

Federal Research and Development Funding: FY2013

John F. Sargent Jr.
Specialist in Science and Technology Policy

December 5, 2013

Congressional Research Service

7-5700

www.crs.gov

R42410

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 05 DEC 2013		2. REPORT TYPE		3. DATES COVERED 00-00-2013 to 00-00-2013	
4. TITLE AND SUBTITLE Federal Research and Development Funding:FY2013				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Congressional Research Service,The Library of Congress,101,Independence Avenue SE,Washington,DC,20540				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 62	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Summary

President Obama's budget request for FY2013 included \$140.820 billion for research and development (R&D), a \$1.951 billion (1.4%) increase from the FY2012 estimated funding level of \$138.869 billion. The FY2013 Consolidated and Further Continuing Appropriations Act (P.L. 113-6), signed into law on March 26, 2013, provided year-long appropriations to all agencies for FY2013. The law included divisions incorporating five of the regular appropriations bills—Agriculture, Rural Development, Food and Drug Administration, and Related Agencies; Commerce, Justice, Science, and Related Agencies; Department of Defense; Department of Homeland Security; and Military Construction and Veterans Affairs, and Related Agencies—and included continuing appropriations for agencies covered under the other regular appropriations bills. Agency appropriations were subject to one or more rescissions as well as sequestration. For several agencies, research and development (R&D) funding is included in accounts with non-R&D activities. For such agencies, unless Congress provides funding at the full request level as requested, it is not possible to know the agency's R&D funding level. In such cases, the funding level may not be known until it is included in the President's FY2015 budget request and/or agency budget justifications. When final appropriations are not resolved until after the President's next fiscal year budget request is prepared (as was the case for FY2013 appropriations and the President's FY2014 request) funding for agency R&D may not be known until the subsequent year's budget request. However, some agencies may opt to provide funding estimates, publicly or privately (for example, in response to a CRS inquiry). Determination of funding levels can be complicated by a number of factors, including rescissions, sequestration, supplemental funding, transfers, and reprogramming. Agency analyses in this report use the most current information available at the time this report was published.

Funding for R&D is highly concentrated in a few departments. Under President Obama's FY2013 budget request, seven federal agencies would have received 95.8% of total federal R&D funding, the largest among them being the Department of Defense (50.6%) and the Department of Health and Human Services (22.3%, primarily for the National Institutes of Health). Among the largest changes proposed in the President's request, the R&D budget of the Department of Defense would have fallen by \$1.535 billion (2.1%), while R&D funding for the Department of Commerce's National Institute of Standards and Technology (NIST) would have increased by \$1.329 billion. The proposed NIST growth was fueled by increases in funding for its core research laboratories and by the establishment of two new initiatives: \$1 billion for the National Network for Manufacturing Innovation, which seeks to promote the development of manufacturing technologies with broad applications, and \$300 million for a Wireless Innovation (WIN) Fund to help develop cutting-edge technologies for public safety users.

President Obama also requested increases in the R&D budgets of NIST, the National Science Foundation, and the Department of Energy's Office of Science that were targeted for doubling over 7 years, from their FY2006 levels, by the America COMPETES Act, and over 11 years by the America COMPETES Reauthorization Act of 2010. The funding requested for FY2013 was consistent with a doubling timeframe of 17 years, much longer than authorized by either act.

The President's budget request sought support for three multi-agency R&D initiatives in FY2013: \$1.766 billion for the National Nanotechnology Initiative, an increase of \$70 million (4.1%) over FY2012; \$3.807 billion for the Networking and Information Technology Research and Development program, an increase of \$69 million (1.8%); and \$2.633 billion for the U.S. Global Change Research Program, an increase of \$136 million (5.6%).

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Overview

The 112th Congress continued 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 drove 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 (e.g., national defense, health, safety, the environment, 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.

Congress plays 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 acted to complete the FY2013 appropriations process it faced two overarching issues: the extent to which the federal R&D investment could grow in the context of increased pressure on discretionary spending and how available funding would 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.

This report provides government-wide, multi-agency, and individual agency analyses of the President's FY2013 request as it relates to R&D and related activities and congressional actions on appropriations legislation, and specific information on appropriations enacted by Congress in the FY2013 Consolidated and Further Continuing Appropriations Act, (P.L. 113-6) for agencies that have made such information available. Agency FY2013 appropriations were subject to one or more rescissions as well as sequestration.

For several agencies, research and development (R&D) funding is included in accounts with non-R&D activities. For such agencies, unless Congress provides funding at the full request level as requested, it is not possible to know the agency's R&D funding level. In such cases, the funding level may not be known until it is included in the President's FY2015 budget request and/or agency budget justifications. When final appropriations are not resolved until after the President's next fiscal year budget request is prepared (as was the case for FY2013 appropriations and the President's FY2014 request) funding for agency R&D may not be known until the subsequent year's budget request. However, some agencies may opt to provide funding estimates, publicly or privately (for example, in response to a CRS inquiry). Determination of funding levels can be complicated by a number of factors, including rescissions, sequestration, supplemental funding, transfers, and reprogramming. Agency analyses in this report use the most current information available at the time this report was published.

President Obama's proposed FY2013 budget, released on February 13, 2012, included \$140.820 billion for R&D in FY2013, a 1.4% increase over the estimated FY2012 R&D funding level of

\$138.869 billion.¹ Adjusted for inflation, the President's FY2013 R&D request represented a decrease of 0.2% from the FY2012 level.²

Among its provisions, the President's FY2013 budget maintained 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 sought to achieve this objective by authorizing increased funding for accounts at three agencies with a strong R&D emphasis in these disciplines: the Department of Energy (DOE) Office of Science, the National Science Foundation (NSF), and the Department of Commerce (DOC) National Institute of Standards and Technology's (NIST) core laboratory research and R&D facilities construction funding (collectively referred to as the "targeted accounts"). However, appropriations provided to these agencies for FY2008, FY2009, and FY2010 fell short of the levels authorized in P.L. 110-69. P.L. 111-358 set authorization levels for the targeted accounts for FY2011-FY2013 at a slower growth rate than P.L. 110-69. FY2011 and FY2012 funding for the targeted accounts fell short of their P.L. 111-358 authorized levels. For FY2013 appropriations not only fell short of the authorized levels for the targeted accounts, but actually decreased 3.1% from the FY2012 appropriations level. (See "Doubling Effort" later in this report for a more detailed discussion.)

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);³ however, doing so likely would have required a substantial increase in public and/or private investment. In 2009, total U.S. R&D expenditures were \$400.5 billion,⁴ or approximately 2.87% of GDP.⁵ Based on 2009 figures, reaching President Obama's 3% goal would have required an increase of 4.4% in national R&D spending.

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).⁶ The biomedical research community experienced a variety

¹ 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.

² As calculated by CRS using the GDP (chained) price index from Table 10.1, Gross Domestic Product and Deflators Used in the Historical Tables: 1940–2017, from the President's FY2013 budget. Available at <http://www.whitehouse.gov/sites/default/files/omb/budget/fy2013/assets/hist10z1.xls>.

³ The research and experimentation tax credit is frequently referred to as the research and development tax credit or R&D tax credit, though 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 and Policy Issues for the 113th Congress*, by Gary Guenther.

⁴ 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/>.

⁵ 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>.

⁶ Jennifer Couzin and Greg Miller, "NIH Budget: Boom and Bust," *Science*, vol. 316, no. 5823 (April 2007), pp. 356-361, at <http://www.scienceline.org/cgi/content/full/316/5823/356>.

of challenges resulting from such a circumstance following the five-year doubling of the National Institutes of Health (NIH) 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.⁷ The current effort to double funding for the targeted accounts has followed a similar pattern, but on a smaller scale. Funding for the targeted accounts grew by about 28% from FY2006 to FY2010 (or approximately 6.4% per year), but fell 3.6% between FY2010 and FY2013.

Analysis of federal R&D funding is complicated by several factors, such as the inclusion of R&D in accounts with non-R&D activities. As a result of this 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) (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 FY2013 budget request was the inclusion of the Wireless Innovation (WIN) Fund, a part of the Administration's Wireless Innovation and Infrastructure Initiative. First proposed in the President's FY2012 budget request, the WIN Fund would have received \$300 million in FY2013 from receipts generated through electromagnetic spectrum auctions. The fund was intended to support development of leading-edge wireless technologies and public safety applications. Under the President's budget, NIST was to have received up to \$300 million in FY2013 if the WIN fund had been established. NIST intended to use these funds to work with industry and public safety organizations on research and development of new standards, technologies, and applications that advance public safety communications, including establishing a competitive grant fund. The grant fund would have awarded between \$70 million and \$75 million per year from FY2014 through FY2016 for related research, development, and demonstration projects.⁸ Congress did not authorize the establishment of the WIN Fund in FY2013.

Federal R&D Funding Perspectives

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

⁷ 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.

⁸ *Wireless Innovation Fund*, factsheet, National Institute of Standards and Technology website, http://www.nist.gov/public_affairs/factsheet/wireless_innov2013.cfm.

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 FY2011 (actual), FY2012 (estimated), and FY2013 (request) as reported by OMB.

Under President Obama's FY2013 budget request, seven federal agencies would have received 95.8% of total federal R&D funding: Department of Defense (DOD), 50.6%; Department of Health and Human Services (HHS) (primarily the National Institutes of Health), 22.3%; Department of Energy (DOE), 8.5%; National Aeronautics and Space Administration (NASA), 6.8%; National Science Foundation (NSF), 4.2%; Department of Commerce (DOC), 1.8%; and Department of Agriculture (USDA), 1.6%. This report provides an analysis of the R&D budget requests for these agencies, as well as for the Department of Homeland Security (DHS), Department of the Interior (DOI), Department of Transportation (DOT), and the Environmental Protection Agency (EPA). In total, these agencies account for more than 98% of FY2012 actual appropriations and FY2013 requested federal R&D funding.

The largest agency R&D increases in the President's FY2013 request were for DOC, \$1.315 billion (104.5%);⁹ DOE, \$884 million (8.0%); HHS, \$247 million (0.8%); NSF, \$224 million (3.9%); and NASA, \$203 million (2.2%). Under President Obama's FY2013 budget request, DOD R&D funding would have been reduced by \$1.535 billion (2.1%) and USDA R&D by \$34 million (1.5%).

Table 1. Federal Research and Development Funding by Agency, FY2011-FY2013

(Budget authority, dollar amounts in millions)

Department/Agency	FY2011 Actual	FY2012 Estimate	FY2013 Request	Dollar Change, 2012 to 2013	Percent Change, 2012 to 2013
Defense	77,500	72,739	71,204	-1,535	-2.1%
Health and Human Services	31,186	31,153	31,400	247	0.8%
Energy	10,673	11,019	11,903	884	8.0%
NASA	9,099	9,399	9,602	203	2.2%
National Science Foundation	5,486	5,680	5,904	224	3.9%
Commerce	1,275	1,258	2,573	1,315	104.5%
Agriculture	2,135	2,331	2,297	-34	-1.5%
Veterans Affairs	1,160	1,164	1,166	2	0.2%
Transportation	953	944	1,076	132	14.0%

⁹ The Department of Commerce total includes mandatory proposals for the Wireless Innovation Network and the National Network for Manufacturing Innovation at the National Institute for Standards and Technology. These programs are discussed in the DOC NIST section of this report. Mandatory spending is typically provided in permanent or multi-year appropriations contained in the authorizing law, and therefore, the funding becomes available automatically each year, without legislative action by Congress. For additional information on mandatory spending, see CRS Report RL33074, *Mandatory Spending Since 1962*, by Mindy R. Levit and D. Andrew Austin, *Mandatory Spending Since 1962*, by D. Andrew Austin and Mindy R. Levit.

Department/Agency	FY2011 Actual	FY2012 Estimate	FY2013 Request	Dollar Change, 2012 to 2013	Percent Change, 2012 to 2013
Interior	757	796	854	58	7.3%
Homeland Security	664	577	729	152	26.3%
Environmental Protection Agency	584	568	580	12	2.1%
Other	1,242	1,241	1,532	291	23.4%
Total ^{Error! Reference source not found.}	142,714	138,869	140,820	1,951	1.4%

Source: Executive Office of the President, OMB, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2013*, Table 22-1.

a. 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 FY2013 request included \$30.627 billion for basic research, up \$449 million (1.5%) from FY2012; \$33.369 billion for applied research, up \$1.586 billion (5.0%); \$74.138 billion for development, down \$345 million (0.5%); and \$2.690 billion for facilities and equipment, up \$265 million (10.9%).

Table 2. Federal Research and Development Funding by Character of Work, Facilities, and Equipment, FY2011-FY2013

(Budget authority, dollar amounts in millions)

	FY2011 Actual	FY2012 Estimate	FY2013 Request	Dollar Change, 2012 to 2013	Percent Change, 2012 to 2013
Basic research	29,697	30,178	30,627	449	1.5%
Applied research	30,833	31,783	33,369	1,586	5.0%
Development	80,246	74,483	74,138	-345	-0.5%
Facilities and equipment	1,938	2,425	2,690	265	10.9%
Total ^a	142,714	138,869	140,820	1,951	1.4%

Source: Executive Office of the President, OMB, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2013*, Table 22-1.

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**.) In turn, the overall federal R&D budget reflects a wide range of national priorities, from supporting advances in spaceflight to developing new and affordable sources of energy. These

priorities and the mission of each agency contribute, in part, to the composition of an agency's R&D spending (i.e., the allocation between basic research, applied research, development, and facilities and equipment). The federal government is the nation's largest supporter of basic research, funding 53.2% of U.S. basic research in 2009, primarily because the private sector asserts it cannot capture an adequate return on long-term fundamental research investments. In contrast, industry funded only 21.7% of U.S. basic research in 2009 (with state governments, universities, and other non-profit organizations funding the remaining 25.1%).¹⁰ In the President's FY2013 budget request, the Department of Health and Human Services, primarily the National Institutes of Health (NIH), accounted for more than half of all federal funding for basic research.¹¹

In contrast to basic research, industry is the primary funder of applied research in the United States, accounting for an estimated 48.1% in 2009, while the federal government accounted for an estimated 42.2%.¹² Among federal agencies, HHS is the largest funder of applied research, accounting for nearly half of all federally funded applied research in the President's FY2013 budget request.¹³ Industry also provides the vast majority of funding for development. Industry accounted for an estimated 77.6% in 2009, while the federal government provided an estimated 21.3%.¹⁴ DOD is the primary federal agency funder of development, accounting for 87.0% of total federal development funding in the President's FY2013 budget request.¹⁵

Table 3. Top R&D Funding Agencies by Character of Work, Facilities, and Equipment, FY2011-FY2013

(Budget authority, dollar amounts in millions)

	FY2011 Actual	FY2012 Estimated	FY2013 Request	Dollar Change, 2012 to 2013	Percent Change, 2012 to 2013
Basic Research					
Health and Human Services	16,013	16,051	16,010	-41	-0.3%
National Science Foundation	4,636	4,778	4,987	209	4.4%
Energy	3,979	3,918	4,096	178	4.5%
Applied Research					
Health and Human Services	15,066	14,919	15,192	273	1.8%
Defense	4,328	4,737	4,477	-260	-5.5%

¹⁰ National Science Board, *Science and Engineering Indicators 2012*, NSB 12-01, Appendix Table 4-8, January 2012, <http://www.nsf.gov/statistics/seind12/appendix.htm>.

¹¹ 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.

¹² National Science Board, *Science and Engineering Indicators 2012*, NSB 12-01, Appendix Table 4-9, January 2012, <http://www.nsf.gov/statistics/seind12/appendix.htm>.

¹³ Executive Office of the President, Office of Management and Budget, *Analytical Perspectives*, Table 22-1, February 13, 2012, <http://www.whitehouse.gov/sites/default/files/omb/budget/fy2013/assets/spec.pdf>.

¹⁴ National Science Board, *Science and Engineering Indicators 2012*, NSB 12-01, Appendix Table 4-10, January 2012, <http://www.nsf.gov/statistics/seind12/appendix.htm>.

¹⁵ Executive Office of the President, Office of Management and Budget, *Analytical Perspectives*, Table 22-1, February 13, 2012.

	FY2011 Actual	FY2012 Estimated	FY2013 Request	Dollar Change, 2012 to 2013	Percent Change, 2012 to 2013
Energy	3,575	3,857	4,152	295	7.6%
Development					
Defense	71,205	65,786	64,536	-1,250	-1.9%
NASA	5,299	4,975	5,131	156	3.1%
Energy	2,361	2,387	2,855	468	19.6%
Facilities and Equipment					
Energy	758	857	800	-57	-6.7%
Commerce	254	209	632	423	202.4%
National Science Foundation	395	452	458	6	1.3%

Source: Executive Office of the President, OMB, *Analytical Perspectives, Budget of the United States Government, Fiscal Year 2013, February 13, 2012.*

Note: Top funding agencies based on FY2013 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. President Obama's FY2013 budget request sought funding for six multiagency R&D initiatives discussed below.

