillance, and Reconnaissance innovations by the Air Force.

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. The Consolidated Appropriations Act, 2012 provided $12.438 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 which 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. The Consolidated Appropriations Act, 2012 provided $2.116 billion for basic research. This included an increase above the requested levels for the following: $20 million for Army University and Industry Research Centers at Historically Black Colleges, $20 million for Navy competitive university research and $8 million for Navy nanotechnology research, and $12 million for Air Force research in cybersecurity. Congress also appropriated less than requested for the National Defense Education Program ($15 million) and for Basic Research Initiatives ($7 million) in the Office of the Secretary.

Table 6. Department of Defense RDT&E

(in millions of dollars)

	FY20111	FY2012 Request		FY2012 House		FY2012 Senate		FY2012 Enacted	
Budget Account	**Base + OCO Enact'd**	**Base**	**OCO**	**Base**	**OCO**	**Base**	**OCO**	**Base**	**OCO**
Army	9,854	9,684	9	9,381	9	8,311	19	8,755[a]	19
Navy	17,841	17,956	54	17,799	54	17,407	158	17,754	54
Air Force	27,001	27,738	142	26,313	182	26,008	208	26,536	260
Defensewide	21,020	19,856[b]	192	19,309[c]	192	19,117	197	19,194	194
Dir. Test & Eval.	195	191		191		191		191	
Total Title IV - By Account[d]	**75,912**	**75,425**	**397**	**72,993**	**437**	**71,034**	**582**	**72,431**	**526**
Budget Activity									
6.1 Basic Research	1,947	2,078		2,098[e]		2,081		2,116	
6.2 Applied Research	4,497	4,687		4,657[e]		4,734		4,748	
6.3 Advanced Dev.	5,669	5,581		5,425[e]		5,378		5,573	
6.4 Advanced Component Dev. and Prototypes	14,443	13,727	2	13,434[e]	2	13,693[f]	12	13,499[g]	12
6.5 Systems Dev. and Demo	14,578	15,664	11	14,770[e]	11	13,029[f]	11	13,834[g]	11
6.6 Management Support[h]	4,569	4,175	18	4,146[e]	18	4,357[f]	18	4,357[g]	18
6.7 Op. Systems Dev.[i]	30,209	29,512	366	28,580[e]	406	27,759[f]	542	28,293[g]	486
Total Title IV—by Budget Activity[d]	**75,912**	**75,425**	**397**	**73,109[e]**	**437**	**71,034**	**582**	**72,421[j]**	**526**
Title V—Revolving and Management Funds									
National Defense Sealift Fund	28	48		48		48		48	
Title VI—Other Defense Programs									
Office of Inspector General		2		5		5		5	
Defense Health Program	1,176	664		1,217[k]		1,018		1,267	
Chemical Agents and Munitions Destruction	393	407		407		407		407	
Grand Total[d]	**77,509**	**76,546**	**397**	**74,671[l]**	**437**	**72,512**	**582**	**74,148**	**526**

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. Includes an additional $10 million added to the Army's Title IV account per Section 8114, Division A of the Consolidated Appropriations Act, 2012, with which the Secretary of the Army may conduct research on alternative energy resources for deployed forces.

b. Includes the $100 million for Defense Advanced Research Project Agenecy's (DARPA's) share of the Wireless Innovation Fund.

c. Includes $16 million reduction voted on the House floor which offset an increase in peer-reviewed prostate cancer research in the Defense Health Program, and the $100 million general reduction to DARPA's RDT&E funding.

d. Total may differ from sum of components due to rounding.

e. Does not include the $16 million reduction in Defensewide account voted on the House floor offsetting an increase in peer-reviewed prostate cancer research in the Defense Health Program, nor the $100 million general reduction in the DARPA RDT&E. Therefore, the "Total Title IV by Budget Activity" figure is larger than the "Total Title IV by Account" figure.

f. Does not include $50 million transferred from the Army's 6.4, 6.5,and 6.7 accounts and another $50 million from the Air Force's 6.4, 6.5, and 6.7 accounts to their respective 6.6 accounts to support test facilities, per Section 8072 of the Senate version of H.R. 2219 as reported by the Senate Appropriations Committee (S.Rept. 112-77).

g. Does not include $50 million from the Army's 6.4, 6.5, and 6.7 accounts and $34 million from the Air Force's 6.4, 6.5 and 6..7 accounts transferred to their respective 6.6 accounts to support test facilities, per Section 8074, Division A of the Consolidated Appropriations Act, 2012.

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

i. Includes funding for classified programs.

j. Does not include the $10 million added to the Army's account by Section 8114, Division A of the Consolidated Appropriations Act, 2012 (see footnote a above).

k. Includes $30 million increase in Defense Health Program RDT&E approved on the House floor.

l. The "Grand Total" figure uses the "Total Title IV – by Account" figure.

Department of Homeland Security[31]

The Department of Homeland Security (DHS) requested $1.528 billion for R&D and related programs in FY2012, a 36% increase from FY2011. This total included $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 have provided $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 have provided $1.076 billion, including $780 million for S&T, $268 million for DNDO, and $28 million for Coast Guard RDT&E. The final appropriation was $984 million, including $668 million for S&T, $289 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.[32] 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 requested $1.176 billion for the S&T Directorate for FY2012. This was 53% more than the net FY2011 appropriation of $767 million.[33] The request for Laboratory Facilities

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

[32] 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.