Doubling Effort

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-FY2016) 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.¹⁶ 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, growing at a pace consistent with doubling over approximately 11 years.¹⁷ (See **Table 4** for individual and aggregate appropriations for the targeted accounts.)

¹⁶ For additional information, see CRS Report RL34328, *America COMPETES Act: Programs, Funding, and Selected Issues*, by Deborah D. Stine.

¹⁷ 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).

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-FY2013.¹⁸ The aggregate authorization levels in this act for the targeted accounts were consistent with an 11-year doubling path, slower than the America COMPETES Act's 7-year doubling path. Appropriations fell below the levels set in P.L. 111-358 for FY2011 and FY2012.

In his FY2013 budget, President Obama requested \$13.073 billion in aggregate funding for the targeted accounts, an increase of \$544.0 million (4.3%) above the enacted FY2012 aggregate funding level of \$12.529 billion, but below the America COMPETES Reauthorization Act of 2010 (P.L. 111-358) level of \$15.105 billion. Estimated FY2013 appropriations for the targeted accounts as provided by P.L. 113-6, incorporating reductions due to rescissions and sequestration, were \$12.141 billion,¹⁹ \$2.964 billion (19.6%) below the FY2013 authorized level, \$388.1 million (3.1%) below the FY2012 appropriation level, and \$457.1 million (3.6%) below FY2010 (actual) appropriations (the fiscal year preceding the authorizations provided under the America COMPETES Reauthorization Act). The compound annual growth rate between FY2006 (actual) appropriations and FY2013 (estimated) appropriations is 3.0%, a pace that would result in doubling in somewhat more than 23 years—more than three times the length of time originally envisioned in the 2007 America COMPETES Act and more than twice the doubling period established by the America COMPETES Reauthorization Act of 2010.²⁰

In light of ongoing 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 The FY2013 budget request, like the FY2012 budget request, reiterated President Obama's intention to double funding for the targeted accounts from their FY2006 levels but did not specify the length of time over which the doubling is to take place. In addition, the Office of Management and Budget's Public Budget Database, published as part of the President's FY2013 request, included projections of budget authority for the targeted accounts through FY2017 that would set a doubling pace of more than 21 years.

¹⁸ 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.

¹⁹ Estimate based on figures cited in agency operating plans/current plans as of October 31, 2013.

²⁰ All doubling path calculations in this report use FY2006 as the baseline. 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.

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>.

**Table 4. Funding for Targeted Accounts
FY2006-FY2011 (Actual), FY2012 (Estimated), and FY2013 (Estimate)**
(in millions of current dollars)

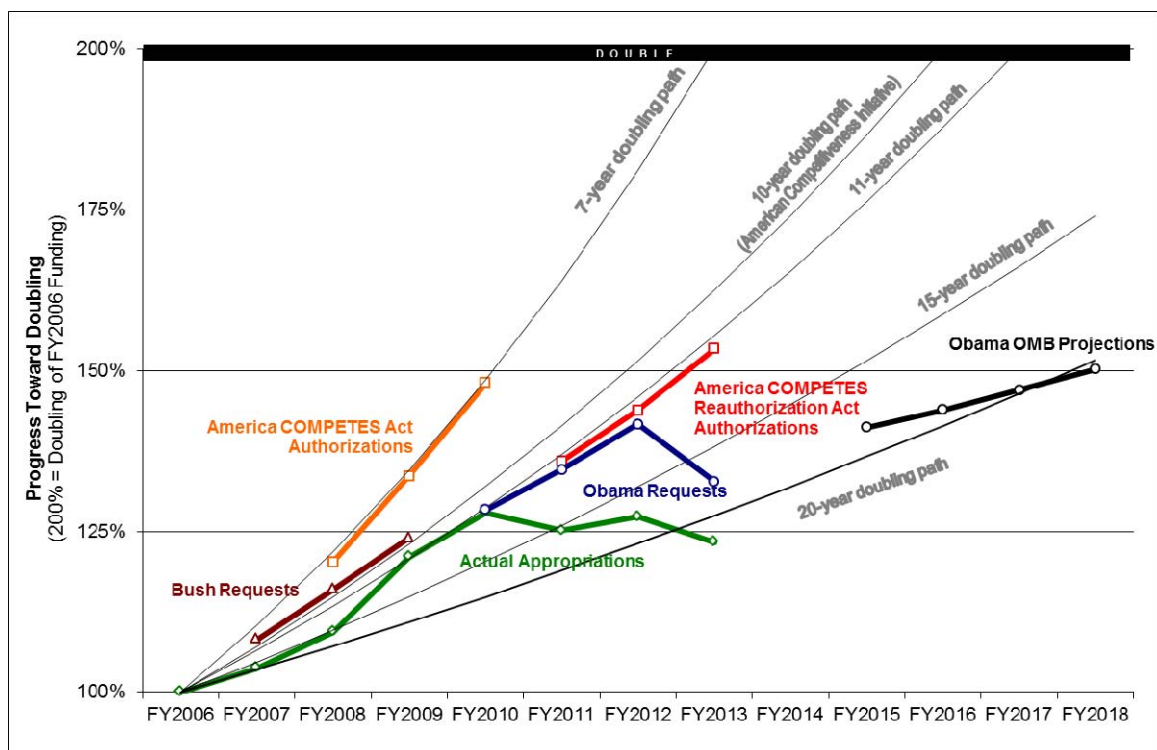
Agency	FY2006 Actual	FY2007 Actual	FY2008 Actual	FY2009 Actual	FY2009 ARRA	FY2010 Actual	FY2011 Actual	FY2012 Actual	FY2013 Est. ^a
NSF	5,646	5,884	6,084	6,469	2,402	6,972	6,913 ^b	7,033	6,884
DOE/Office of Science	3,632	3,837	4,083	4,807	1,633	4,964	4,843	4,874	4,621
NIST/core research ^c	395	434	441	472	220	515	497.4	567	580
NIST/facilities	174	59	161	172	360	147	70	55	56
Total^d	9,846	10,214	10,768	11,920	4,615	12,598	12,323	12,529	12,141

Source: NIST, budget requests for FY2008-FY2013, http://www.nist.gov/public_affairs/budget/index.cfm, and NIST enacted, http://www.nist.gov/public_affairs/releases/approps-summary2014.cfm; DOE, budget requests for FY2008-FY2013, <http://www.cfo.doe.gov/crorgcf30.htm>, and DOE current plan, http://science.energy.gov/~media/budget/pdf/sc-congressional-appropriations/fy-2014/FY-2012_FY_2014_Request_Science_Stat_Table.pdf; NSF, budget requests for FY2008-FY2013, <http://www.nsf.gov/about/budget>, and NSF operating plan, http://www.nsf.gov/about/congress/113/highlights/cu13_0409.jsp.

- a. FY2013 figures are agency estimates that incorporate reductions due to rescissions and sequester.
- b. Includes \$54.0 million transferred to the U.S. Coast Guard for icebreaking services (per P.L. 112-10).
- c. NIST core research is performed under its scientific and technical research and services (STRS) account.
- d. Totals may differ from the sum of the components due to rounding.

Figure 1 shows aggregate funding for the targeted accounts as a percentage of their FY2006 funding level, and illustrates how actual (FY2006-FY2013), requested (FY2007-FY2013), projected (FY2014-FY2017), 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** are in current dollars, not constant dollars, therefore the effect of inflation on the purchasing power of these funds is not taken into consideration.

Figure I. 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, 2012, and 2013, and current plans/operating plans for FY2013; the President's FY2013 budget request; and agency authorization levels from the America COMPETES Act (P.L. 110-69) and the America COMPETES Reauthorization Act of 2010 (P.L. 111-358).

Notes: The 7-year doubling pace represents annual increases of 10.4%, the 10-year doubling pace represents annual increases of 7.2%, the 11-year doubling pace represents annual increases of 6.5%, the 15-year doubling represents annual increases of 4.7%, and the 20-year doubling represents annual increases of 3.3%. 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-FY2012 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

The President requested \$1.766 billion in funding for the National Nanotechnology Initiative (NNI) for FY2013, \$70 million (4.1%) above the FY2012 estimated level of \$1.696 billion. Under the Administration's FY2013 request, nanotechnology funding would have increased at the DOE by \$127 million (40.3%), at the NSF by \$9 million (2.1%), at the DOC by \$7 million (7.0%), and at the EPA by \$2 million (11.8%) over FY2012 funding levels. Under the 2013 request, nanotechnology funding for the DOD would have fallen by \$72 million (19.9%), while nanotechnology funding for other NNI agencies would have remained essentially flat.²³ Final

²³ Executive Office of the President, Office of Science and Technology Policy, *Science, Technology, Innovation, and STEM Education*, Table 2, February 13, 2011. For additional information on the NNI, see CRS Report RL34401, *The* (continued...)

FY2013 appropriations figures for NNI R&D are not expected to be available until the President's FY2015 budget is released.

Networking and Information Technology Research and Development Program

President Obama requested \$3.807 billion in FY2013 funding for the Networking and Information Technology Research and Development (NITRD) program, \$69 million (1.8%) above FY2012 funding. The NITRD request included increases of \$69 million (6.1%) for NSF, \$33 million (5.9%) for DOE, \$20 million (16.4%) for DOC, and \$17 million (36.2%) for DHS. Under the 2013 request, DOD NITRD funding would have been reduced by \$67 million (5.7%), while NITRD funding for other agencies would have remained essentially flat.²⁴ Final FY2013 appropriations figures for NITRD R&D are not expected to be available until the President's FY2015 budget is released.

U.S. Global Change Research Program

President Obama proposed \$2.563 billion for the U.S. Global Change Research Program (USGCRP) in FY2013, \$136 million (5.6%) above the FY2012 estimated level of \$2.427 billion. Four agencies would have received the bulk of the FY2013 USGCRP funding increase under the President's request: NASA (up \$79 million, 5.7%); DOC, including the National Oceanic and Atmospheric Administration and NIST (up \$23 million, 7.2%); DOE (up \$19 million, 9.0%), and the DOI (U.S. Geological Survey) (up \$9 million, 15.3%).²⁵ Final FY2013 appropriations figures for USGCRP R&D are not expected to be available until the President's FY2015 budget is released.

Materials Genome Initiative

Announced in June 2011, the Materials Genome Initiative (MGI) is a multi-agency initiative

to create new knowledge, tools, and infrastructure with a goal of enabling U.S. industries to discover, manufacture, and deploy advanced materials twice as fast than is possible today. Agencies are currently developing implementation strategies for the Materials Genome Initiative with a focus on: (1) the creation of a materials innovation infrastructure, (2) achieving national goals with advanced materials, and (3) equipping the next generation materials workforce. Materials science funding opportunities announced in FY 2012 and requested in the FY 2013 Budget reflect these efforts.²⁶

(...continued)

National Nanotechnology Initiative: Overview, Reauthorization, and Appropriations Issues, by John F. Sargent Jr.

²⁴ Ibid.

²⁵ 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.

²⁶ E-mail correspondence between OSTP and CRS, March 14, 2012.

In congressional testimony, OSTP Director John Holdren stated that the purpose of the Materials Genome Initiative is to “speed our understanding of the fundamentals of materials science, providing a wealth of practical information that American entrepreneurs and innovators will be able to use to develop new products and processes” in much the same way that the Human Genome Project accelerated a range of biological sciences by identifying and deciphering the human genetic code.²⁷ The Obama Administration has not published FY2012 or FY2013 funding levels for the MGI.

Advanced Manufacturing Partnership

In June 2011, President Obama launched the Advanced Manufacturing Partnership (AMP), an effort to bring together “industry, universities, and the Federal government to invest in emerging technologies that will create high-quality manufacturing jobs and enhance our global competitiveness.”²⁸ Two R&D-focused components of the AMP are the National Robotics Initiative (NRI) and the National Network for Manufacturing Innovation (NNMI). The President’s FY2013 budget included \$2.2 billion for federal advanced manufacturing R&D, a 19% increase over FY2012.²⁹

National Robotics Initiative

The National Robotics Initiative (NRI) seeks to “develop robots that work with or beside people to extend or augment human capabilities.”³⁰ Among the goals of the program are increasing labor productivity in the manufacturing sector, assisting with dangerous and expensive missions in space, accelerating the discovery of new drugs, and improving food safety by rapidly sensing microbial contamination.³¹ In FY2012, four agencies—NSF, NIH, NASA, and USDA—issued a joint solicitation to provide research funding for next-generation robotics. In addition, the Department of Defense, through multiple component agencies, is supporting the NRI through the Defense University Research Instrumentation Program. DOD is supporting the purchase of equipment to assist in robotics research to advance defense technologies and applications, including unmanned ground, air, sea, and undersea vehicles and autonomous systems.³²

National Network for Manufacturing Innovation

The President’s FY2013 budget also proposed establishment of a National Network for Manufacturing Innovation (NNMI) to promote the development of manufacturing technologies

²⁷ John P. Holdren, Director, Office of Science and Technology Policy, Executive Office of the President, testimony before the Senate Committee on Commerce, Science, and Transportation, Subcommittee on Science and Space, hearing on “Keeping America Competitive Through Investments in R&D,” March 6, 2012, http://commerce.senate.gov/public/?a=Files.Serve&File_id=fed566eb-e2c8-49da-aec5-f84e4045890b.

²⁸ Ibid.

²⁹ Timothy F. Geithner, Secretary, U.S. Department of the Treasury, testimony before the House Committee on the Budget, hearing on “The President’s Fiscal Year 2013 Revenue and Economic Policy Proposals,” February 16, 2012, <http://budget.house.gov/UploadedFiles/GeithnerTestimony02162012.pdf>.

³⁰ Ibid.

³¹ Executive Office of the President, Office of Science and Technology Policy, website, August 3, 2011, <http://www.whitehouse.gov/blog/2011/08/03/supporting-president-s-national-robotics-initiative>.

³² Ibid.

with broad applications. This initiative was to have been carried out through a collaboration between NIST, DOD, DOE, and NSF with mandatory funding of \$1 billion.³³

According to NIST, the NNMI would have consisted of

a network of institutes where researchers, companies, and entrepreneurs can come together to develop new manufacturing technologies with broad applications. Each institute would have a unique technology focus. These institutes will help support an ecosystem of manufacturing activity in local areas. The Manufacturing Innovation Institutes would support manufacturing technology commercialization by helping to bridge the gap from the laboratory to the market and address core gaps in scaling manufacturing process technologies.³⁴

The President's budget proposed mandatory spending of \$1 billion over 10 years (FY2013-FY2022) in support of the NNMI, with initial funding of \$206 million in FY2013. Funding for the program would be front-loaded with \$839 million in spending projected for FY2013-FY2017.³⁵ Congress provided no funding for this initiative for FY2013.

FY2013 Appropriations Status

The remainder of this report provides a more in-depth analysis of R&D in 12 federal departments and agencies that, in aggregate, receive more than 98% of federal R&D funding. Annual appropriations for these agencies are provided through 8 of the 12 regular appropriations bills. As of September 14, 2012, five of the eight regular appropriations bills that provide R&D funding for agencies covered in-depth in this report had passed the House; none had passed the Senate.

On September 13, 2012, the House passed Continuing Appropriations Resolution, 2013 (H.J.Res. 117) providing appropriations for all agencies through March 27, 2013,

at a rate for operations as provided in the applicable appropriations Acts for fiscal year 2012 and under the authority and conditions provided in such Acts, for continuing projects or activities (including the costs of direct loans and loan guarantees) that are not otherwise specifically provided for in this joint resolution, that were conducted in fiscal year 2012, and for which appropriations, funds, or other authority were made available in the [12 regular FY2012 appropriations acts and the Disaster Relief Appropriations Act, 2012 (P.L. 112-77)].³⁶

H.J.Res. 117 also included several modifications to FY2012 funding levels. Among the modifications that may have affected federal R&D funding were: an increase of 0.612% above the funding levels provided under the 12 regular appropriations act, except for amounts provided for Overseas Contingency Operations/Global War on Terrorism; a \$363.2 million (5.0%) increase in funding for the DOE National Nuclear Security Administration's (NNSA) Weapons Activities

³³ According to OSTP, funding for the NNMI is mostly separate from the \$2.2 billion proposed investment in advanced manufacturing under the AMP, though there is an overlap of \$137 million. E-mail correspondence between OSTP and CRS, March 14, 2012.

³⁴ U.S. Department of Commerce, *FY2013 Budget in Brief*, February 2012, p. 123, http://www.osec.doc.gov/bmi/budget/FY13BIB/fy2013bib_final.pdf.

³⁵ Office of Management and Budget, Executive Office of the President, *Fiscal Year 2013 Budget of the U.S. Government*, February 2012, Table S-9, p. 217.

³⁶ H.J.Res. 117, as passed by the House.

over its FY2012 level; and \$100.0 million above the FY2012 level for NNSA's Defense Nuclear Proliferation account for domestic uranium enrichment research, development, and demonstration. On September 22, the Senate passed H.J.Res. 117 without amendment. On September 25, 2012, the bill was sent to President Obama who signed it into law (P.L. 112-175) on September 28.

On March 26, 2013, President Obama signed into law the Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6) providing appropriations for all agencies through the end of FY2013. P.L. 113-6 included five regular appropriations acts as Divisions A-E:

- Division A: Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2013.
- Division B: Commerce, Justice, Science, and Related Agencies Appropriations Act, 2013.
- Division C: Department of Defense Appropriations Act, 2013.
- Division D: Department of Homeland Security Appropriations Act, 2013.
- Division E: Military Construction and Veterans Affairs, and Related Agencies Appropriations Act, 2013.

Division F, the Full-Year Continuing Appropriations Act, 2013, provided continuing appropriations for all departments and agencies not covered in Divisions A-E.

Section 3001 of Division G provided across-the-board rescissions that were applicable to various projects and activities in Divisions A through E. For security discretionary budget authority in Divisions A through E, 0.1% was rescinded. For nonsecurity discretionary budget authority, 2.513% was rescinded in Divisions A and E, and 1.877% was rescinded in Division B.³⁷ (See CRS Report R42782, *FY2013 Continuing Resolutions: Analysis of Components and Congressional Action*, by Jessica Tollestrup, for additional information.)

Section 3004 of P.L. 113-6 was intended to eliminate any amount by which the new budget authority provided in the act exceeded the FY2013 discretionary spending limits in Section 251(c)(2) of the Balanced Budget and Emergency Deficit Control Act. As enacted, this section provided two separate across-the-board rescissions—one for non-security budget authority and one for security budget authority—of 0%, to be applied at the program, project, and activity level. The section required the percentages to be increased if OMB estimated that additional rescissions were needed to avoid exceeding the limits. Subsequent to the enactment of P.L. 113-6, OMB calculated that additional rescissions of 0.032% of security budget authority, and 0.2% of non-security budget authority, would be required.

In addition to the rescissions, FY2013 appropriations were subject to additional reductions through sequestration as required by the Budget Control Act of 2011 (P.L. 112-25), as amended by the American Taxpayer Relief Act of 2012 (P.L. 112-240).

³⁷ "Security" and "nonsecurity" are defined Section 250(c)(4)(A) and (B) of the Balanced Budget and Emergency Deficit Control Act (BBEDCA). Security budget authority includes discretionary appropriations associated with agency budgets for the Department of Defense, the Department of Homeland Security, the Department of Veterans Affairs, the National Nuclear Security Administration, intelligence community management, and budget function 150. Nonsecurity budget authority is all other discretionary appropriations.

Where available, this report includes FY2013 funding levels incorporating the effects of the rescissions and sequestration.

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 bill is available on the CRS webpage, *Status Table of Appropriations*, available at <http://crs.gov/Pages/AppropriationsStatusTable.aspx?source=QuickLinks>.

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, FY2013 Status Table of Appropriations, available at <http://crs.gov/Pages/AppropriationsStatusTable.aspx?source=QuickLinks>.

Department of Defense³⁸

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 administers the fund, tracks (but does not report) the amount of funding allocated to RDT&E. The JIEDDF funding is not included in the table below.

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

In addition, GWOT/OCO-related requests/appropriations often include money for a number of transfer funds. These have included in the past the Iraqi Freedom Fund (IFF), the Iraqi Security

³⁸ This section was written by John Moteff, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

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 FY2013, the Obama Administration requested \$69.408 billion for DOD's baseline Title IV RDT&E and another \$246 million in OCO RDT&E. The FY2013 request was \$2.902 billion and \$280 million, respectively, below what Congress appropriated for FY2012. In addition, the Administration requested \$673 million in RDT&E through the Defense Health Program, \$647 million in RDT&E through the Chemical Agents and Munitions Destruction program, and \$43 million in RDT&E through the National Defense Sealift Fund. Congress authorized \$69.938 billion for the baseline RDT&E account (Title II in the National Defense Authorization Act for Fiscal Year 2013, P.L. 112-239) and \$246 million in additional OCO RDT&E. In regards to appropriations, the Consolidated and Further Continuing Appropriation Act, 2013 (P.L. 113-6) provided \$69.859 billion for baseline RDT&E (not adjusted for sequestration). This was more than requested, but nearly \$6 billion less than appropriated in FY2012. P.L. 113-6 appropriated \$248 million in OCO RDT&E. The act also appropriated \$6 million less than what was requested for the National Defense Sealift Fund and appropriated nearly double the requested level for RDT&E in the Defense Health Plan.

RDT&E funding can be analyzed 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, 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.

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

According to its FY2013 Budget Request Overview, DOD was seeking to "maintain a strong S&T posture" going forward. The FY2013 Title IV baseline S&T funding request was \$11.861 billion, \$343 million less than what Congress appropriated for S&T in FY2012. Congress authorized \$11.839 billion for S&T, but appropriated \$12.471 billion.

Within the S&T program, basic research (6.1) receives special attention, particularly from the nation's universities. DOD is not a large funder of basic research compared to the National Institutes of Health or the National Science Foundation. 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 Administration requested \$2.117 billion for basic research for FY2013, \$5 million more than what Congress appropriated for Title IV basic research in FY2012. Congress authorized \$2.127 and appropriated \$2.128 billion for basic research.

Table 6. Department of Defense RDT&E
(in millions of dollars)

Budget Account	FY2012 Actual	FY2013 Authorized		FY2013 Request		FY2013 House		FY2013 Senate		FY2013 P.L. 113-6 ^a	
	Base + OCO	Base	OCO	Base	OCO	Base	CO	Base	OCO	Base	OCO
Army	9,760	8,495	15	8,929	20	8,593	15	8,428	42	8,668	30
Navy	17,866	17,309	60	16,883	60	16,988	61	16,646	19	16,946	53
Air Force	27,421	25,383	53	25,428	53	25,118	53	25,374	53	25,407	53
Defensewide	20,895	18,551	112	17,982	112	19,100	107	18,419	112	18,613	112
Dir. Test & Eval.	192	200		185		185		224		188	
Total Title V—By Account^a	76,135	69,938	240	69,408	246	69,982	236	69,090	226	69,859	248
Budget Activity											
6.1 Basic Research	1,878	2,127		2,117		2,116		2,127		2,128	
6.2 Applied Research	4,329	4,488		4,478		4,563		4,599		4,720	
6.3 Advanced Dev.	5,340	5,224		5,266		5,530		5,449		5,623	
6.4 Advanced Component Dev. and Prototypes	14,142	13,036	20	12,409	24	13,197	20	12,622	35	12,635	19
6.5 Systems Dev. And Demo	14,346	14,474	2	14,695	2	14,110	2	13,856	14	13,990	17
6.6 Management Support ^a	5,661	4,317	5	4,263	5	4,402	5	4,471	5	4,515	5
6.7 Op. Systems Dev. ^b	30,441	26,272	213	26,180	214	26,064	209	25,966	172	26,247	206
Total Title IV—by Budget Activity	76,135	69,938	240	69,408	246	69,982	236	69,090	226	69,859	247
Title V—Revolving and Mgm't Funds											

Budget Account	FY2012 Actual	FY2013 Authorized		FY2013 Request		FY2013 House		FY2013 Senate		FY2013 P.L. 113-6 ^a	
	Base + OCO	Base	OCO	Base	OCO	Base	CO	Base	OCO	Base	OCO
National Defense Sealift Fund	18	43		43		37		33		37	
Title VI—Other Defense Programs											
Defense Health Program	1,206	673		673		1,218		1,027		1,307	
Chemical Agents and Munitions Destruction	393	647		647		647		647		647	
Grand Total^d	77,752	71,301	240	70,771	246	71,884	236	70,797	226	71,850	247

Source: CRS, adapted from the Department of Defense Budget, Fiscal Year 2013 RDT&E Programs (R-1), February 2012 and relevant FY2013 Budget Justification (R-2) documents. H.Rept. 112-705, Conference Report to accompany H.R. 4320. H.Rept. 112-493 to accompany H.R. 5856. S.Rept. 112-196, to accompany H.R. 5856. Senate Explanatory Statement with regard to H.R. 933, Congressional Record, March 11, 2013.

- Does not include final sequestration.
- Total may differ from sum of components due to rounding.
- Includes funding for the Director of Test and Evaluation.
- Includes funding for classified programs.
- The “Grand Total” figure uses the “Total Title IV-by Account” figure.

Department of Homeland Security³⁹

For the Department of Homeland Security (DHS), the President requested \$1.179 billion for R&D and related programs in FY2013, a 20% increase from FY2012. This total included \$831 million for the Directorate of Science and Technology (S&T), \$328 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 House bill would have provided a total of \$1.162 billion, including \$826 million for S&T, \$316 million for DNDO, and \$20 million for Coast Guard RDT&E. The Senate committee recommended the same amounts as the request. The department’s April 2013 operating plan, reflecting the final continuing resolution, reductions due to sequestration, and subsequent reprogramming, included \$1.123 billion.⁴⁰ (See **Table 7**.)

³⁹ This section was written by Daniel Morgan, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

⁴⁰ The operating plan did not include approximately \$7 million appropriated by the Disaster Relief Appropriations Act, 2013 (P.L. 113-2).

The S&T Directorate is the primary DHS R&D organization.⁴¹ 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 \$831 million for the S&T Directorate for FY2013. This was 24% more than the FY2012 appropriation of \$673 million. Funding for Research, Development, and Innovation (RDI) would have increased by \$212 million. Of the six thrust areas within RDI, the largest requested increase (from \$61 million in FY2012 to \$144 million in FY2013) was for disaster resilience R&D. A reduction of \$50 million in the request for Laboratory Facilities reflected the omission of funding for the National Bio and Agro-Defense Facility (NBAF), a planned replacement for the existing Plum Island Animal Disease Center. The \$50 million appropriated in FY2012 for the start of NBAF construction was one-third of what the Administration had requested. DHS announced plans for an assessment of whether and for what purpose a facility like NBAF should be built. The assessment was to consider current threats and review cost, safety, and alternatives to the NBAF plan.

The House bill would have provided \$826 million for the S&T Directorate, or \$6 million less than the request. The total included \$72 million less than the request for RDI. The House committee directed DHS to determine how to allocate that reduction across the six thrust areas. In Laboratory Facilities, the bill would have provided \$75 million more than the request. The committee directed that this increase should be spent on NBAF construction.

The Senate committee recommended S&T funding levels that were the same as the Administration's request. Within RDI, however, it specified separate amounts for each of the six thrust areas, rather than a single total. In recommending no funding for NBAF construction, the committee noted a total cost estimate for the facility of \$1.138 billion.

The April 2013 operating plan included \$801 million for the S&T Directorate. Funding for RDI, at \$432 million, was between the House and Senate levels.

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 \$328 million for DNDO for FY2013, an increase of 14% above the FY2012 appropriation of \$290 million. The request included an increase of \$44 million for Transformational R&D, a program that the Administration had previously proposed to transfer to S&T. The proposed increase for Transformational R&D was partially offset by a proposed reduction of \$23 million for Systems Development. In the Systems Acquisition account, funding for human-portable radiation detectors would have increased by \$20 million, while funding for radiation portal monitors would have decreased to \$1 million from \$7 million in FY2012.

The House bill would have provided \$316 million for DNDO, or \$12 million less than the request. Most of the reduction would have been in the Transformational R&D program. The bill directed DHS to provide an updated implementation plan for its responsibilities under the domestic portion of the global nuclear detection architecture. The House committee stated that it intended this to be an annual report. The committee report also advocated consolidation of

⁴¹ 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.

DNDO with the DHS Office of Health Affairs (OHA).⁴² It stated that consolidation could result in cost savings and “could provide greater awareness and coordination ... by creating a more visible focal point for ... coordination and strategic planning” of efforts against weapons of mass destruction. The committee directed DHS to develop and submit a plan to merge DNDO and OHA into an Office of Weapons of Mass Destruction Defense for FY2014.

As in the case of S&T, the Senate committee recommended DNDO funding levels that were the same as the Administration’s request. Like the House committee, the Senate committee directed DHS to provide an updated implementation plan for its responsibilities under the domestic portion of the global nuclear detection architecture.

The April 2013 operating plan included \$303 million for DNDO, including \$71 million for Transformational R&D.

Table 7. Department of Homeland Security R&D and Related Programs
(in millions of dollars)

	FY2012 Actual	FY2013 Request	FY2013 House	FY2013 Senate	FY2013 Op. Plan
Directorate of Science and Technology	\$673	\$831	\$826	\$831	\$801
Management and Administration	135	138	130	138	127
R&D, Acquisition, and Operations	538	693	696	693	674
<i>Research, Development, and Innovation</i>	266	478	406	478	432
<i>Laboratory Facilities</i>	182	127	202	127	158
<i>Acquisition and Operations Support</i>	54	48	48	48	46
<i>University Programs</i>	37	40	40	40	38
Domestic Nuclear Detection Office	290	328	316	328	303
Management and Administration	38	40	38	40	38
Research, Development, and Operations	215	237	227	237	216
<i>Systems Engineering and Architecture</i>	30	30	30	30	29
<i>Systems Development</i>	51	28	28	28	27
<i>Transformational R&D</i>	40	84	75	84	71
<i>Assessments</i>	38	33	33	33	31
<i>Operations Support</i>	33	36	36	36	34
<i>National Technical Nuclear Forensics Center</i>	23	26	26	26	24
Systems Acquisition	37	51	51	51	50
<i>Radiation Portal Monitors Program</i>	2	1	1	1	1
<i>Securing the Cities</i>	22	22	22	22	21
<i>Human Portable Radiation Detection Systems</i>	14	28	28	28	27

⁴² H.Rept. 112-492, pp. 12-14. Note that this language was in the introductory section of the committee report, separate from the main discussion of DNDO.

	FY2012 Actual	FY2013 Request	FY2013 House	FY2013 Senate	FY2013 Op. Plan
U.S. Coast Guard RDT&E	28	20	20	20	20
TOTAL	991	1,179	1,162	1,179	1,123

Sources: FY2012 from DHS FY2014 congressional budget justification, <http://www.dhs.gov/dhs-budget>. FY2013 request from DHS FY2013 congressional budget justification, <http://www.dhs.gov/dhs-budget>. FY2013 House from H.R. 5855 as passed by the House and H.Rept. 112-492. FY2013 Senate Committee from S. 3216 as reported and S.Rept. 112-169. FY2013 operating plan from Department of Homeland Security, Office of the Chief Financial Officer, *U.S. Department of Homeland Security Fiscal Year 2013 Post-Sequestration Operating Plan*, April 26, 2013.

- a. **Note:** FY2013 operating plan amounts do not include approximately \$7 million appropriated by the Disaster Relief Appropriations Act, 2013 (P.L. 113-2).

National Institutes of Health⁴³

The FY2013 President's Budget request for NIH was \$30.860 billion (program level), the same as FY2012 and \$65 million lower than the comparable FY2011 amount of \$30.926 billion. The final FY2012 total dropped below the FY2011 level after adjustment for the rescissions mandated in the Consolidated Appropriations Act, 2012 (P.L. 112-74), and a transfer of funds within HHS.⁴⁴

On June 14, 2012, the Senate Appropriations Committee reported S. 3295 (S.Rept. 112-176), its FY2013 bill for the Departments of Labor, Health and Human Services, and Education, and Related Agencies (Labor/HHS). The committee recommended funding NIH at \$100 million higher than the President's request. The House Appropriations Committee did not report a comparable FY2013 bill, but the House Labor/HHS Subcommittee approved a draft FY2013 bill on July 18, 2012. The Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6) provided appropriations for Labor/HHS agencies through the end of FY2013. The law provided an increase of almost \$70 million for the NIH Office of the Director, but also required an across-the-board rescission of 0.2% for all accounts (pursuant to Section 3004, as interpreted by OMB). The March 1, 2013, sequestration order and a transfer of funding under the authority of the HHS Secretary further reduced FY2013 amounts for NIH by \$1.553 billion and \$173 million respectively; these reductions are reflected in amounts shown for the FY2013 Operating Plan in **Table 8**.