[33] The Department of Defense and Full-Year Continuing Appropriations Act, 2011 (P.L. 112-10) rescinded $61 million (continued...)

included $150 million to support the start of construction at the National Bio and Agro-Defense Facility (NBAF). About $109 million of the request for Research, Development, and Innovation was 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 radiological and nuclear R&D 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."

The Senate-reported bill provided $780 million for S&T.[34] For Research, Development, and Innovation, it provided $440 million. The bill approved the proposed transfer of activities from DNDO, but 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.

The final appropriation for S&T was $668 million. This amount included $266 million for Research, Development, and Innovation and $50 million for NBAF construction. The proposed transfer from DNDO was denied.

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 (RDI) 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 RDI budget category as "all-encompassing ... too large and vague." The Senate report stated that the new structure "reduces transparency and accountability." The conference report stated that the new RDI category "will enable S&T to more quickly shift resources ... between research activities" and "should ... partially offset the impact of an overall funding reduction," but it directed S&T to submit a quarterly "detailed breakout" of RDI projects "for accountability and visibility."

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, the FY2012 budget justification projected a need for $691 million in total appropriations between FY2012 and FY2017. In the appropriations acts for FY2009 through FY2011, Congress authorized DHS to use receipts from

(...continued)

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 was 42%.

[34] The bill rescinded $20 million from prior-year unobligated balances. Without this rescission, the Senate-reported bill provided $800 million for S&T.

the sale of Plum Island to offset NBAF construction and PIADC decommissioning costs.[35] The House-passed, Senate-reported, and enacted bills for FY2012 all continued this authorization. According to DHS, however, the likely value of such receipts "has been found to be considerably overestimated."[36]

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. The Administration requested $332 million for DNDO for FY2012, approximately the same as the FY2011 appropriation of $331 million. The request for Research, Development, and Operations was $58 million less than the FY2011 appropriation; it included no funds for Transformational R&D, which the Administration proposed to transfer to the S&T Directorate. The request for Systems Acquisition was $84 million, versus $30 million in FY2011. Within Systems Acquisition, the request included $37 million for radiation portal monitors and $27 million for the Securing the Cities program, which was previously funded at congressional direction and limited to the New York region. The request proposed expanding Securing the Cities 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. The bill provided $20 million for acquisition of radiation portal monitors. It 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 $8 million for radiation portal monitors. Like the House bill, it provided $22 million for Securing the Cities, including $2 million for a new city.

The enacted appropriation for DNDO was $289 million. This included $40 million for Transformational R&D, whose transfer to S&T was denied. The radiation portal monitors program received $7 million. Like the House and Senate bills, the conference report included $22 million for Securing the Cities, including $2 million for 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.[37] Each homeland security appropriations act from FY2007 through FY2011 included a requirement for secretarial certification before full-scale ASP procurement. 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.[38] Although the FY2012 request included funds to purchase

[35] 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).

[36] 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.

[37] 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.

[38] 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.

and deploy 44 ASPs for secondary screening, the director of DNDO subsequently stated that DNDO will deploy 13 ASPs that it has already purchased but will "end the ASP program as originally conceived."[39] 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." Noting the cancellation decision, the conference report omitted the previous requirement for ASP certification. It directed DHS to notify the appropriations committees if a successor program is initiated.

The global nuclear detection architecture (GNDA) overseen by DNDO remains an issue of congressional interest.[40] 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 enacted bill included similar language.

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 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."[41] In contrast, the FY2012 request for Systems Acquisition included 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 were not provided in the DNDO budget justification for either FY2011 or FY2012.

[39] 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.

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

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

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

(in millions of dollars)

	FY2011 Enacted	FY2012 Request	FY2012 House	FY2012 Senate	FY2012 Enacted
Directorate of Science and Technology	**$767**	**$1,176**	**$539**	**$780**	**$668**
Management and Administration	140	149	141	143	135
R&D, Acquisition, and Operations	626	1,027	398	637	533
Research, Development, and Innovation	*n/a*	*660*	*107*	*440*	*266*
Laboratory Facilities	*140*	*277*	*202*	*127*	*177*
Acquisition and Operations Support	*n/a*	*54*	*54*	*54*	*54*
University Programs	*40*	*37*	*37*	*37*	*37*
Rescission of Prior-Year Unobligated Balances	*(61)*	—	—	*(20)*	—
Domestic Nuclear Detection Office	**331**	**332**	**337**	**268**	**289**
Management and Administration	37	41	40	37	37
Research, Development, and Operations	264	206	245	191	215
Systems Engineering and Architecture	*33*	*32*	*30*	*31*	*30*
Systems Development	*53*	*70*	*69*	*60*	*51*
Transformational R&D	*96*	—	*45*	—	*40*
Assessments	*38*	*43*	*40*	*40*	*38*
Operations	*33*	*37*	*36*	*35*	*33*
Forensics	*22*	*25*	*25*	*25*	*23*
Rescission of Prior-Year Unobligated Balances	*(11)*	—	—	—	—
Systems Acquisition	30	84	52	40	37
Radiation Portal Monitors Program	—	*37*	*20*	*8*	*7*
Securing the Cities	*20*	*27*	*22*	*22*	*22*
Human Portable Radiation Detection Systems	*10*	*20*	*10*	*10*	*8*
U.S. Coast Guard RDT&E	**25**	**20**	**13**	**28**	**28**
TOTAL	**1,122**	**1,528**	**889**	**1,076**	**984**

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. FY2012 enacted from P.L. 112-74 and H.Rept. 112-331.

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[42]

The Consolidated Appropriations Act, 2012 (P.L. 112-74), enacted on December 23, 2011, provided FY2012 appropriations for NIH.[43] The conference agreement on the act (H.Rept. 112-331) gave NIH total discretionary funding of $30.8 billion, virtually unchanged from the FY2011 level (see **Table 8**). However, the total does not yet reflect an across-the-board rescission of 0.189%. The Obama Administration had requested discretionary budget authority of $31.8 billion for NIH, an increase of $1,062 million (3.3%) over FY2011.[44] In late September 2011, bills from the Senate Appropriations Committee had recommended total discretionary funding of $30.6 billion, slightly below the FY2011 level, while House bills would have provided $31.8 billion, equal to the request. Further details on congressional action follow the discussion of the request below.

NIH'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.)

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 from FY2002-FY2011 (but not in FY2012), Congress 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, in recent years about $300 million, has been 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.

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

[42] 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.

[43] 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.

[44] FY2011 funding of $30.8 billion was provided in P.L. 112-10, The Department of Defense and Full-Year Continuing Appropriations Act, 2011.

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.

FY2012 President's Budget Request. Under the FY2012 request, NIH said it would focus on implementing a new translational medicine program[45] 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 planned to 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.[46] 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. NCATS would also take charge of the Therapeutics for Rare and Neglected Diseases (TRND) program; the request planned to double support for TRND in FY2012 to $50 million. In FY2011, TRND was funded on an NIH-wide basis.

Another proposal for NCATS was that it 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. 111-152, 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 received 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

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

[46] 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. In June 2011, NIH sent Congress detailed materials and revised tables reflecting the proposed realignment. The proposal was not submitted as an official budget amendment.

as cancer and Alzheimer's disease, and enable development of more effective therapies.

2. Enhancing the Evidence Base for Health Care Decisions. NIH would 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 requested $8.4 million for this program in FY2012.

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, represented about 53% of NIH's proposed budget. The request would support an estimated 36,852 RPG awards, 248 more grants than in FY2011.[47] 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 provided an inflation-adjustment increase of 1%.

Other Funding Mechanisms. The FY2012 request included an increase over FY2011 for *research training* stipends for individuals supported by the Ruth L. Kirschstein National Research Service Awards program. The budget request would have raised funding for the program by $13 million to $794 million, allowing NIH to support 16,831 full-time training positions, 29 more than in FY2011. Changes were also proposed in the request for other funding mechanisms within the NIH budget. Support for r*esearch centers* would increase by $42 million (1.4%) to $3.036 billion. *R&D contracts* were proposed for a $151 million (4.9%) increase to $3.245 billion (excluding the funding proposed for transfer to the Global HIV/AIDS Fund). The NIH *intramural research program* would have gained $94 million (2.9%) for a total of $3.382 billion. *Research management and support* had a requested increase of $19 million (1.3%) to a total of $1.538 billion. Operations of the *Office of the Director* were proposed for a large increase of $118 million (19%) for a total of $742 million. The appropriation for *Buildings and Facilities* would increase by almost $76 million (152%) to $126 million.

[47] 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.

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 (2.6%) from FY2011.

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 recommended $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 have provided $80 million for NIH (see Note h on **Table 8**). The committee approved NIH's plan to abolish NCRR and create NCATS, though funding recommended for NCATS and all the other components was lower than requested under the realignment. The NCATS appropriation would have included $20 million for the Cures Acceleration Network and would have maintained 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 committee included $299 million in the appropriation for transfer to the Global HIV/AIDS Fund.

The House Appropriations Committee did not report 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 have provided $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 h on **Table 8**). H.R. 3070 did not provide for the creation of NCATS or the elimination of NCRR. It would have funded all the existing NIH components at the same level as the request, except that $100 million would have shifted from Office of the Director to NCRR. The Director was told to ensure that at least $488 million be provided for the CTSA program, and that up to $2 million could be used for an advisory board to plan for the Cures Acceleration Network. The bill required support of at least 9,150 new and competing RPGs, maintenance of an allocation ratio of 90% to 10% in support of extramural versus intramural activities, funding for the PHS Evaluation Set-Aside at 2.4%, and would have prohibited any funding of patient-centered outcomes research (comparative effectiveness research). No funding was included for transfer to the Global Fund.

The final conference agreement enacted in P.L. 112-74 gave NIH $30.690 billion in Labor/HHS funding (Division F) and an additional $79 million in Interior/Environment funding (Division E), for a total of $30.769 billion in discretionary budget authority.[48] Although that amount is only $2 million above the FY2011 level of $30.767 billion, it actually gives NIH $299 million (1.0%) more than in FY2011 to spend on its own programs. The FY2011 appropriations required NIH to transfer $297 million to the Global HIV/AIDS Fund, whereas the FY2012 appropriations did not

[48] As noted earlier, the dollar amounts included here and in the text and tables of Division F (Labor/HHS) of the conference report and the joint explanatory statement do not reflect an across-the-board rescission of 0.189% mandated in Section 527. The rescission is to be applied to all discretionary programs, projects, and activities except Pell Grants (Department of Education). A similar rescission of 0.16% applies to Division E accounts (Interior appropriations). Final amounts will be updated after agencies have submitted the FY2012 operating plans required in Section 517 of Division F.

designate any funds for transfer. Funding for the PHS Evaluation Set-Aside was maintained at 2.5%.