NIH Organization and Sources of Funding. NIH supports and conducts a wide range of basic and clinical research, research training, and health information dissemination across all fields of biomedical and behavioral sciences. About 83% of NIH's budget goes out to the extramural research community in the form of grants, contracts, and other awards. The funding supports research performed by more than 300,000 non-federal scientists and technical personnel who work at more than 2,500 universities, hospitals, medical schools, and other research institutions around the country and abroad. The agency's organization consists of the Office of the NIH Director and 27 institutes and centers. The Office of the Director (OD) sets overall policy for NIH

⁴³ This section was written by Pamela W. Smith and Judith A. Johnson, CRS Domestic Social Policy Division. 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 was provided in P.L. 112-10, The Department of Defense and Full-Year Continuing Appropriations Act, 2011.

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 an intramural Buildings and Facilities account. (The other three centers, which perform centralized support services, are funded through assessments on the IC appropriations.)

Funding for NIH comes primarily from the annual Labor/HHS appropriations bill, 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 authorized and directly appropriated in the Public Health Service (PHS) Act for a special program on type 1 diabetes research; it also receives \$8.2 million annually in discretionary funding for the National Library of Medicine from a transfer within PHS. The total funding available for NIH activities, taking account of add-ons and transfers, is the program level.

NIH and other HHS agencies and programs that are authorized under the PHS Act are subject to a budget assessment called the PHS Program Evaluation Set-Aside or the evaluation tap. Section 241 of the PHS Act (42 U.S.C. §238j) authorizes the Secretary to use a portion of eligible appropriations to study the effectiveness of federal health programs and to identify ways to improve them. Congress sets the percentage level of the tap in the annual Labor/HHS appropriations acts, and also directs specific amounts of funding from the tap for transfer to a number of HHS programs. The set-aside has the effect of redistributing appropriated funds for specific purposes among PHS and other HHS agencies. NIH, with the largest budget among the PHS agencies, becomes the largest "donor" of program evaluation funds, and is a relatively minor recipient. The set-aside level for FY2012 was 2.5% of eligible appropriations, making just over \$1.0 billion available for transfer among programs. The FY2013 President's Budget proposed increasing the set-aside to 3.2%, which would have increased the NIH contribution by about \$200 million. In S. 3295, the Senate Appropriations Committee rejected the proposed increase and called for the tap to continue at 2.5%. Ultimately, the 2.5% tap was maintained under the provisions of P.L. 113-6, and NIH was assessed over \$700 million as in FY2012. 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.⁴⁵

FY2013 President's Budget Request. Most of the ICs were flat-funded in the request with a few increases and decreases as noted below. NIH described its FY2013 areas of emphasis under four broad themes that built on current activities and continued implementation of an organizational restructuring for translational medicine that started in FY2012.

Investing in Basic Research. Congress has given NIH direction to continue its emphasis on support of basic biomedical and behavioral research, which seeks to understand the causes of disease onset and progression. About 54% of the FY2013 request was targeted for basic research in areas such as genetics, regenerative medicine (including stem cells), and environmental and behavioral influences on health.

⁴⁵ For further information on the PHS Evaluation Set-Aside, see CRS Report R43304, *Public Health Service Agencies: Overview and Funding*, coordinated by Amalia K. Corby-Edwards and C. Stephen Redhead.

Accelerating Discovery Through Technology. The request indicated that NIH would continue to support development and application of advanced technologies (DNA sequencing, microarray technology, nanotechnology, new imaging modalities, and computational biology) to increase understanding of complex diseases and enable development of more effective therapies. A high-priority project, the Cancer Genome Atlas, generates maps of genetic changes found in different types of cancer.

Advancing Translational Sciences. Translational medicine focuses on converting basic research discoveries into clinical applications that benefit patients. In 2010, NIH began planning for the creation of the National Center for Advancing Translational Sciences (NCATS). The new entity pulls together a variety of preclinical and clinical translational sciences resources that were scattered across the ICs. NCATS was established and funded in the FY2012 appropriations law (P.L. 112-74), which also abolished the National Center for Research Resources and transferred its programs to NCATS and several other ICs. The NCATS mission includes exploring more reliable, rapid, and cost-effective ways to test possible new drugs, diagnostics, and preventive measures for human use (or new uses for old products). In addition, NCATS fosters partnerships between extramural researchers, industry, health care, and government entities to speed commercialization of new therapies.⁴⁶ The FY2013 request for NCATS was \$639 million, \$64 million (11%) over its FY2012 first-year budget. The request indicated that nearly \$40 million of the increase would go to expanding the Cures Acceleration Network (CAN) from \$10 million to almost \$50 million. The \$463 million requested for the Clinical and Translational Science Awards (CTSA) program included a \$1 million increase. CTSA funds a national consortium of medical research institutions engaged in improving clinical research.

Encouraging New Investigators and New Ideas. NIH has several programs to support exceptional young scientists and speed their transition to independent research. 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 FY2013, the same as in FY2012. 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; the President requested \$12 million for this program, up from \$8 million in FY2012. For NIH's major research training program, the Ruth L. Kirschstein National Research Service Awards, the budget proposed funding of \$775 million, \$2 million below FY2012. The request noted this level would support a 2% stipend increase and 16,361 training positions, a decrease of 309 positions. During FY2013, NIH systematically analyzed biomedical workforce and training needs, with a special focus on promoting diversity in the workforce and understanding barriers to career advancement.

Selected Other Program Changes in IC Budgets. *Institutional Development Awards (IDeA):* The FY2012 appropriation provided the IDeA program with a \$50 million increase (22%) to \$276 million, and NIH was encouraged to broaden the eligibility criteria for these research capacity and infrastructure grants. For FY2013, the Administration did not request continuation of the extra funding—the budget request for the National Institute of General Medical Sciences (NIGMS) included \$225 million for the IDeA program, \$51 million less than in FY2012.

⁴⁶ 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>.

National Children's Study: The budget request for the Office of the Director was \$28 million below FY2012 because requested funding for the National Children's Study was reduced by nearly 15% from \$193 million to \$165 million. The pilot Vanguard Study is moving to a less resource-intensive phase, and NIH is evaluating more cost-effective sampling approaches for the study.

Alzheimer's disease research: In February 2012, the Administration announced that NIH would devote additional resources to Alzheimer's disease research in FY2012 and FY2013.⁴⁷ Within FY2012 appropriations, NIH planned to redirect \$50 million from other research areas to Alzheimer's-related grants. In FY2013, HHS planned to make available \$80 million from the Prevention and Public Health Fund (mandatory funding authorized and directly appropriated by the Affordable Care Act) for a portfolio of new research on Alzheimer's.

Research Project Grants. The main funding mechanism for supporting extramural investigator-initiated research is competitive, peer-reviewed research project grants (RPGs). The President's Budget requested \$16.5 billion for RPGs in FY2013, about 52% of NIH's proposed budget. This amount would have supported an estimated 35,888 RPG awards. Within that total, 9,415 would be competing RPGs ("competing" awards means new grants plus competing renewals of existing grants.) The average cost of a competing RPG in FY2013 was estimated to be \$431,000. After adjusting for certain large high-cost grants that happened to come into competing status in FY2013 (HIV/AIDS Clinical Trials Networks grants), there was an expected overall reduction of 1% in the average cost of competing RPGs.

NIH proposed several grant-funding policies in order to maximize resources for investigator-initiated grants and for young, first-time researchers. According to the request, non-competing (continuation) RPGs would have had their budgets reduced by 1% from the FY2012 level, and the budgets of competing RPGs would have been negotiated downward by about 1% to avoid growth in the average award size. NIH planned to continue current policies that equalize the success rates of new and established investigators in receiving funding. Additional review and scrutiny was planned for awards to any scientist who already has total grant support of \$1.5 million or more.

Other Funding Mechanisms. The FY2013 request also proposed changes for other funding mechanisms within the NIH budget besides those for RPGs and training awards. Support for *research centers* would decrease by \$64 million (-2.1%) to \$2.966 billion, largely because of the proposed \$51 million drop in funding for the IDeA program mentioned previously. A \$108 million (3.6%) increase to \$3.076 billion was proposed for the *R&D contracts* mechanism, reflecting (among other things) funding to cover the proposed increase in the PHS Program Evaluation Set-Aside. The NIH *intramural research program* would gain \$21 million (0.6%) for a total of \$3.420 billion. *Research management and support* requested an increase of \$1.7 million (0.1%) to a total of \$1.535 billion. The *Office of the Director* would decrease by \$28 million to \$1.429 billion because of the plans for the National Children's Study discussed earlier. 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 might benefit from collaboration between two or more institutes or centers. The request for the Common Fund

⁴⁷ U.S. Department of Health and Human Services, "We Can't Wait: Administration Announces New Steps to Fight Alzheimer's Disease," press release, February 7, 2012, <http://www.hhs.gov/news/press/2012pres/02/20120207a.html>.

was \$545 million, the same as the FY2012 level. *Buildings and Facilities* was \$125 million, the same as FY2012.

FY2013 Senate Committee Recommendation. The committee recommended a total of \$30.723 billion in Labor/HHS funding for NIH, a \$100 million increase (0.3%) above both the request and the FY2012 level. The increase over FY2012 was spread across most of the ICs, with some exceptions reflecting program priorities. The committee recommended a 10% increase for NCATS and would have allowed up to \$40 million to be used for the Cures Acceleration Network rather than the requested \$50 million. No extra funding for the IDeA program would have been provided in the bill in the NIGMS appropriation, although the committee report included language referring to an “increase that should be paid for by a reduction in funding across NIH ICs.” Funding for the National Institute on Aging would also have been increased above the request to continue the HHS initiative on Alzheimer’s research. The committee disagreed, however, with the President’s request to allocate \$80 million from the Prevention and Public Health Fund for NIH research on Alzheimer’s.

FY2013 Operating Plan. Final FY2013 funding levels for NIH ICs and for extramural and intramural programs became clear when HHS released its agency operating plans. For NIH, the FY2013 program level of \$29.151 billion represented a decrease of \$1.709 billion (-5.5%) from the FY2012 level. RPGs will receive \$14.906 billion, a reduction of \$976 million from the FY2012 level of \$15.882 billion. The operating plan level will support an estimated 33,335 RPG awards, 1,282 fewer than in FY2012.

Table 8. National Institutes of Health Funding
(in millions of dollars)

Component	FY2012 Actual ^a	FY2013 Request	FY2013 House Subcomm. draft bill	S. 3295 Senate Committee- reported	FY2013 Operating Plan ^b
National Cancer Institute (NCI)	5,063	5,069	5,066	5,084	4,779
National Heart/Lung/Blood Institute (NHLBI)	3,073	3,076	3,075	3,085	2,901
Dental/Craniofacial Research (NIDCR)	410	408	410	409	387
Diabetes/Digestive/Kidney (NIDDK) ^c	1,794	1,792	1,795	1,798	1,693
Neurological Disorders/Stroke (NINDS)	1,623	1,625	1,624	1,630	1,532
Allergy/Infectious Diseases (NIAID)	4,482	4,495	4,485	4,509	4,231
General Medical Sciences (NIGMS)	2,426	2,379	2,527	2,387	2,291
Child Health/Human Development (NICHD)	1,319	1,321	1,320	1,325	1,245
National Eye Institute (NEI)	701	693	702	695	662
Environmental Health Sciences (NIEHS)	684	684	685	686	646
National Institute on Aging (NIA)	1,120	1,103	1,102	1,124	1,040
Arthritis/Musculoskeletal/Skin (NIAMS)	535	536	535	537	505
Deafness/Communication Disorders (NIDCD)	416	417	416	419	392
National Institute of Nursing Research (NINR)	145	144	145	145	136
Alcohol Abuse/Alcoholism (NIAAA)	459	457	459	458	433

Component	FY2012 Actual ^a	FY2013 Request	FY2013 House Subcomm. draft bill	S. 3295 Senate Committee-reported	FY2013 Operating Plan ^b
National Institute on Drug Abuse (NIDA)	1,051	1,054	1,052	1,057	993
National Institute of Mental Health (NIMH)	1,478	1,479	1,462	1,484	1,395
Nat'l Human Genome Research Inst (NHGRI)	512	511	512	513	483
Biomedical Imaging/Bioengineering (NIBIB)	338	337	338	338	319
Complementary/Alternative Medicine (NCCAM)	128	128	128	128	121
Minority Health/Health Disparities (NIMHD)	276	279	276	280	260
Fogarty International Center (FIC)	69	70	70	70	66
Advancing Translational Sciences (NCATS)	574	639	575	631	542
National Library of Medicine (NLM)	365	373	367	374	318
Office of Director (OD)	1,457	1,429	1,373	1,431	1,436
Buildings & Facilities (B&F)	125	125	125	125	118
Subtotal, Labor/HHS Appropriation	30,623	30,623	30,623	30,723	28,926
Superfund (Interior appropriation to NIEHS) ^d	79	79	75	79	75
Total, NIH discretionary budget authority	30,702	30,702	30,698	30,802	29,001
Pre-appropriated type 1 diabetes funds ^e	150	150	150	150	142
PHS Evaluation Tap funding ^f	8	8	0	8	8
Total, NIH program level	30,860	30,860	30,848	30,960	29,151

Sources: Adapted by CRS from (1) NIH, *Justification of Estimates for Appropriations Committees, FY2013*, Vol. 1 - Overview/Supplementary Tables, February 13, 2012, p. ST-2, <http://officeofbudget.od.nih.gov/pdfs/FY13/Vol%201%20Tab%203%20-%20Supplementary%20Tables.pdf>, as well as FY2014 NIH Justification; (2) draft FY2013 bill released by House Labor/HHS Appropriations Subcommittee on July 17, 2012, <http://appropriations.house.gov/uploadedfiles/bills-112hr-sc-ap-fy13-laborhhsed.pdf>; (3) S.Rept. 112-176 on S. 3295; and (4) NIH Office of Budget, Operating Plan—Allocation by IC, <http://officeofbudget.od.nih.gov/cy.html>.

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

- a. NIH FY2012 appropriations were provided in Division F (Labor/HHS/Education) and Division E (Interior/Environment) of the Consolidated Appropriations Act, 2012 (P.L. 112-74). Amounts shown reflect across-the-board rescissions of 0.189% (Division F) and 0.16% (Division E). FY2012 Actual reflects Secretary's transfer of \$8.727 million to Health Resources and Services Administration for Ryan White AIDS and Secretary's net transfer of \$18.273 million for Alzheimer's disease research to National Institute on Aging (NIA) from other ICs. FY2012 figures are shown on a comparable basis to the FY2013 request, House committee, and Senate committee amounts, reflecting transfers from ICs to National Library of Medicine (NLM).
- b. FY2013 Operating Plan reflects final funding levels under P.L. 113-6, the Consolidated and Further Continuing Appropriations Act, 2013 (which provided a program level total of \$30.877 billion), reduced by the March 1, 2013, sequestration (-\$1.553 billion) and the April 3, 2013, administrative transfers (-\$173 million). IC and NLM amounts are not comparable to the other columns as the FY2013 Operating Plan figures do not reflect transfers from ICs to NLM.
- c. Amounts for the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) do not include mandatory funding for type 1 diabetes research (see note e).
- d. This is a separate account in the Interior/Environment appropriations for National Institute of Environmental Health Sciences (NIEHS) research activities related to Superfund. In FY2013 committee action, the House Appropriations Committee reported H.R. 6091 on July 10, 2012

(H.Rept. 112-589), and the leadership of the Senate Appropriations Interior/Environment Subcommittee released a draft bill on Sept. 25, 2012.

- e. Mandatory funds available to NIDDK for type 1 diabetes research under PHS Act §330B (provided by P.L. 110-275, P.L. 111-309, and P.L. 112-240). Funds have been appropriated through FY2014.
- f. Additional funds for NLM from PHS Evaluation Set-Aside (§241 of PHS Act).

Department of Energy⁴⁸

The Administration requested \$12.763 billion for Department of Energy (DOE) R&D and related programs in FY2013, including activities in three major categories: science, national security, and energy. This request was 8.2% more than the FY2012 appropriation of \$11.794 billion. The House bill would have provided \$11.680 billion. The Senate committee recommended \$12.240 billion. A final total for the FY2013 operating plan is not yet available. (See **Table 9** for details.)

The request for the DOE Office of Science was \$4.992 billion, an increase of 2.4% from the FY2012 appropriation of \$4.874 billion. The Administration's stated goal is to double the funding of the Office of Science.⁴⁹ 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 FY2013 request was 37% more than the FY2006 baseline. The America COMPETES Reauthorization Act of 2010 (P.L. 111-358) authorized \$6.007 billion for the Office of Science in FY2013. The House bill would have provided \$4.801 billion. The Senate committee recommended \$4.909 billion. The amount provided under the FY2013 operating plan was \$4.621 billion, a reduction of 5.2% from the FY2012 level.

The Office of Science includes six major research programs. A requested increase of \$112 million for the largest program, basic energy sciences (BES), would have funded "new science supporting a clean energy agenda," materials and chemistry by design, and joint R&D with the Office of Energy Efficiency and Renewable Energy (EERE). Costs for increased utilization of existing BES facilities and the start of construction of the Linac Coherent Light Source-II, a high-energy x-ray source, were mostly offset in the Administration proposal by a scheduled ramp-down in construction for the National Synchrotron Light Source-II. The House bill would have provided \$142 million less than the request for BES. The Senate committee recommended \$88 million less than the request. Both committees rejected the proposal for BES energy frontier research centers to work jointly with EERE. In the fusion energy sciences program, the request would have increased the U.S. contribution to the International Thermonuclear Experimental Reactor (ITER) by \$45 million, but this would have been more than offset by reduced funding for domestic fusion activities, including the end of operations for the Alcator C-Mod tokamak, a fusion reactor. The estimated total cost for the U.S. share of ITER, a multi-year construction project, remains in the range of \$1.45 billion to \$2.2 billion, but "it is possible that costs will increase."⁵⁰ The House bill would have provided \$76 million more than the request for fusion, including domestic funding at

⁴⁸ This section was written by Daniel Morgan, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

⁴⁹ For more information, see CRS Report R41951, *An Analysis of Efforts to Double Federal Funding for Physical Sciences and Engineering Research*, by John F. Sargent Jr.

⁵⁰ DOE FY2013 congressional budget justification, vol. 4, p. 191.

the FY2012 level and \$28 million more than requested for ITER. The Senate committee's recommendation for fusion was the same as the request.

The request for DOE national security R&D was \$4.054 billion, an 8.1% increase from \$3.752 billion in FY2012. The request for nonproliferation and verification R&D included a one-time increment of \$150 million for domestic uranium enrichment R&D and demonstration. The House bill would have provided the proposed increment for domestic uranium enrichment; the Senate committee rejected it. Final figures under the FY2013 operating plan are not yet available.

The request for DOE energy R&D was \$3.717 billion, up 17.3% from \$3.168 billion in FY2012. In energy efficiency, funding for the Advanced Manufacturing Office (formerly the Industrial Technologies Program) would have increased by \$174 million, and funding for building technologies and vehicle technologies would have increased by \$91 million each. In renewable energy, funding for biomass and biorefinery systems would have increased by \$71 million, while funding for water power and for hydrogen and fuel cell technologies would have decreased. A proposed increase in funding for fossil energy R&D reflected the rescission of unobligated prior-year balances in FY2012; excluding this rescission, the FY2013 request for fossil energy R&D was a decrease of \$105 million, mostly from the coal program. The request for the Advanced Research Projects Agency–Energy (ARPA-E) was \$350 million, an increase of \$75 million. The House-passed bill and Senate committee report both included less than the request for energy efficiency, renewable energy, and ARPA-E, and more than the request for fossil energy. Under the FY2013 operating plan, energy efficiency and renewable energy received \$1.599 billion, a reduction of 4.9% from the FY2012 enacted level; other operating plan amounts are not yet available.

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

(in millions of dollars)

	FY2012 Enacted	FY2013 Request	FY2013 House	FY2013 Senate	FY2013 Op. Plan
Science	\$4,874	\$4,992	\$4,801	\$4,909	\$4,621
Basic Energy Sciences	1,688	1,800	1,657	1,712	1,596
High Energy Physics	791	777	777	782	748
Biological and Environmental Research	610	625	542	625	578
Nuclear Physics	547	527	548	540	520
Advanced Scientific Computing Research	441	456	442	456	418
Fusion Energy Sciences	401	398	475	398	385
Other	396	410	361	396	376
National Security	3,752	4,054	4,006	3,952	n/a
Weapons Activities ^a	2,307	2,398	2,381	2,426	n/a
Naval Reactors	1,080	1,089	1,087	1,089	n/a
Nonproliferation and Verification R&D	354	548	528	418	n/a
Defense Environmental Cleanup Tech. Devt.	11	20	10	20	n/a
Energy	3,168	3,717	2,873	3,378	n/a
Energy Efficiency and Renewable Energy ^b	1,682	2,072	1,295	1,717	1,599

	FY2012 Enacted	FY2013 Request	FY2013 House	FY2013 Senate	FY2013 Op. Plan
Fossil Energy R&D	347	421	529	461	n/a
Nuclear Energy	765	770	765	785	n/a
Electricity Delivery & Energy Reliability R&D	99	103	83	103	n/a
Advanced Research Projects Agency–Energy	275	350	200	312	n/a
Total	11,794	12,763	11,680	12,240	n/a

Sources: FY2012 and FY2013 request from DOE FY2013 congressional budget justification, <http://energy.gov/cfo/downloads/fy-2013-budget-justification>. FY2013 House from H.R. 5325 as passed by the House and H.Rept. 112-462. FY2013 Senate from S. 2465 as reported and S.Rept. 112-164. FY2013 operating plan from DOE website: Science from funding summary dated August 19, 2013, at <http://science.energy.gov/budget/>; Energy Efficiency and Renewable Energy from “Fiscal Year 2013 Budget,” http://www4.eere.energy.gov/office_eere/current_budget.php, updated October 28, 2013. Other FY2013 operating plan amounts are not available (n/a).

Notes: Totals may differ from the sum of their components due to rounding. All amounts are reduced for rescissions and use of prior-year balances. FY2012 amounts are reduced to reflect allocation of the contractor pay freeze rescission in Sec. 309 of P.L. 112-74.

- 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 prorated shares of Readiness in Technical Base and Facilities and Legacy Contractor Pensions. 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. Excluding Weatherization and Intergovernmental Activities.

National Science Foundation⁵¹

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.”⁵² 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 requested a total of \$7.373 billion in funding for NSF in FY2013. This amount was \$268.4 million (3.8%) more than the foundation’s FY2012 actual funding level of \$7.105 billion and \$926.9 million (11.2%) less than the America COMPETES Reauthorization Act of 2010 (P.L. 111-358, COMPETES 2010) authorized level of \$8.300 billion. The House-passed Commerce, Justice, Science, and Related Agencies Appropriations Act, 2013 (H.R. 5326, H.Rept. 112-463), would have provided \$7.333 billion top line to NSF. This amount was \$40.6 million (0.6%) less than the request and \$59.4 million (0.8%) more than the \$7.273 billion Senate Committee on Appropriations recommendation (S. 2323, Commerce, Justice, Science, and Related Agencies

⁵¹ 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.

⁵² The National Science Foundation Act of 1950 (P.L. 81-507).

Appropriations Act, 2013, and S.Rept. 112-158). Final (post-sequestration, post-rescission) FY2013 current plan funding for the NSF was \$6.884 billion. This amount was \$220.6 million (3.1%) less than the FY2012 actual funding level and \$1.416 billion less than authorized.

Since FY2006, NSF budget increases have been at least partially driven by the “doubling path” policy. In accordance with this policy, Congress and successive Administrations sought to double funding for the NSF, Department of Energy’s Office of Science, and National Institute of Standards and Technology’s core laboratory and construction accounts (collectively “the targeted accounts”).⁵³ As authorized by COMPETES 2010, targeted account funding would have increased at a compound annual growth rate of 6.3%, which was close to the 6.4% growth rate in actual appropriations during the previous authorization period (FY2008 to FY2010).⁵⁴ At a growth rate of 6.3%, it would have taken approximately 11 years to double funding for the targeted accounts. The President’s FY 2013 budget request, however, established a 4.1% compound annual growth rate for targeted accounts. This growth rate was similar to the 4.1% growth rate set by FY2012 enacted appropriations. As originally passed by the House (H.R. 5326 and H.R. 5325) and recommended by the Senate Committee on Appropriations (S. 2323 and S. 2465), the compound annual growth rate in funding for the targeted accounts would have been 3.8% and 3.9%, respectively, in FY2013. The combined effects of sequestration and the rescissions in the final appropriations act, P.L. 113-6, reduced the FY2013 growth rate further, to 3.0%.⁵⁵

The full House and the Senate Committee on Appropriations agreed on essentially identical appropriations levels for five of NSF’s six major accounts in FY2013. (See **Table 10**.)⁵⁶ The primary difference between the two proposals was in the main research account (Research and Related Activities or R&RA). The House would have provided \$59.4 million (1.0%) more to the R&RA account in FY2013.⁵⁷ Details about the FY2013 funding status of major NSF accounts follows.

FY2013 Funding Status of Major NSF Accounts

FY2013 post-sequestration, post-rescission funding for NSF’s main research account, **Research and Related Activities (R&RA)**, was \$5.544 billion. This amount was \$214.6 million (3.7%) less than the FY2012 actual funding level of \$5.758 billion and was \$1.094 billion (16.5%) less than the COMPETES 2010 authorized funding level of \$6.638 billion.

⁵³ For an analysis of the doubling effort that includes historic trends, see CRS Report R41951, *An Analysis of Efforts to Double Federal Funding for Physical Sciences and Engineering Research*, by John F. Sargent Jr.

⁵⁴ As authorized by the America COMPETES Reauthorization Act of 2010 (P.L. 111-358).

⁵⁵ This calculation compares combined FY2013 actual, current, and enacted appropriations for the targeted accounts to the FY2006 actual baseline.

⁵⁶ Funds from major NSF accounts may be merged at the program level and in many cases NSF’s education, facilities, and research activities are deeply integrated as a matter of practice.

⁵⁷ R&RA is the primary source of research funding at the NSF and the largest account at the Foundation. Between FY2003 and FY2012, R&RA’s share of the NSF budget increased by 3.7%. This increase appears to be attributable, at least in part, to more rapid budget growth in the R&RA account than in other NSF accounts. Between FY2003 actual and the FY2012 estimate the total NSF budget grew by \$1.664 billion. 92.9% of this increase (\$1.545 billion) went to R&RA. By comparison, the average role for R&RA in the total NSF budget during this period was 79.5%. For more information on historical funding trends at NSF, see CRS Report R42470, *An Analysis of STEM Education Funding at the NSF: Trends and Policy Discussion*, by Heather B. Gonzalez.

The President's FY2013 request for R&RA was \$5.983 billion, \$225.0 million (3.9%) more than the FY2012 actual level and \$654.5 million (9.9%) less than the COMPETES 2010 authorized level. The request highlighted priorities in interdisciplinary research, clean energy, advanced manufacturing, materials, wireless communications, smart systems, and cybersecurity; and included increases for all but one of the research directorates.⁵⁸ The largest requested R&RA increase (by amount and percentage) was for the Integrative Activities (IA) account. Increases in IA would have largely applied to the R&RA contribution to the Graduate Research Fellowship (GRF) program⁵⁹ and to increased support for the Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE) program.⁶⁰ NSF also sought an increase for the Innovation Corps (I-Corps) program.⁶¹

The differences between the House, Senate committee, and the President on FY2013 funding for R&RA—as included in H.R. 5326, S. 2323, and the FY2013 budget request—were small. H.R. 5326 would have provided \$5.943 billion for R&RA in FY2013. S. 2323 would have provided \$5.883 billion. These amounts were about 1-2% less than the FY2013 request (\$5.983 billion) and about 2-3% more than the FY2012 actual (\$5.758 billion). An amendment to H.R. 5326 that was adopted during House floor debate (H.Amdt. 1094) would have eliminated funding for political science research at NSF.

H.Rept. 112-463 directed NSF to prioritize—of new R&RA activities—cybersecurity, advanced manufacturing, materials, and research in the natural and physical sciences, math, and engineering. In particular, the House report provided the requested level of \$148.9 million for NSF's Advanced Manufacturing initiative. Other R&RA provisions in the House report included a requirement that I-Corps recipients commit to the domestic production of goods or services commercialized with NSF assistance; two required reports on the management of scientific facilities; and language encouraging NSF to establish neuroscience as a cross-cutting theme. H.Rept. 112-463 also endorsed NSF-proposed changes in R&RA; except for the proposed termination of the Communicating Science Broadly program, which the House Committee on Appropriations sought to maintain.

Research provisions in the Senate committee report highlighted R&RA support for scientific facilities and instrumentation; provided the requested levels for astronomical sciences (\$244.6 million) and cybersecurity research (\$161.0 million); and expressed concerns about the adequacy of funding levels for the Academic Research Fleet. The Senate committee report also provided the requested level of funding (\$7.5 million) for Large Synoptic Survey Telescope pre-construction planning. Other R&RA provisions in S.Rept. 112-158 included \$158.0 million for the Experimental Program to Stimulate Competitive Research (EPSCoR) in FY2013. This

⁵⁸ Increases for the R&RA directorates ranged from 2.1% for Social, Behavioral, and Economic Sciences to 23.4% for Integrative Activities. The only reduction in the request was to the U.S. Arctic Research Commission, for which NSF sought a \$60,000 (4.1%) reduction from the FY2012 estimate of \$1.45 million.

⁵⁹ The FY2013 IA request for the GRF was \$121.5 million, which was \$33.0 million (37.3%) more than the FY2012 estimated level of \$88.5 million. The FY2013 NSF-wide request for GRF was \$243.0 million, which was \$45.0 million (22.7%) over the FY2012 estimate of \$198.4 million. GRF was co-funded roughly equally by R&RA and E&HR.

⁶⁰ The FY2013 IA request for INSPIRE was \$31.0 million, \$18.7 million (151.0%) more than the FY2012 estimated level of \$12.4 million. The NSF-wide request for INSPIRE was \$63.0 million, \$42.7 million (209.3%) more than the FY2012 estimated level of \$20.4 million. All but \$2.0 million of INSPIRE funding would have come from R&RA.

⁶¹ The FY2013 request for the I-Corps program was \$19.0 million, \$11.4 million (151.3%) more than the FY2012 estimated level of \$7.5 million. All but \$30,000 of this funding would have come from R&RA accounts.

amount was slightly below the President's FY2013 request for \$158.2 million and was \$7.1 million (4.7%) more than the FY2012 estimate of \$150.9 million.

Provisions in the March 11, 2013, explanatory statement incorporated NSF's proposed R&RA terminations; adopted by reference House report language relating to advanced manufacturing; adopted by reference Senate report language on cybersecurity research; and adopted by reference House report language regarding I-Corps, with the stipulation that if NSF determines that there are practical considerations preventing implementation, then the foundation will report those concerns to the appropriations committees. Other R&RA provisions in the explanatory statement rejected Senate report limitations on OneNSF initiatives, but stated that future growth should not come at the expense of core functions and encouraged NSF to refine the balance between core functions and OneNSF initiatives in its FY2014 and future budget requests. The explanatory statement also provided \$247.6 million (pre-sequestration, pre-rescission) for astronomical sciences, including \$164.9 million for infrastructure, and provided \$158.2 million (pre-sequestration, pre-rescission) for EPSCoR.

Other accounts that fund R&D at the NSF include the **Education and Human Resources (E&HR)** account and **Major Research Equipment and Facilities Construction (MREFC)**. FY2013 post-sequestration, post-rescission funding for E&HR was \$833.3 million and for MREFC was \$196.2 million. These amounts were close to FY2012 actual levels—\$830.5 million and \$198.1 million E&HR and MREFC, respectively. The FY2013 current plan funding level for MREFC was equal to the request⁶² while the FY2013 current plan funding level for E&HR was \$42.3 million (4.8%) less than the requested amount of \$875.6 million.

The FY2013 budget request for E&HR sought to reframe NSF's education programs—emphasizing core R&D activities, scholarships, and partnerships with research directorates and other federal agencies. The President's request sought \$20.0 million in new funding (\$5.0 million for each division) to establish the reframing effort.⁶³ The FY2013 request also sought funding for a new NSF-wide initiative, Expeditions in Education (E²). The goal for E² activities was to use current or emerging areas of science to address STEM education challenges. Funding would come from both R&RA and E&HR.⁶⁴ The request for E&HR included \$121.5 million for the GRF program, \$11.9 million (10.8%) over the FY2012 estimate. NSF sought to reduce funding for the Integrative Graduate Education and Research Traineeship (IGERT) program by \$8.1 million (13.6%), from \$59.8 million in FY2012 (estimated level) to \$51.7 million in FY2013. As requested, funding for minority-serving institutions (MSIs) would have continued at FY2012 levels.⁶⁵ The FY2013 NSF budget request did not include specified funding for Hispanic-serving institutions.

The President's FY2013 NSF budget request did not include funding for new MREFC projects in FY2013. Two of MREFC's four funded projects in FY2013 were in the second-to-last year of their planned funding cycles.

⁶² As authorized by P.L. 112-55, NSF transferred \$30.0 million from the R&RA account to MREFC in FY2012. This amount is reflected in the FY2013 request, which was \$30.0 million more than the level Congress specified in FY2012.

⁶³ NSF stated that these funds would be used for grants to synthesize existing work, highlight trends and challenges, and identify future needs.