With the FY2012 appropriations, Congress approved NIH's plan to create NCATS, abolish NCRR, and distribute NCRR's programs to NCATS and other NIH entities.[49] In **Table 8**, funding for NCATS and the other realigned programs is displayed for the Senate bill and the enacted FY2012 appropriations, but the columns for FY2011, the FY2012 request, and the House bill display amounts reflecting NIH's original alignment (i.e., they have not been made comparable for the NCATS-related shifts in funding). A table in the explanatory statement accompanying the FY2012 conference report (H.Rept. 112-331, pp. 1135-1136) displays the comparable adjustments for FY2011 (which are budget-neutral) and allows comparison with the FY2012 amounts for all the institutes and centers. Analysis of the table indicates that the $299 million increase provided in the FY2012 appropriations was allocated as follows: $76 million boosted the Buildings and Facilities account to $126 million (requested after a large cut in FY2011; $60 million went to two specific increases discussed below (CAN and IDeA); and the $163 million balance was divided proportionally among all the institutes, centers, and the Office of the Director, with each receiving an increase of 0.54%.

In the explanatory statement accompanying the conference report, the conferees gave detailed instructions on the implementation of certain aspects of NCATS. They stressed that the role of NCATS is to research ways to re-engineer and streamline the process of therapeutics development.[50] NCATS was directed to foster partnerships between extramural researchers, industry, and government entities to speed commercialization of new therapies through a market-based approach. Funding for two NCATS programs was specified in bill language: at least $488 million from all NIH funds for the CTSA program (a $30 million increase) and up to $10 million for the Cures Acceleration Network. The conferees gave NIH instructions to further study the use of the CAN authority and to survey other federal and private sector activities relating to CAN. They also expressed disappointment with the informal way that NIH had requested the NCATS/NCRR reorganization and mentioned concerns that NIH had not properly involved the Scientific Management Review Board in evaluating the merits of the proposal. They pointed out that another reorganization being contemplated by NIH—a possible merger of the institutes concerned with research on drug abuse and alcohol abuse—should draw on lessons learned from the creation of NCATS.

The conferees also made comments on selected other NIH programs, particularly stressing that NIH ensure support of the extramural research community by funding as many new and competing research project grants as possible at a reasonable award level. Extramural research should be maintained at about 90% of the NIH budget, with basic research retaining its current (unspecified) share. The Institutional Development Awards (IDeA) program was given a $50 million increase (22%), and NIH was encouraged to broaden the eligibility criteria for these research capacity and infrastructure grants. Finally, NIH was directed to conduct a trans-NIH review of processes for formulating and completing clinical trials, building on recommendations from a 2010 Institute of Medicine study of cancer clinical trials.

[49] Authorizing language amending the PHS Act to accomplish the reorganization appears in Section 221 of Division F.

[50] See National Institutes of Health, "NIH Establishes National Center for Advancing Translational Sciences," press release, December 23, 2011, http://www.nih.gov/news/health/dec2011/od-23.htm.

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]	FY2012 Enacted P.L. 112-74[e]
Cancer (NCI)	5,059	5,196	5,196	5,002	5,082
Heart/Lung/Blood (NHLBI)	3,070	3,148	3,148	3,036	3,085
Dental/Craniofacial Research (NIDCR)	410	420	420	405	411
Diabetes/Digestive/Kidney (NIDDK)	1,792	1,838	1,838	1,772	1,800
Neurological Disorders/Stroke (NINDS)	1,622	1,664	1,664	1,604	1,629
Allergy/Infectious Diseases (NIAID)[f]	4,776	4,916	4,916	4,725	4,499
General Medical Sciences (NIGMS)	2,034	2,102	2,102	2,347	2,435
Child Health/Human Development (NICHD)	1,318	1,352	1,352	1,303	1,324
Eye (NEI)	701	719	719	693	704
Environmental Health Sciences (NIEHS)	684	701	701	676	687
Aging (NIA)	1,100	1,130	1,130	1,088	1,106
Arthritis/Musculoskeletal/Skin (NIAMS)	534	548	548	528	537
Deafness/Communication Disorders (NIDCD)	415	426	426	410	417
Nursing Research (NINR)	144	148	148	143	145
Alcohol Abuse/Alcoholism (NIAAA)	458	469	469	453	460
Drug Abuse (NIDA)	1,051	1,080	1,080	1,039	1,055
Mental Health (NIMH)	1,477	1,517	1,517	1,461	1,483
Human Genome Research (NHGRI)	511	525	525	506	514
Biomedical Imaging/Bioengineering (NIBIB)	314	322	322	334	339
Research Resources (NCRR)	1,258	1,298	1,398	0	0
Complementary/Alternative Medicine (NCCAM)	128	131	131	126	128
Minority Health/Health Disparities (NIMHD)[g]	210	215	215	273	277
Fogarty International Center (FIC)	69	71	71	69	70
Advancing Translational Sciences (NCATS)	0	0	0	582	576
National Library of Medicine (NLM)	337	387	387	359	338
Office of Director (OD)	1,167	1,298	1,198	1,439	1,462
Common Fund (non-add)	*(543)*	*(557)*	*(557)*	*(538)*	*(546)*
Buildings & Facilities (B&F)	50	126	126	126	126
Subtotal, Labor/HHS Appropriation	30,688	31,748	31,748	30,498	30,690
Superfund (Interior appropriation to NIEHS)[h]	79	81	79	80	79
Total, NIH discretionary budget authority	30,767	31,829	31,827	30,578	30,769
Pre-appropriated Type 1 diabetes funds[i]	150	150	150	150	150
PHS Evaluation Tap funding[j]	8	8	8	8	8

Component	FY2011 Enacted[a]	FY2012 Request[b]	FY2012 House Bill[c]	FY2012 Senate Comm.[d]	FY2012 Enacted P.L. 112-74[e]
Total, NIH program level	30,926	31,987	31,985	30,737	30,927
Total, NIH program level (less Global Fund)	30,628	31,687	31,985	30,438	30,927