⁶⁴ The total request for E² in FY2013 was \$49.0 million, of which \$20.5 million will come from E&HR.

⁶⁵ Funding sources for MSIs include the Historically-Black Colleges and Universities Undergraduate Program (HBCU-UP), Louis Stokes Alliances for Minority Participation (LSAMP), and the Tribal Colleges and Universities Program (TCUP), among others.

Both the full House and the Senate Committee on Appropriations would have funded E&HR and MREFC at the President's requested levels in FY2013—\$875.6 million and \$196.2 million, respectively. Provisions in H.Rept. 112-463 expressed continued concern about contingency costs in the MREFC account.

There were substantive differences between House and Senate appropriations committee recommendations for certain E&HR sub-accounts.⁶⁶ For example, H.Rept. 112-463 would have provided the requested level of funding (e.g., no change from FY2012) for NSF's MSI programs, while S.Rept. 112-158 would have provided a slight increase. H.Rept. 112-463 would have funded the Advanced Technology Education (ATE) program at \$69.0 million, while S.Rept. 112-158 would have provided \$64.0 million.⁶⁷ A third difference was between the two recommendations for NSF's Informal Science Education (ISE) program. H.Rept. 112-463 accepted the Administration's proposed changes to ISE, including a \$13.6 million reduction from the FY2012 estimate of \$61.4 million. S.Rept. 112-158 rejected the requested reduction to ISE.

The March 11, 2013, explanatory statement incorporated Senate report funding levels for MSI programs, directed NSF to fund ISE (now renamed Advancing Informal Science Learning or AISL) as described in the Senate report, and provided \$69.0 million for ATE. The explanatory statement also incorporated many of NSF's proposed E&HR reductions.

The FY2013 request provides no increases for NSF's administrative accounts (e.g., Agency Operations and Award Management, National Science Board, and Office of Inspector General) in FY2013. Both the full House and Senate Committee on Appropriations would have provided the requested funding levels for these accounts in FY2013. FY2013 current plan funding (post-sequestration, post-rescission) reduced these accounts by -1.9% (AOAM), -6.8% (NSB) and -6.5% (OIG) from FY2012 actual funding levels.

Both the House and Senate appropriations committees expressed concerns about the "OneNSF Framework" in FY2013. As proposed, the OneNSF Framework sought to enable operations across organizational and disciplinary boundaries. This NSF-wide initiative included E², INSPIRE, and I-Corps; as well as other investments in smart systems, cyberinfrastructure, cybersecurity, and the Science, Engineering and Education for Sustainability (SEES) portfolio. NSF sought increases over FY2012 estimated levels for six of the seven OneNSF Framework priorities. The Senate Committee on Appropriations recommended that NSF reduce funding for OneNSF activities and encouraged the foundation to focus resources on core programs and infrastructure. The House Committee on Appropriations expressed concern about a perceived lack of administrative clarity in OneNSF activities and encouraged NSF to promulgate clear standards and guidance on the administration of these activities.

Funding for other NSF-wide investments in the FY2013 request included the National Nanotechnology Initiative (\$434.9 million), the Networking and Information Technology Research and Development program (\$1.207 billion), and the U.S. Global Climate Change Research program (\$332.9 million).

⁶⁶ The FY2013 E&HR re-framing categorized these accounts as Core R&D Programs.

⁶⁷ The FY2013 request for ATE was \$64.0 million. The House Committee on Appropriations would offset the recommended \$5.0 million increase to ATE with an equivalent reduction to the E&HR contribution to the GRF.

The FY2013 request also proposed cutting or consolidating 11 foundation programs, totaling \$67.0 million. Most of these programs were in the research directorates and had reached their planned endpoints or were otherwise considered obsolete. As noted above, the House Committee on Appropriations rejected the proposed termination of the Communicating Science Broadly program.

Table 10. NSF Funding by Major Account
(budget authority in millions of dollars)

Account	FY2012 Actual	FY2013 Authorized	FY2013 Request ^a	H.R. 5326 House-passed	S. 2323 Senate Committee-reported	FY2013 Current Plan
<i>Biological Sciences (BIO)</i>	\$712.3	n/s	\$733.9	n/s	n/s	\$678.9
<i>Computer and Information Science and Engineering (CISE)^a</i>	937.2	n/s	n/a ^a	n/s	n/s	858.5
<i>Engineering (ENG)</i>	824.6	n/s	876.3	n/s	n/s	813.5
<i>Geosciences (GEO)^a</i>	1,321.4	n/s	n/a ^a	n/s	n/s	1,265.8
<i>Mathematical and Physical Sciences (MPS)</i>	1,308.7	n/s	1,345.2	n/s	n/s	1,249.5
<i>Social, Behavioral, and Economic Sciences (SBE)</i>	254.2	n/s	259.6	n/s	n/s	242.5
<i>International and Integrative Activities^a</i>	398.6	n/s	n/a ^b	n/s	n/s	433.5
<i>U.S. Arctic Research Commission (USARC)</i>	1.45	n/s	1.39	n/s	n/s	1.39
Research and Related Activities, Total	\$5,758.3	\$6,637.9	\$5,983.3	\$5,942.7	\$5,883.3	\$5,543.7
Education and Human Resources	\$830.5	\$1,041.8	\$875.6	\$875.6	\$875.6	833.3
Major Research Equip. and Facilities Construction	\$198.1	\$236.8	\$196.2	\$196.2	\$196.2	196.2
Agency Ops. and Award Management	\$299.3	\$363.7	\$299.4	\$299.4	\$299.4	293.6
Nat'l Science Board	\$4.4	\$4.9	\$4.4	\$4.4	\$4.4	4.1
Office of the Inspector General	\$14.1	\$15.0	\$14.2	\$14.2	\$14.2	13.2
NSF, Total	\$7,104.7	\$8,300.0	\$7,373.1	\$7,332.5	\$7,273.1	6,884.1

Source: Numbers in the "FY2012 Actual" column are from NSF's FY2014 Budget Request to Congress. Numbers in the "FY2013 Request" column are from the FY2013 NSF Budget Request to Congress. Numbers in the "FY2013 Authorized" column are from the America COMPETES Reauthorization Act of 2010 (P.L. 111-358). Numbers in the "Full House" column are from H.Rept. 112-463 and H.R. 5326. Numbers in the "Senate Committee" column

are from S.Rept. 112-158 and S. 2323. Numbers in the “FY2013 Current Plan” column are from National Science Foundation, “NSF Congressional Highlight: Congress Completes Action on FY 2013 Appropriations,” fact sheet, April 9, 2013, http://www.nsf.gov/about/congress/113/highlights/cu13_0409.jsp.

Notes: “n/s” means “not specified.” CRS was unable to identify a defined amount of funding for this account. “n/a” means not applicable. Numbers are rounded. FY2013 current plan funding levels are post-sequestration, post-rescission.

- a. Beginning in FY2013, NSF realigned four foundation offices. The Office of Cyberinfrastructure became a division within CISE, the Office of Polar Programs became a division within GEO, and the offices of International Science and Engineering and Integrative Activities merged and became the Office of International and Integrative Activities. FY2012 actual and FY2013 current plan funding levels in this table reflect these consolidations.
- b. Although the NSF realigned four foundation offices at the beginning of FY2013, its FY2013 budget request reflects the previous account structure, which provided separate lines for CISE and the Office of Cyberinfrastructure. The FY2013 request for CISE was \$709.7 million. The FY2013 request for the Office of Cyberinfrastructure was \$218.3 million.
- c. Although the NSF realigned four foundation offices at the beginning of FY2013, its FY2013 budget request reflects the previous account structure, which provided separate lines for GEO and the Office of Polar Programs. The FY2013 request for GEO was \$906.4 million. The FY2013 request for the Office of Polar programs was \$449.7 million.
- d. Although the NSF realigned four foundation offices at the beginning of FY2013, its FY2013 budget request reflects the previous account structure, which provided separate lines for the Office of International Science and Engineering and the Office of Integrative Activities. The FY2013 request for the Office of International Science and Engineering was \$51.3 million. The FY2013 request for the Office of Integrative Activities was \$431.5 million.

National Aeronautics and Space Administration⁶⁸

The Administration requested \$16.291 billion for NASA R&D in FY2013. This amount was 2.8% more than the \$15.850 billion enacted for FY2012, but 11.3% less than the \$18.360 billion authorized by the NASA Authorization Act of 2010 (P.L. 111-267). The bill passed by the House would have provided \$16.049 billion. The bill reported by the Senate committee would have provided \$16.305 billion. The August 2013 NASA operating plan, reflecting the final continuing resolution, reductions due to sequestration, and subsequent reprogramming, included \$15.491 billion. For a breakdown of these amounts, see **Table 11**.

The requested increase in NASA R&D funding in FY2013, despite a requested decrease in funding for NASA as a whole, was made possible by the retirement of the space shuttles. The space shuttle program was classified as an operational expense, not R&D. The last shuttle flight was completed in July 2011, and the remaining closeout costs in FY2013 were only about \$39 million, compared with \$596 million in FY2012 and several billion dollars per year during the period of shuttle operations.

The Administration’s \$4.911 billion request for NASA’s Science account in FY2013 was 3.5% less than the FY2012 appropriation. Funding for planetary science would have decreased \$308.1 million or 20.5%. Most of the proposed reduction for planetary science was in the Mars exploration program, whose expected costs were reduced by the launch of the Mars Science Laboratory in November 2011, the planned launch of the Mars Atmosphere and Volatile

⁶⁸ This section was written by Daniel Morgan, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

Evolution Mission (MAVEN) in 2013, and the termination of NASA's participation (with the European Space Agency) in the 2016 and 2018 ExoMars missions. NASA planned to develop a new Mars exploration strategy that would integrate robotic missions funded by the Science account with human spaceflight and technology development activities in other accounts. Also in Science, funding for the James Webb Space Telescope (JWST) would have increased \$98.0 million or 18.5% under the Administration's request. Following an independent review of JWST in October 2010, NASA developed a revised plan for the program in 2011. In the FY2012 appropriations conference report, Congress capped the formulation and development cost of JWST and mandated annual reports on the program by the Government Accountability Office. The House-passed bill would have provided \$5.095 billion for Science, or \$184 million more than the request, including an increase of \$88 million for a future Mars sample return mission. The House report directed that if, in the judgment of the National Research Council, NASA's new Mars strategy would not accomplish a sample return mission, NASA should reallocate the \$88 million increase to a mission to Jupiter's moon Europa. The Senate committee recommended \$5.021 billion for Science, or \$110 million more than the request, including an increase of \$100 million for Mars Exploration. The August 2013 operating plan included \$4.782 billion for Science. Despite this reduction for the account overall, funding for JWST was at the requested level, and funding for Mars Exploration was approximately 3% more than the request.

The request for Aeronautics was \$551.5 million, a decrease of 3.2% from FY2012. The Administration proposed to transfer research on hypersonic entry, descent, and landing to the Space Technology account; eliminate most funding for air-breathing hypersonic flight systems; and combine the hypersonic research remaining in the Aeronautics program with supersonic research to create a single project on high-speed flight. The House-passed bill would have provided \$569.9 million. The Senate committee recommended the requested amount. Both committees expressed concern about the planned changes in NASA's hypersonics research. The House committee directed NASA to work with the Department of Defense to define agency roles and propose changes to the division of responsibilities. The Senate committee directed NASA to provide a report on how it planned to maintain hypersonics expertise either with its own funds or in collaboration with other agencies. The August 2013 operating plan included \$529.5 million for Aeronautics.

For Space Technology, the Administration requested \$699.0 million, an increase of 21.6% from FY2012. About half of the proposed increase was for technology demonstration missions designed to bridge the gap between early-stage development and operational use. In February 2012, the National Research Council (NRC) released its assessment of NASA's draft roadmaps for space technology development.⁶⁹ According to NASA, the Space Technology program was investing at some level in all 16 of the technology areas that the NRC report recommended for emphasis. The House-passed bill would have provided \$632.5 million for Space Technology. The Senate committee recommended \$651.0 million and directed NASA to give priority to ongoing activities. The August 2013 operating plan included \$614.5 million.

The Administration's request for Exploration in FY2013 was \$3.933 billion, a 4.3% increase over FY2012 but 25.3% less than the authorized level. This account funds development of the Multipurpose Crew Vehicle (MPCV) and the Space Launch System (SLS) heavy-lift rocket—which the 2010 authorization act mandated for human exploration of space beyond Earth orbit—

⁶⁹ National Research Council, *NASA Space Technology Roadmaps and Priorities: Restoring NASA's Technological Edge and Paving the Way for a New Era in Space*, download.nap.edu/catalog.php?record_id=13354.

as well as development of the commercial crew transportation systems that NASA intends to use for U.S. astronaut access to the International Space Station. The shortfall in Exploration funding relative to the authorization act raised questions about the feasibility of NASA's planned human spaceflight program. NASA officials stated that funding at the requested level would permit a first uncrewed flight of the SLS in 2017, a first crewed flight of the SLS in 2021, and the first availability of commercial crew transportation services in 2017, but that funding below the request would jeopardize those schedules. The House-passed bill would have provided \$3.712 billion for Exploration, including \$112.5 million more than the request for the MPCV and SLS and their ground systems (collectively known as Exploration Systems Development) and \$329.7 million less than the request for commercial crew. The Senate committee recommended \$3.909 billion, including \$306.5 million more than the request for Exploration Systems Development and \$304.7 million less than the request for commercial crew. The August 2013 operating plan included \$3.706 billion for Exploration, or \$227.3 million less than the request. Within this total, the operating plan included slightly more than the House amount for Exploration Systems Development and the same as the Senate amount for commercial crew.

The request for the International Space Station (ISS) was \$3.008 billion, an increase of 6.3% from FY2012. Most of the proposed increase would have been for ISS crew and cargo transportation provided by international partners and commercial companies. (The first commercial cargo flight to the ISS took place in May 2012.) The House-passed bill would have provided \$2.990 billion for the ISS. The Senate committee recommended \$2.958 billion. The operating plan included \$2.776 billion.

The Senate committee recommended \$1.641 billion for NASA to acquire operational satellites for NOAA. In the past, this work had been carried out by NASA on a cost-reimbursement basis using funds appropriated to NOAA. Because the programs covered by the proposal were considered acquisitions, not R&D, transferring the appropriation from NOAA to NASA would not have directly affected NASA R&D funding. As the operating plan was based on the structure of FY2012 appropriations, FY2013 funding for these activities remained at NOAA.

Table 11. NASA R&D
(in millions of dollars)

	FY2012 Actual^a	FY2013 Authorized	FY2013 Request	FY2013 House	FY2013 Senate	FY2013 Op. Plan
Science	\$5,073.7	\$5,509.6	\$4,911.2	\$5,095.0	\$5,021.1	\$4,781.6
<i>Earth Science</i>	1,760.5	2,089.5	1,784.8	1,775.0	1,784.7	1,659.2
<i>Planetary Science</i>	1,501.4	1,591.2	1,192.3	1,400.0	1,292.3	1,271.5
<i>Astrophysics</i>	648.4	1,149.1 ^b	659.4	650.0	669.4	617.0
<i>James Webb Space Telescope</i>	518.6	0.0 ^b	627.6	628.0	627.6	627.6
<i>Heliophysics</i>	644.8	679.8	647.0	642.0	647.0	606.3
Aeronautics	569.4	590.0	551.5	569.9	551.5	529.5
Space Technology	573.7	515.0	699.0	632.5	651.0	614.5
Exploration	3,707.3	5,264.0	3,932.8	3,711.9	3,908.9	3,705.5
<i>Exploration Systems Development</i>	3,001.6	4,040.0	2,769.4	2,881.9	3,075.9	2,883.8
<i>Commercial Spaceflight</i>	406.0	500.0	829.7	500.0	525.0	525.0
<i>Exploration R&D</i>	299.7	724.0	333.7	330.0	308.0	296.7

	FY2012 Actual^a	FY2013 Authorized	FY2013 Request	FY2013 House	FY2013 Senate	FY2013 Op. Plan
International Space Station	2,789.9	3,129.4	3,007.6	2,990.0	2,957.6	2,775.9
Subtotal R&D	12,714.0	15,008.0	13,102.1	12,999.3	13,090.1	12,407.0
Non-R&D Programs ^c	1,568.5	1,308.3	1,142.6	1,133.0	2,808.0	1,100.6
Cross-Agency Support ^d	2,993.9	3,276.8	2,847.5	2,717.5	2,822.5	2,711.0
Associated with R&D	2,665.1	3,014.1	2,619.1	2,499.6	2,591.5	2,490.1
Construction & Environmental - Compliance and Remediation ^d	494.5	366.9	619.2	598.0	679.0	646.6
Associated with R&D	440.2	337.5	569.5	550.1	623.4	593.9
Total R&D	15,819.3	18,359.5	16,290.7	16,049.0	16,305.0	15,491.0
Total NASA	17,770.0	19,960.0	17,711.4	17,447.8	19,399.6	16,865.2

Source: FY2012 actual from NASA FY2014 congressional budget justification, <http://www.nasa.gov/news/budget/>. FY2013 authorized from NASA Authorization Act of 2010 (P.L. 111-267), Sec. 103. FY2013 request from NASA FY2013 congressional budget justification, <http://www.nasa.gov/news/budget/2013.html>. FY2013 House from H.R. 5326 as passed by the House and H.Rept. 112-463. FY2013 Senate from S. 2323 as reported and S.Rept. 112-158. FY2013 operating plan from NASA operating plan summary table dated August 1, 2013, <http://www.nasa.gov/news/budget/2013.html>.