Sources: FY2011 Enacted, FY2012 Request, and FY2012 Enacted columns are based on the conference report tables in H.Rept. 112-331 on the Consolidated Appropriations Act, 2012 (H.R. 2055, P.L. 112-74). 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. In June 2011, 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 was not considered by the subcommittee or the full committee and was not 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. The Consolidated Appropriations Act, 2012 (H.R. 2055, P.L. 112-74), enacted December 23, 2011, included nine regular FY2012 appropriations bills. NIH appropriations were provided in Division F (Labor/HHS/Education) and Division E (Interior/Environment). Amounts shown do not reflect across-the-board rescissions of 0.189% (Division F) and 0.16% (Division E).

f. In three of these columns, 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 and the FY2012 enacted appropriation did not provide for the transfer.

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

h. 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. Final FY2012 Interior/Environment appropriations were enacted as Division E of P.L. 112-74.

i. 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.

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

Department of Energy[51]

The Administration 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 was 24.4% more than the FY2011 appropriation of $11.610 billion. The House-passed bill would have provided $11.256 billion. The Senate-reported bill would have provided $11.552 billion. The final appropriation was $11.904 billion. (See **Table 9** for details.)

The request for the DOE Office of Science was $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 was 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 have provided $4.800 billion. The Senate bill would have provided $4.843 billion. The final appropriation was $4.889 billion.

The Office of Science includes six major research programs. In the largest program, basic energy sciences, the request included $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 (previously funded by the DOE Office of Energy Efficiency and Renewable Energy).[52] The biological and environmental research program was to receive $103 million for foundational genomics research (versus $34 million in FY2010). In the high energy physics program, operations ended at the Tevatron facility in Illinois during FY2011. In fusion energy sciences, the request proposed reducing the U.S. contribution to the International Thermonuclear Experimental Reactor (ITER) 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 stated 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.[53] This statement, however, predated the March 2011 Fukushima earthquake and tsunami, which damaged component test facilities in Japan and may result in additional delays.[54] The House, Senate, and final bills all included significantly less than the Administration's request for basic energy sciences, biological and environmental research, and to a lesser extent, nuclear physics. All three bills provided $20 million for the new energy innovation hub and the requested amount for the existing one. The Senate bill would have

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

[52] The Administration proposed to initiate eight energy innovation hubs in FY2010; Congress funded three. The FY2012 budget request included six hubs. The three new hubs were to focus on batteries and energy storage, critical materials, and smart grid technologies and systems. The final appropriation included funding for five; Congress did not fund the smart grid hub. The aim of energy innovation 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)

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

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

provided $65 million less than the request for fusion energy sciences, but the House bill and the final bill both included slightly more than the request. The final appropriation for ITER was "not more than" the requested amount.

The request for DOE national security R&D was $4.175 billion, a 12.3% increase from $3.718 billion in FY2011. The request proposed a $195 million increase for the naval reactors program to 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 included $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 have provided $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 included a total of $147 million for the Los Alamos and Livermore pension liabilities. The Senate bill would have provided $54 million less than the request for naval reactors. The Senate report directed DOE not to fund design, preparation, or execution of a "scaled experiment," one element of the Administration's proposal for advanced weapons certification. The final appropriation for naval reactors was between the House and Senate amounts. For contractor pension liabilities, the final bill included a total of $224 million, the same as the request.

The request for DOE energy R&D was $4.856 billion, up 59.2% from $3.049 billion in FY2011. Most energy efficiency and renewable energy subprograms were to increase by between 50% and 200%, with the exception of R&D on hydrogen and fuel cell technologies, which were to increase by just 2.5%. "Consistent with the Administration's policy to phase out fossil fuel subsidies," the request included no funds for natural gas technologies or unconventional fossil energy technologies.[55] The request for nuclear energy was a 4% increase from FY2011. The request proposed to increase the funding of the Advanced Research Projects Agency–Energy (ARPA-E) more than threefold, 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 have provided $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 have provided $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 have provided about half the request for electricity delivery and reliability R&D and less than half the request for ARPA-E. The final bill included more than either the House or Senate bill, though still less than the request, for ARPA-E and for energy efficiency and renewables. For nuclear energy, it included more than the House or Senate bill or the request. The final appropriation for fossil energy was between the House and Senate bills.

[55] 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	FY2012 Enacted
Science	**$4,843**	**$5,416**	**$4,800**	**$4,843**	**$4,889**
Basic Energy Sciences	1,678	1,985	1,688	1,694	1,694
High Energy Physics	795	797	797	780	792
Biological and Environmental Research	612	718	547	622	612
Nuclear Physics	540	605	552	550	550
Advanced Scientific Computing Research	422	466	427	442	442
Fusion Energy Sciences	375	400	406	335	402
Other	420	445	382	420	397
National Security	**3,718**	**4,175**	**3,725**	**3,955**	**3,838**
Weapons Activities[a]	2,379[b]	2,572	2,338	2,426	2,391
Naval Reactors	959	1,154	1,031	1,100	1,080
Nonproliferation and Verification R&D	361	418	346	418	356
Defense Envtal. Cleanup Technol. Development	19	32	10	11	11
Energy	**3,049**	**4,856**	**2,731**	**2,755**	**3,177**
Energy Efficiency and Renewable Energy[c]	1,594	2,806	1,237	1,561	1,687
Fossil Energy R&D	445	453	477	258	347
Nuclear Energy	726	754	734	584	769
Electricity Delivery & Energy Reliability R&D	105	193	104	101	99
Advanced Research Projects Agency–Energy	180	650[d]	180	250	275
Total	**11,610**	**14,447**	**11,256**	**11,552**	**11,904**

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. FY2012 enacted from P.L. 112-74 and H.Rept. 112-331.