- a. Includes rescissions.
- b. James Webb Space Telescope was included in Astrophysics in the authorization act.
- c. Space Shuttle, Space and Flight Support, Education, Inspector General, and (in the Senate bill only) NOAA Operational Satellite Acquisition.
- d. Allocation between R&D and non-R&D is estimated by CRS in proportion to the underlying program amounts (omitting NOAA Operational Satellite Acquisition in the Senate bill, for comparability) 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 Commerce

National Institute of Standards and Technology⁷⁰

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 President's FY2013 budget requested \$857.0 million for NIST, an increase of 14.1% over the \$750.8 million appropriated in FY2012. Included in this figure was \$648.0 million for research

⁷⁰ This section was written by Wendy H. Schacht, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

and development in the Scientific and Technical Research and Services (STRS) account, 14.3% above the FY2012 amount of \$567.0 million. Under the Industrial Technology Services (ITS) account, the Manufacturing Extension Partnership (MEP) program was to receive \$128.0 million, a 0.3% decrease from FY2012 funding of \$128.4 million. Also included in ITS, the Administration again proposed the creation of a new activity, the Advanced Manufacturing Technology Consortia (AMTech), which was not funded when it was included in the FY2012 budget. In FY2013, support for AMTech would total \$21.0 million. The requested appropriation for the construction budget was \$60.0 million, 8.3% above the \$55.4 million for FY2012.

In addition to the appropriations included in the budget request that are to be addressed through the annual appropriations process, the Administration proposed two new programs that were to be funded through mandatory appropriations.⁷¹ Up to \$300.0 million generated by the proceeds of the spectrum auction was to support the Wireless Innovation Fund and \$1.000 billion was to be provided for establishment of the National Network for Manufacturing Innovation.

S. 2323, as reported from the Senate Committee on Appropriations, would have provided \$826.0 million in FY2013 funding for NIST, 10.0% above the FY2012 appropriation but 3.6% below the Administration's request. Support for the STRS account totaled \$623.0 million, 9.9% more than the previous fiscal year and 3.9% less than the President proposed. MEP would have received \$128.5 million, 0.1% above the FY2012 figure and 0.4% more than the budget request, while AMTech would have been financed at \$14.5 million, 31.0% below the Administration's budget proposal. The \$60.0 million in the construction account was 8.3% more than in FY2012 and the same as the budget request.

As passed by the House, H.R. 5326 would have funded NIST at \$830.2 million, an increase of 10.6% over FY2012, 3.1% less than the Administration's budget, and 0.5% more than the Senate figure. The \$621.2 million for the STRS account was an increase of 9.6% above the earlier fiscal year, but 4.1% less than the President's request, and 0.3% less than the amount included in S. 2323. Funding for MEP was \$128.0 million, 0.3% less than FY2012, the same as the budget proposal, and 0.4% below the Senate-reported bill. AMTech would have received \$21.0 million, equal to the amount in the Administration request, and 44.8% more than in S. 2323. The \$60.0 million included for construction was the same as that in the request and the Senate bill.

Accounting for the rescissions in P.L. 113-6 and sequestration, FY2013 support for NIST increased 2.4% to \$769.4 million.⁷² Included in this funding was \$579.8 million for the STRS account which was 2.3% above the earlier fiscal year. The \$119.4 million for MEP was 7% less than FY2012 while the AMTech program received initial funding of \$14.2 million. The construction budget increased 1% to \$56.0 million.

NIST's extramural programs, which are directed toward increased private sector commercialization, have been a source of contention. 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

⁷¹ Mandatory spending is typically provided in permanent or multi-year appropriations contained in the authorizing law, and therefore, the funding becomes available automatically each year, without legislative action by Congress. For additional information on mandatory spending, see CRS Report RL33074, *Mandatory Spending Since 1962*, by Mindy R. Levit and D. Andrew Austin.

⁷² Figures from the National Institute of Standards and Technology Appropriations Summary available at http://www.nist.gov/public_affairs/releases/approps-summary2014.cfm.

balance the federal budget, has led to proposals for the elimination of these activities. In 2007, the Advanced Technology Program was terminated and replaced by the Technology Innovation Program which operated until support was withdrawn in the final FY2012 appropriation. An additional extramural program, AMTech, introduced in the FY2012 budget request, also was not funded until FY2013.⁷³

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; his FY2012 budget was intentionally silent on a timeframe for doubling. While the final FY2012 appropriation did not include an increase in support for NIST, there was a 14.0% increase in funding for R&D under the STRS account.⁷⁴ The Administration’s FY2013 budget proposal would have increased support for NIST 14.1% (excluding mandatory appropriations) and included a 14.3% increase in the STRS account. S. 2323 contained a 10.0% increase in funding for NIST and a 9.9% increase in funding for the STRS account, while H.R. 5326 included a 10.6% increase for NIST and a 9.6% increase for STRS. The final FY2013 appropriation after rescissions and sequestration contained smaller increases in support including 2.4% for NIST and 2.3% more the STRS account.

Table 12. NIST
(in millions of dollars)

NIST Program	FY2012 Enacted P.L. 112-55	FY2013 Authorized	FY2013 Request	H.R. 5326 House- passed	S. 2323 Senate Committee- reported	P.L. 113-6 Current Operating Plan
Scientific and Technical Research and Services	567.0	676.7	648.0	621.2	623.0	579.8
Industrial Technology Services	128.4	241.7	149.0	149.0	143.0	133.6
<i>Technology Innovation Program</i>	0		0	0	0	0
<i>Manufacturing Extension Partnership</i>	128.4	165.1	128.0	128.0	128.5	119.4

⁷³ 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.

⁷⁴ For additional information on NIST, see CRS Report 95-30, *The National Institute of Standards and Technology: An Appropriations Overview*.

NIST Program	FY2012 Enacted P.L. 112-55	FY2013 Authorized	FY2013 Request	H.R. 5326 House- passed	S. 2323 Senate Committee- reported	P.L. 113-6 Current Operating Plan
<i>Baldrige Program</i>	0	10.6	0	0	0	0
<i>AMTech</i>	0		21.0	21.0	14.5	14.2
Construction	55.4	121.3	60.0	60.0	60.0	56.0
NIST Total^a	750.8	1,039.7	857.0	830.2	826.0	769.4
Mandatory Appropriations						
Wireless Innovation Fund			300.0			
National Network for Manufacturing Innovation			1,000.0			

Sources: NIST website (available at http://www.nist.gov/public_affairs/budget/index.cfm), P.L. 112-10, P.L. 113-6 and Administration's FY2012 Budget Request.

a. Numbers may not add due to rounding.

National Oceanic and Atmospheric Administration⁷⁵

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. 4.⁷⁶ The reorganization was intended to unify elements 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 climate; weather and air quality; and ocean, coastal, and Great Lakes resources. These efforts support the four long-term goals of NOAA's Next Generation Strategic Plan: (1) climate adaptation and mitigation, (2) weather-ready nation,⁷⁷ (3) healthy oceans, and (4) resilient coastal communities and economies.⁷⁸

For FY2013, President Obama requested \$650.6 million in R&D funding for NOAA, an 11.9% increase in funding from the FY2012 actual level of \$573.4 million. R&D accounted for 12.9% of NOAA's total FY2013 discretionary budget request of \$5.055 billion. The R&D request consisted of \$452 million for research (69.4%), \$56 million for development (8.6%), and \$143 million for

⁷⁵ This section was written by Harold F. Upton, Analyst in Natural Resources Policy, CRS Resources, Science, and Industry Division.

⁷⁶ "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>.

⁷⁷ According to NOAA a weather-ready nation is envisioned as a society that is prepared for and responds to weather-related events.

⁷⁸ 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.

R&D equipment (22.0%). Excluding equipment, about \$371 million (73.0%) of the R&D request would have funded intramural programs and \$137 million (27.0%) would have funded extramural programs.⁷⁹

NOAA's administrative structure has five line offices that reflect its diverse mission: 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).

Table 13 provides R&D funding levels by line office for FY2012 enacted, the FY2013 request, and the FY2013 estimate from the NOAA spend plan.⁸⁰ On April 19, 2012, the Senate Committee on Appropriations reported S. 2323, and on May 10, 2012, the House passed H.R. 5326. Neither of the appropriations bills or accompanying committee reports specify R&D funding levels for NOAA, but total recommended agency funding has been provided in **Table 13** for context. For 2013, the NOAA spend plan provides \$543.0 million in R&D funding, a 5.3% decrease in funding from the FY2012 level of \$573.4 million. Of the R&D FY2013 total, \$414.9 million funds R&D (76.4%) and \$128.1 million funds R&D equipment (23.6%). R&D accounts for 11.4% of NOAA's total FY2013 discretionary budget of \$4.748 billion.

Table 13. NOAA R&D

(in millions of dollars)

Line Offices	FY2012 Enacted	FY2013 Request	H.R. 5326 House- passed ^a	S. 2323 Senate Committee- reported ^a	FY2013 Spend Plan
National Ocean Service	62.4	80.0			62.2
National Marine Fisheries Service	53.6	59.7			32.4
Office of Oceanic and Atmospheric Research	338.6	378.9			336.1
National Weather Service	22.5	21.6			24.3
National Environmental Satellite, Data, and Information Service	26.7	35.5			25.1
Office of Marine and Aviation Operations ^b	69.6	74.9			62.8
Total R&D^c	573.4	650.6			543.0
NOAA Total	4,893.7	5,054.5	4,944.7	3,418.7^d	4,747.8

Sources: Stacy Dennery, NOAA Budget Office, e-mail concerning NOAA R&D, August 7, 2013.

⁷⁹ National Oceanic and Atmospheric Administration, *National Oceanic and Atmospheric Administration FY 2013 Budget Summary*, National Oceanic and Atmospheric Administration, Washington, DC, March 2012, http://www.corporateservices.noaa.gov/nbo/13bluebook_highlights.html.

⁸⁰ Stacy Dennery, NOAA Budget Office, e-mail concerning NOAA R&D, August 7, 2013.

- a. Neither of the appropriations bills or accompanying committee reports specify R&D funding levels for NOAA or its line offices, but total recommended agency funding has been provided for context.
- b. All OMAO R&D funding is for equipment.
- c. Totals may differ from the sum of the components due to rounding.
- d. The large difference in the NOAA total is due to the recommended transfer of satellite acquisition to NASA.

Department of Agriculture⁸¹

U.S. Department of Agriculture (USDA) research and education activities are included in four organizations: Agricultural Research Service (ARS), National Institute of Food and Agriculture (NIFA),⁸² Economic Research Service (ERS), and National Agricultural Statistics Service (NASS). For these four agencies in FY2013, the President requested \$2.598 billion, an increase of 2.6% from the FY2012 enacted level of \$2.533 billion. (See **Table 14**.) Even with the proposed decline in funding in the FY2013 request, Secretary of Agriculture Tom Vilsack stated that

To help sustain record farm income, we will invest in research and development to improve agricultural productivity. The budget has made a 23% increase in funding for our premier competitive grants program to support the most worthy projects and continues support for in-house research and the land grant universities. We'll continue our efforts to combat destructive pests and disease that threaten crops and livestock.⁸³

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, a primary information resource on food, agriculture, and natural resource sciences. The ARS laboratories focus on efficient food and fiber production, development of new products and uses for agricultural commodities, development of effective biocontrols for pest management, and support of USDA regulatory and technical assistance programs. The President requested \$1.1 billion for ARS in FY2013, 0.7% above the FY2012 enacted level. The FY2013 request included \$50.4 million in program reallocations to address the nation's most critical research needs, including a reallocation of \$4.0 million for research to develop integrated, sustainable production systems that will improve food production efficiency and protect the environment.

The President also proposed elimination of lower priority extramural projects. Priorities in the FY2013 request included the conversion of agricultural products into biobased products and biofuels; 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, and research on detection methods and countermeasures to foreign animal diseases that could result in catastrophic losses. The FY2013 request proposed an increase of approximately \$25 million for research directed at improving

⁸¹ This section was written by Christine M. Matthews, Specialist in Science and Technology Policy, and updated by Dennis A. Shields, Specialist in Agricultural Policy.

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

⁸³ U.S. Department of Agriculture, "Remarks as Prepared for Delivery: Agriculture Secretary Vilsack Before the House Subcommittee on Agriculture, Rural Development, Food and Drug Administration, and Related Agencies," February 17, 2012, http://www.usda.gov/wps/portal/usda!/ut/p/c5/04_SB8K8xLLM9MsszPy8xBz9CP0s_gA.

American agriculture's adaptability to environmental challenges. This proposal stemmed from recommendations contained in a 2011 report of the President's Council of Advisors on Science and Technology stating the need for improved accounting of ecosystem services and increased protection of the environment.

The National Institute of Food and Agriculture was established in Title VII, Section 7511 of the Food, Conservation, and Energy Act of 2008 (P.L. 110-246, also known as the 2008 farm bill). 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.⁸⁴ Funding is distributed to the states through competitive awards, statutory formula funding, and special grants.

For FY2013, the President requested \$1.2 billion for NIFA, 3.0% above the FY2012 enacted level. The Administration's FY2013 request for NIFA emphasized competitive, peer-reviewed allocation of research funding to generate solutions for the most critical needs of agriculture. Funding for FY2013 included support for grant management, as well as for programs that are responsive to critical national issues such as agricultural security, local and regional emergencies, zoonotic diseases, climate change, childhood obesity, and pest risk management.

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 FY2013 request sought \$325.0 million for the AFRI, a proposed increase of \$61.0 million over the FY2012 enacted level. Major initiatives for FY2013 included proposed funding of \$30.0 million for alternative and renewable energy research to develop high-quality, cost-effective feedstocks for biofuel production; \$3.7 million for research to address the adaptation of production systems to climate varieties; \$7.2 million for international food security to improve research and extension efforts on sustainable plant and animal production systems; and \$3.2 million for AFRI's Foundational Research Program. Additional research was also requested for global climate change research to develop mitigation capabilities for agricultural production, and support for an integrated food safety research program with the potential for improving the understanding of disease-causing microorganisms. The request also supported research in agricultural genomics, emerging issues in food and agricultural security, the ecology and economics of biological invasions, and plant biotechnology.

The FY2013 budget request proposed \$77.4 million for Economic Research Service, slightly below the FY2012 enacted level of \$77.7 million. The request included the termination of low-priority programs. The ERS supports economic and social science information analysis on

⁸⁴ The numbers 1862, 1890, and 1994 in this context refer to the years laws were enacted creating these classifications of colleges and universities.

agriculture, rural development, food, commodity markets, and the environment. ERS collects and disseminates data concerning USDA programs and policies to various stakeholders.

Funding for the National Agricultural Statistics Service was proposed at \$179.5 million in the FY2013 request, \$20.9 million above the FY2012 enacted level. The FY2013 request included 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 included production and use of biomass materials; stocks and prices of distillers' grains; current and proposed ethanol production plants; the chemical use data series on major row crops; post-harvest chemical use; and alternating annual fruit, nuts, and vegetable chemical use. A funding increase of \$20.9 million supported the 2012 Census of Agriculture, an anticipated increase related to the cyclical nature of the five-year census program.

On April 26, 2012, the Senate Committee on Appropriations reported S. 2375, Agriculture, Rural Development, Food and Drug Administration and Related Agencies Appropriation Act, FY2013 (S.Rept. 112-163). Funding for the four combined USDA research agencies was \$2.598 billion, essentially the same as the President's request.

On June 20, 2012, the House Committee on Appropriations reported H.R. 5973, Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2013 (H.Rept. 112-542). Funding for the four combined USDA research agencies was \$2.499 billion, about \$100 million below both the President's request and the Senate-reported amount. A breakdown by agency is provided in **Table 14**.

Based on USDA's operating plan, the FY2013 enacted levels (with rescissions and sequester reductions) was \$2.402 billion for the combined USDA research budget, down 5.2% from 2012 enacted level.