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 and enacted bills). 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[56]

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."[57] 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.[58] 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.[59] The current status of the doubling path is discussed in detail in this report in the "Presidential Initiatives" section.

[56] 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.

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

[58] 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.

[59] 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."[60]

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.[61] 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

[60] 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.

[61] 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.[62]

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.[63] 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

[62] 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.

[63] 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[64] and $456.0 million for the NNI.[65] (NSF is a principal funding agency for both of these efforts.) The Administration also asked for $998.2 million for the SEES portfolio.[66] 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.

[64] 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.

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

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

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
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[67]

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 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

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

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.[68]

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. 69

[68] 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.

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

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**

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[70]

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.[71] 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.[72]

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

[71] "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.

[72] 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.

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.[73] 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.

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:[74]

> 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?

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

[74] 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.

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	n/a
NMFS	54.6	55.4	84.0	n/a
OAR	405.5	390.0	175.1	n/a
CS	N/A	N/A	246.5	n/a
NWS	41.2	21.5	34.1	n/a
NESDIS	25.7	28.9	28.4	n/a
OMAO[a]	85.8	61.8	77.8	n/a
Total R&D[b]	**684.7**	**629.2**	**736.9**	n/a
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.

Notes: n/a=not available

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

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

National Aeronautics and Space Administration[75]

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.[76]

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.[77] An independent review of

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

[76] 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.

[77] 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.

the James Webb Space Telescope (JWST) in October 2010 estimated that the project was 15 months behind schedule and $1.4 billion over budget.[78] 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.[79] 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, §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.

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

[78] 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.

[79] 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.

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.[80] 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.

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

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

	FY2011 Enacted	FY2011 Op. Plan	FY2012 Auth.	FY2012 Request	FY2012 House	FY2012 Senate	FY2012 Final
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, §543). The rescission of $30 million in unobligated prior-year funds in the House bill (H.R. 2596, §528(e)) and the final act (P.L. 112-55, §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[81]

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),[82] 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

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

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

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 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 University Colleges	91.0	66.2	91.0	52.7	46.0	62.3
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

	FY2010 Actual[a]	FY2011 Enacted[d]	FY2012 Request	FY2012 House[e]	FY2012 Senate[f]	FY2012 Enacted[g]
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[83]

The Administration has requested $779.2 million in R&D funding for the Department of the Interior (DOI) for FY2012, essentially the same as its FY2011 funding level of $779.6. (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) ranked second in R&D intensity at DOI, with approximately 25% of its funding devoted to R&D.

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. In January 2012, DOI provided detailed information to CRS on R&D funding levels for each of its agencies and for broad program areas; this data was used for the analysis in this section. However, in providing the information, DOI noted that, "The USGS realigned their disciplines in the 2012 budget and at the same time re-baselined their R&D to better align with A-11 definitions." Accordingly, funding levels, differences, and percentage changes provided in this section are internally consistent but may differ from previously published data.

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

U.S. Geological Survey

The Consolidated Appropriations Act, FY2012 (P.L. 112-74) provides USGS with $1.068 billion for FY2012, approximately the same as the Senate draft, $14 million (1.3%) above H.R. 2584 as reported from the House Committee on Appropriations, $50 million (4.9%) above the President's request, but $16 million below the FY2011 estimated funding level (-1.5%). All USGS funding is provided through the Surveys, Investigations, and Research (SIR) account; the Administration requested funds for a second account in FY2012, National Land Imaging, but no funds were provided.[84]

USGS R&D is conducted under seven activity/program areas that 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.

P.L. 112-74 provides $675.5 million in R&D funding for FY2012under the SIR account, $35.5 million (5.5%) more than in FY2011 and $73.2 million (12.2%) more than the request. Compared to FY2011, funding for four SIR activity/program areas in FY2012 were cut: Energy, Minerals, and Environmental Health ($-3.2 million, -3.2%); Climate and Land Use Change (-$2.5 million, -2.4%); Natural Hazards (-$1.1 million, -1.0%), and Administration and Enterprise Information ($0.1 million, -11.4%). Funding for three SIR activity/program areas was increased in FY2012: Water Resources ($12.2 million, 11.0%), Core Science Systems ($29.7 million, 58.8%), all of the increase accounted for the National Geospatial Program which increased by $34.7 million;[85] and Ecosystems ($0.4 million, 0.3%).

Other DOI Agencies

The Bureau of Ocean Energy Management, Regulation, and Enforcement received the second largest increase in FY2012 DOI agency R&D funding at $63.3 million, an increase of $27.7 million over FY2011 though $5.2 million less than the President's request. Congress provided $16.6 million for the Bureau of Land Management in FY2012, the same as in FY2011, but $5.1 million more than the President's request. The Bureau of Reclamation received $12.0 million, $2.1 million less than in FY2011 and approximately equal to the request. R&D funding for the National Park Service increased by $4.6 million over FY2011 to $30.9 million, slightly higher than the request. The Fish and Wildlife Service received $48.5 million for R&D in FY2012, $1.5 more than in FY2011 and $1.5 million less than the request.

[84] The figures provided for DOI incorporate a 0.16% across-the-board rescission included in P.L. 112-74.

[85] According to the DOI budget office, the National Geospatial Program's large nominal increases resulted from DOI's reclassification of activities. In particular, the FY2012 funding figures include funding for activities not previously classified as R&D that are now classified as such. Private communication between CRS and the DOI budget office, January 24, 2012.

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	FY2012 Enacted (P.L. 112-74)
U.S. Geological Survey	640.0	607.2	a	a	675.5
Bureau of Land Management	16.6	11.5	a	a	16.6
Bureau of Reclamation	14.1	12.2	a	a	12.0
National Park Service	26.3	30.7	a	a	30.9
Fish and Wildlife Service	47.0	49.0	a	a	48.5
Bureau of Ocean Energy Management, Regulation, and Enforcement[b]	35.6	68.5	a	a	63.3
Total, DOI R&D[c]	**779.6**	**779.2**	a	a	**846.8**

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

a. R&D funding cannot be determined.

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[86]

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 research and development (R&D) activities to provide 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.

Prior to enactment of the Consolidated Appropriations Act, 2012 (P.L. 112-74, H.R. 2055) on December 23, 2011, EPA and other departments and agencies funded within the Interior, Environment, and Related Agencies Appropriations bill were operating under a series of continuing resolutions sequentially extending FY2012 funding.[87]

[86] This section was written by Robert Esworthy, Specialist in Environmental Policy, CRS Resources, Science, and Industry Division. For a broader overview of EPA's FY2012 appropriations see, CRS Report R41896, *Interior, Environment, and Related Agencies: FY2012 Appropriations*, coordinated by Carol Hardy Vincent, and CRS Report R41979, *Environmental Protection Agency (EPA) FY2012 Appropriations*, by Robert Esworthy.

[87] As with other federal agencies funded under the 12 appropriations bills, at the onset of FY2012 EPA had operated under continuing resolutions (P.L. 112-33 and P.L. 112-36) sequentially extending funding from October 1, 2011, through November 18, 2011. In addition to providing final FY2012 appropriations for 3 of the regular appropriations bills, the Consolidated and Further Continuing Appropriations Act, 2012 (P.L. 112-55) enacted November 18, 2011, included a provision continuing appropriations for those federal agencies (including EPA) funded under the remaining 9 appropriations bills through December 16, 2011. Two subsequent short term continuing resolutions just prior to (continued...)

Title II of Division E under P.L. 112-74 (H.R. 2055) provided $818.0 million for the EPA S&T account for FY2012 (does not include the 0.16% across-the-board rescission[88]), including transfers from the Hazardous Substance Superfund account. The total FY2012 enacted funding for the S&T account was $22.3 million (2.7%) below the FY2011 enacted appropriations of $840.3 million (including a 0.2% across-the-board rescission[89]). The appropriations for EPA's S&T account included in P.L. 112-74 represents 9.7% of the total $8.46 billion included for the agency overall for FY2012. As indicated in **Table 16** below, the FY2012 enacted appropriations were more than recommended in the Interior, Environment and Related Agencies FY2012 Appropriations bill (H.R. 2584, H.Rept. 112-151) as reported by House Appropriations Committee on July 19, 2011, but less than the amounts recommended in a October 14, 2011, draft released jointly by the chairman and ranking Member of the Senate Appropriations Subcommittee on Interior, Environment, and Related Agencies,[90] and in the President's FY2012 budget request.

In addition to funding priorities among the various EPA programs and activities, several recent and pending EPA regulatory actions91 were central to the debate on the FY2012 appropriations, 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, received much of the attention. Several actions under the Clean Water Act, Safe Drinking Water Act, and Resource Conservation and Recovery Act (RCRA), also received some attention. Congressional concerns regarding these issues were prominent areas of debate during oversight and deliberation of EPA's S&T funding levels. Some Members expressed concerns related to these actions during hearings and markup of EPA's FY2012 appropriations, and authorizing committees have been addressing EPA regulatory actions through hearings and legislation.

P.L. 112-74 included several administrative and general provisions affecting EPA actions and authorities. For example, Division E, Title IV "General Provisions" in P.L. 112-74, included provisions specifying requirements and restrictions on the use of FY2012 funds for certain Clean Air Act regulatory actions and greenhouse gas emission reporting requirements (see sections 425, 426, 427 and 432), and certain Clean Water Act permitting requirements associated with silvicultural activities (section 429). P.L. 112-74 includes fewer provisions than the more than 30 provisions proposed in the Interior, Environment, and Related Agencies Appropriations bill H.R. 2584 (H.Rept. 112-151) as reported by the House Committee on Appropriations on July 19, 2011.92 Additional proposals to address EPA actions also represented a significant proportion of the roughly 250 amendments considered and pending prior to suspension of floor debate of

(...continued)

enactment of the FY2012 Consolidated Appropriations Act: P.L. 112-67 extended funding for one day through December 17, 2011, to allow for the Senate to consider and adopt the conference report; P.L. 112-68 extended funding through December 23, 2011, to give Congress time to prepare the FY2012 Consolidated Appropriations Act for the President's consideration. See CRS Report RL30343, *Continuing Resolutions: Latest Action and Brief Overview of Recent Practices*, by Sandy Streeter.

[88] P.L. 112-74, Section 436, Title IV, Div. E.

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

[90] 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.

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

[92] CRS Report R41979, *Environmental Protection Agency (EPA) FY2012 Appropriations*, by Robert Esworthy, contains tables comparing EPA provisions contained in P.L. 112-74 with those proposed in H.R. 2584.

H.Rept. 112-151 on July 28, 2011.93 Along with the provisions contained in the FY2012 Consolidated Appropriations law as enacted (P.L. 112-74), the Conference Report (H.Rept. 112-331) included extensive language with regard to specific actions by EPA, in lieu of certain provisions proposed in the House Appropriations Committee-reported bill (H.R. 2584). With regard to EPA's R&D, under the S&T account in H.Rept. 112-331 (p. 1072), the Conferees required specific refinements and modifications to EPA's policies and practices for conducting assessments under the agency's Integrated Risk Information System (IRIS).

The Conferees accepted the reorganization of the budget presentation of certain program activities below the appropriations account level for FY2012 as proposed by the President,[94] including consolidation and modifications of line-items, making the FY2011 enacted levels not comparable to the reorganized line items as reflected in **Table 16** below. Newly revised program areas within the S&T account include Clean Air and Climate; Research: Air, Climate and Energy; Research: Chemical Safety and Sustainability; and Research: Sustainability and Healthy Communities. As the table indicates, there was variability among the FY2012 enacted amounts, compared to the FY2012 proposals and the FY2011 enacted amounts. In those cases where FY2012 enacted amounts were the same as proposed for FY2012 and enacted for FY2011, the FY2012 enacted levels would be a decrease once the 0.16% across-the-board rescission is taken into account. The $23.0 million transfer from the Superfund account included in P.L. 112-74 for FY2012, is the same as in both the House and Senate versions and as requested, but is $3.8 million less than the $26.8 million transferred in FY2011.

The activities funded within the S&T account include research conducted by universities, foundations, and other non-federal entities that receive 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 account, as well as a portion of the former Salaries and Expenses, and Program Operations accounts, which had been in place until FY1996.[95] 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[96] historical and projected budget

[93] House *Congressional Record* H5688-5693, July 28, 2011. The House considered H.R. 2584 from July 25, 2011, to July 28, 2011, but did not complete debate on the bill.

[94] 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.

[95] 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.

[96] The Office of Management and Budget (OMB) reports R&D budget authority (BA) amounts in its Analytical Perspectives accompanying the annual President's, 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. 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* (continued...)

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. Central facets of this debate centers include 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 of data, lack of transparency and effective peer review, and other related research planning and process issues.[97]

Table 16. Environmental Protection Agency S&T Account

(in millions of dollars; FY2012 enacted amounts do not include the 0.16% across the board rescission)

Environmental Protection Agency	FY2011 Enacted (P.L. 112-10)	FY2012 Request	House Reported H.R. 2584	Senate Subcommittee Draft	FY2012 Enacted (P.L. 112-74)
Science and Technology Approps. Account					
Air Toxics and Quality	$120.5	—	—	—	—
Clean Air and Climate	—	134.4	120.1	129.1	124.6
- Climate Protection Program	—	*16.3*	*16.3*	*16.3*	*16.3*
Climate Protection	16.8	—	—	—	—
Enforcement	15.3	15.3	15.3	15.3	15.3
Homeland Security	46.2	42.0	42.0	42.0	42.0
Indoor Air and Radiation	1.3	6.8	6.8	6.8	6.8
IT/Data Management/Security	3.7	4.1	3.7	3.7	3.7
Operations & Administration	69.7	76.5	70.1	75.5	72.1
Pesticide Licensing	6.6	6.8	6.6	6.6	6.6
Research: Air, Climate, and Energy	—	108.0	93.0	105.0	99.0

(...continued)

pgs. 363-368, available at http://www.gpoaccess.gov/usbudget/browse.html.

[97] 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.

Environmental Protection Agency	FY2011 Enacted (P.L. 112-10)	FY2012 Request	House Reported H.R. 2584	Senate Subcommittee Draft	FY2012 Enacted (P.L. 112-74)
Research: Clean Air	102.4	—	—	—	—
- Research: Global Change	*20.8*	—	—	—	—
Research: Safe and Sustainable Water	117.3	118.8	108.5	118.8	113.7
Research: National Priorities	—	—	5.0	—	5.0
Research: Human Health & Ecosystems	243.9	—	—	—	—
Research: Chemical Safety and Sustainability	—	138.1	125.5	131.6	131.5
- Research: Computational toxicology	*21.1*	*21.2*	*21.1*	*21.1*	*21.2*
- Research: Endocrine disruptor	*16.0*	*16.9*	*15.9*	*15.9*	*16.9*
- Research: Fellowships	*16.0*	*17.3*	*0.0*	*Not specified*	*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	171.0
Water: Human Health Protection	3.8	3.8	3.8	3.8	3.8
—Subtotal S&T Account Base Appropriations	***$813.5***	***$825.6***	***$754.6***	***$809.1***	***$795.0***
—Transfer in from Hazardous Substance Superfund Account	***$26.8***	***$23.0***	***$23.0***	***$23.0***	***$23.0***
Total Science and Technology	**$840.3**	**$848.6**	**$777.6**	**$832.1**	**$818.0**
R&D Budget Authority Reported by OMB	*(CR) $590.0 est*	*$579.0 est*	*N/A*	*N/A*	*N/A*

Source: Prepared by CRS. FY2012 and FY2011 enacted amounts in the table are based on the Consolidated Appropriations Act, FY2012, P.L. 112-74, and the Conference Report (H.Rept. 112-331). The House Committee-reported and Senate draft proposals 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 Subcommittee 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 of R&D budget authority 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[98]

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

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

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 focused on applications such as modeling environmental impacts of aviation and further advancing technologies that reduce aircraft noise and emissions. [99]

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

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

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.

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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