**Table 14. U.S. Department of Agriculture Research, Education, and Extension
Mission Area Appropriations**
(budget authority in millions of dollars)

Agency and Program	FY2010 enacted	FY2011 enacted	FY2012 enacted	FY2013			
	P.L. 111-80	P.L. 112-10	P.L. 112-55	Admin. request	House report	Senate report	Enacted with Rescissions and Sequester
Agricultural Research Service	1,250.5	1,133.2	1,094.6	1,102.6	1,073.5	1,101.9	1,016.9
Nat'l Institute of Food and Agriculture (NIFA)	1,343.2	1,214.8	1,202.3	1,238.7	1,175.0	1,238.7	1,147.0
<i>Research and Education</i>	<i>788.2</i>	<i>698.7</i>	<i>705.6</i>	<i>732.7</i>	<i>691.5</i>	<i>738.6</i>	<i>683.2</i>
<i>AFRI</i>	<i>262.5</i>	<i>264.5</i>	<i>264.5</i>	<i>325.0</i>	<i>276.5</i>	<i>298.0</i>	<i>not avail.</i>
<i>Hatch Act</i>	<i>215.0</i>	<i>236.3</i>	<i>236.3</i>	<i>234.8</i>	<i>231.6</i>	<i>236.3</i>	<i>not avail.</i>
<i>Evans-Allen</i>	<i>48.5</i>	<i>50.9</i>	<i>50.9</i>	<i>50.9</i>	<i>49.9</i>	<i>50.9</i>	<i>not avail.</i>
<i>McIntire-Stennis</i>	<i>29.0</i>	<i>32.9</i>	<i>32.9</i>	<i>32.9</i>	<i>32.3</i>	<i>32.9</i>	<i>not avail.</i>
<i>Extension</i>	<i>494.9</i>	<i>479.1</i>	<i>475.2</i>	<i>462.5</i>	<i>462.5</i>	<i>475.1</i>	<i>439.1</i>

Agency and Program	FY2010 enacted	FY2011 enacted	FY2012 enacted	FY2013			
	P.L. 111-80	P.L. 112-10	P.L. 112-55	Admin. request	House report	Senate report	Enacted with Rescissions and Sequester
Smith-Lever(b)&(c)	297.5	293.9	294.0	292.4	286.1	294.0	not avail.
Smith-Lever(d)	101.3	101.1	99.3	90.4	96.7	99.3	not avail.
Integrated Activities	60.0	36.9	21.5	43.5	21.1	25.0	19.8
Economic Research Service	82.5	81.8	77.7	77.4	75.0	77.4	71.4
Nat'l Agric. Statistics Service	161.8	156.4	158.6	179.5	175.2	179.5	166.6
Total	2,838.0	2,586.3	2,533.3	2,598.2	2,498.7	2,597.5	2,401.9

Source: CRS Report R42596, *Agriculture and Related Agencies: FY2013 Appropriations*, by Jim Monke, compiled from P.L. 111-80; P.L. 112-10; P.L. 112-55; U.S. Department of Agriculture, *FY2013 Budget Summary and Annual Performance Plan*, February 2012; H.R. 5973; S. 2375; P.L. 113-6 and U.S. Department of Agriculture FY2013 Operating Plan available at http://www.dm.usda.gov/foia/docs/USDA_Operating_Plan.pdf.

- a. **Note:** Additional budget and program information is available in USDA's budget explanatory notes for each agency found at http://www.obpa.usda.gov/explan_notes.html.

Department of the Interior⁸⁵

The Department of the Interior (DOI) reports total FY2013 research and development funding of \$789.0 million, \$32.2 million (3.9%) less than its post-reprogramming FY2012 R&D funding level of \$821.1 million, and \$121.8 million (13.4%) less than the President's request of \$910.8 million.⁸⁶ (See **Table 15**.) Several DOI agencies fund R&D, the largest being the U.S. Geological Survey (USGS) which accounted for 78.9% of total DOI R&D funding in FY2013. USGS is also the most R&D-intensive agency in DOI, with R&D accounting for approximately two-thirds of its total appropriations.

Funding for DOI R&D is generally included in accounts 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 or until the DOI publishes such figures. In general, R&D funding levels are determined only after DOI agencies report on their allocation of appropriations. In November 2013, DOI provided detailed information to CRS on R&D funding for FY2013; similar information was provided to CRS in February 2012 on the President's proposed level of R&D funding for each of its agencies and for broad program areas; these data were used for analysis in this section.⁸⁷

U.S. Geological Survey

All USGS funding is provided through a single account, Surveys, Investigations, and Research (SIR). 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.

The USGS reports total FY2013 R&D funding of \$637.9 million, \$34.9 million (5.2%) less than the FY2012 post-reprogramming level of \$672.8 million. The reductions were spread uniformly across the major and minor subaccounts, each being reduced by 5.2% from its FY2012 level: Ecosystems R&D fell \$8.2 million to \$150.1 million; Climate and Land Use Change R&D fell \$5.4 million to \$97.8 million; Energy, Minerals, and Environmental Health R&D fell \$5.0 million to \$91.1 million; Natural Hazards R&D fell \$5.5 million to \$100.4 million; Water Resources R&D fell \$6.3 million to \$114.2 million; Core Science Systems R&D fell \$4.6 million to \$83.9 million; and Administration and Enterprise Information fell \$26 thousand to \$475 thousand.

The President had requested \$726.5 million for USGS R&D in his FY2013 request. Among the largest R&D increases proposed in the USGS portfolio were for Science Synthesis, Analysis, and Research which would have increased by \$11.3 million (74.9%) and Climate Change Science Support for DOI Bureaus which would have increased \$6.6 million (273.9%).

⁸⁵ This section was written by John F. Sargent, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

⁸⁶ Private e-mail correspondence between the DOI budget office and CRS, November 5, 2013.

⁸⁷ Private e-mail correspondence between the DOI budget office and CRS, February 17, 2012.

In the DOI budget classification Natural Hazards, the President's budget would have increased funding for Earthquake Hazards by \$5.4 million (15.1%) and for Coastal and Marine Geology by \$5.4 million (12.3%). Within Ecosystems, three areas received specific attention: Fisheries—Aquatic & Endangered Resources, up \$4.5 million (20.1%); Terrestrial, Freshwater, and Marine Environments, up \$5.8 million (15.9%); and Invasive Species, up \$4.6 million (35.5%). Within Energy, Minerals, and Environmental Health, the request included an increase of \$3.2 million (11.7%) for Energy Resources and a reduction of \$4.0 million (8.0%) for Mineral Resources.

The President sought to eliminate Water Resources Research Act (WRRRA) program funding in FY2012, but Congress opted to provide \$6.5 million for the program. WRRRA provides funding to 54 Water Resources Research Institutes at land grant universities—one in each state, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam for the federal-state partnership in water resources research, education, and information transfer. In his FY2013 budget, the President again sought to eliminate funding (\$6.5 million) for the WRRRA program. According to the President's budget, "The elimination of this program allows the USGS to redirect scarce funds to other priority issues, such as WaterSMART."⁸⁸ The WaterSMART program is a multidisciplinary USGS effort focused on improving understanding of the linkages between water quantity, quality, and the environment. In FY2012, approximately \$8.0 million was directed to WaterSMART activities (R&D and non-R&D). The President's FY2013 budget included funding of \$21.0 million for WaterSMART activities, an increase of \$13.0 million (163.0%).

Other DOI Agencies

In addition to the USGS, several other DOI agencies received funding for R&D in FY2013, including (also see **Table 15.**):

- The Bureau of Ocean Energy Management (BOEM) received \$38.1 million for FY2013, \$2.1 million (5.2%) below its FY2012 level and \$1.0 million (2.6%) below the request.
- The Fish and Wildlife Service (FWS) received \$32.5 million in R&D funding for FY2013, \$4.0 million (14.1%) above its FY2012 level but \$22.7 million (41.1%) below the request.
- The Bureau of Safety and Environmental Enforcement (BSEE) received \$25.8 million in R&D funding for FY2013, \$1.0 million (4.2%) above its FY2012 level but \$1.1 million (4.1%) below the request.
- The National Park Service (NPS) received \$24.7 million in R&D funding for FY2013, \$1.6 million (6.0%) below its FY2012 level and \$6.8 million (21.5%) below the request.
- The Bureau of Land Management (BLM) received \$17.6 million in R&D funding for FY2013, \$1.0 million (6.2%) above its FY2012 level and \$1.0 million (5.2%) below the request.

⁸⁸ Department of the Interior, *Budget Justifications and Performance Information, FY2013: U.S. Geological Survey*, p. B-41, http://www.doi.gov/budget/2013/data/greenbook/FY2013_USGS_Greenbook.pdf.

- The Bureau of Reclamation (BOR) received \$12.4 million in R&D funding for FY2013, \$0.3 million (2.6%) above its FY2012 level and \$0.7 million (5.2%) below the request.

Table 15. Department of the Interior R&D
(in millions of dollars)

	FY2012 Enacted Revised^a	FY2013 Request	FY2013 Operating Plan (Post- Sequester)
U.S. Geological Survey	672.8	726.5	637.9
Bureau of Ocean Energy Management	40.1	39.1	38.1
Fish and Wildlife Service	28.5	55.3	32.5
Bureau of Safety and Environmental Enforcement ^a	24.7	26.9	25.8
National Park Service	26.3	31.5	24.7
Bureau of Land Management	16.6	18.6	17.6
Bureau of Reclamation	12.0	13.0	12.4
Total, DOI R&D^b	821.1	910.8	789.0

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

- As reported by the Department of the Interior to CRS in a private e-mail communication on November 5, 2013. The figures in the 2012 enacted revised column include reprogramming.
- Totals may differ from the sum of the components due to rounding.

Environmental Protection Agency⁸⁹

As part of its responsibilities for administering a number of environmental pollution control laws, the U.S. Environmental Protection Agency (EPA) 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. EPA is 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 the enactment of P.L. 113-6, EPA and other federal departments and agencies had operated under the Continuing Appropriations Resolution, 2013 (P.L. 112-175, H.J.Res. 117), enacted September 28, 2012, in the 112th Congress. With a few exceptions, P.L. 112-175 generally had provided FY2013 appropriations for EPA and most other federal departments and agencies at

⁸⁹ This section was written by Robert Esworthy, Specialist in Environmental Policy, CRS Resources, Science, and Industry Division. For a broader overview of EPA's FY2013 appropriations, see CRS Report R43207, *Environmental Protection Agency (EPA): Appropriations for FY2013 in P.L. 113-6*, by Robert Esworthy and David M. Bearden, and CRS Report R42520, *Environmental Protection Agency (EPA) Appropriations for FY2013: Debate During the 112th Congress*, coordinated by Robert Esworthy.

0.612% above the FY2012 enacted levels. Although not enacted, Title II of H.R. 6091, the Interior, Environment, and Related Agencies Appropriations Act, 2013, as reported by the House Committee on Appropriations on July 10, 2012, had included \$7.06 billion for EPA for FY2013. The bipartisan leadership of the Senate Appropriations Subcommittee on Interior, Environment, and Related Agencies also had released a draft bill on September 25, 2012, which included different funding priorities and proposed \$8.52 billion for EPA in FY2013.

Division F of the Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6), enacted March 26, 2013, provided discretionary appropriations for the full fiscal year through September 30, 2013, in lieu of seven regular appropriations acts, including Interior, Environment, and Related Agencies, which funds EPA. P.L. 113-6 did not specify the final FY2013 enacted funding levels available to EPA or other federal departments and agencies funded in Division F of the law. Instead, the act provided a level of appropriations from which reductions associated with an across-the-board rescission required by the law⁹⁰ and the executive branch's calculations of spending reductions triggered by the Budget Control Act of 2011 BCA (P.L. 112-25) as amended by the American Taxpayer Relief Act (ATRA; P.L. 112-240), were to be made.

P.L. 113-6 did not treat all of EPA's eight appropriations accounts the same. For four of the EPA accounts, the Section 1101 of the act specified a level equal to the FY2012 enacted appropriations.⁹¹ For those accounts, the act further specified that the use of funds provided for these accounts would be subject to the same authorities and conditions in FY2013 that applied in FY2012. For the other four accounts, including the S&T account, P.L. 113-6 specified amounts referred to as "anomalies"⁹² that were below the FY2012 enacted levels. These anomalies were not subject to the same FY2012 authorities and conditions in FY2013. Section 1405 of the act specified the FY2013 funding level for the S&T account at \$785.3 million.

As required under P.L. 113-6,⁹³ EPA reported allocations of FY2013 appropriations by program, project, or activity within each statutory appropriations account, after the application of sequestration and rescissions, in its FY2013 Operating Plan released to the House and Senate Appropriations Committees on May 7, 2013.⁹⁴ In its Operating Plan, EPA reported a total FY2013 enacted discretionary appropriation of \$765.5 million within the S&T account. The FY2013 enacted level for the S&T account, including transfers from the Superfund account, was \$4.2 million above the \$761.4 million proposed for FY2013 in H.R. 6091 as reported, but was \$65.0

⁹⁰ Section 3004 of P.L. 113-6 directed the Office of Management and Budget (OMB) to apply an across-the-board rescission, if needed, in addition to sequestration to ensure that the total level of appropriations in FY2013 did not exceed the discretionary spending caps. Section 3004 did not specify the percentage of this rescission, but directed OMB to calculate it relative to the amount of appropriations that would exceed the caps otherwise. OMB subsequently determined that an across-the-board rescission of 0.2% was necessary in FY2013 to remain within the nonsecurity cap.

⁹¹ Division E of P.L. 112-74 specified the FY2012 enacted funding levels for all eight EPA accounts, subject to a 0.16% across-the-board rescission. Section 1101 of Division F of P.L. 113-6 used the post-rescission amounts for FY2012 as the baseline for four of the eight EPA accounts in FY2013.

⁹² The Senate Committee on Appropriations referred to these exceptions in P.L. 113-6 as "anomalies." See the committee's March 11, 2013, press release summarizing the Senate substitute amendment to H.R. 933: <http://www.appropriations.senate.gov/news.cfm?method=news.view&id=729722e4-2b84-4651-ae53-cad2b62e548e>.

⁹³ Section 1113 of P.L. 113-6 required each federal department and agency funded in Division F of the law to provide the House and Senate Committees on Appropriations with detailed allocations of FY2013 appropriations by program, project, or activity within each statutory appropriations account, after the application of sequestration and rescissions, within 30 days of enactment.

⁹⁴ The levels of FY2013 appropriations indicated in this section are as presented in EPA's Operating Plan provided to CRS by the House Committee on Appropriations.

million (8%) below the President's FY2013 request of \$830.5 million and \$51.2 million (6%) below the \$816.7 million provided for FY2012.⁹⁵ The FY2013 \$21.7 million transfer from the Superfund account for FY2013 was below the \$23.2 million requested level, and the \$23.0 million proposed for FY2013 in the House Committee reported bill and transferred in FY2012. The total amount for FY2013 for the S&T account (including transfers) represented nearly 10% of the agency's total \$7.90 billion for FY2013 as reported by EPA in its FY2013 Operating Plan.

The total base funding across nearly all of the individual EPA research program and activity line-items identified within the S&T account, with few exceptions, were below the FY2013 requested and FY2012 enacted levels, and most were below those proposed in H.R. 6091 as reported (see **Table 16**). Of note, the FY2013 funding of \$15.9 million for the Climate Change Program activity was less than the FY2012 level of \$16.7 million, but more than twice the \$7.8 million requested and included in H.R. 6091 as reported. The \$7.8 million for this activity was the largest requested and proposed decrease (53.0%) for FY2013 within the S&T account. The net reduction as requested was associated with the Administration's proposal to eliminate the Clean Automotive Technology (CAT) program in FY2013, and a reallocation of a portion of the resources.⁹⁶ As reflected in **Table 16**, the FY2013 funding requested for the S&T account included both increases and decreases for individual EPA research program and activity line-items within the account when compared to the enacted FY2012 appropriations. Some activities remained relatively flat compared to the prior year appropriation. As indicated in the table, the FY2013 funding levels were also above the House Committee proposed FY2013 funding for Clean Air and Climate Change, Research—Safe and Sustainable Water, Research—Chemical Safety and Sustainability, and Research—Sustainable and Healthy Communities. The FY2013 funding for these activities were below the FY2013 requested and FY2012 enacted levels.

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

⁹⁵ The Consolidated Appropriations Act, 2012 (P.L. 112-74 Title II of Division E, H.R. 2055) enacted December 23, 2011. FY2012 enacted amounts presented in this section of the report reflect the application of 0.16% rescission. Title IV, Division E of P.L. 112-74, Section 436(a). The total FY2012 enacted appropriations for the EPA S&T account, including transfers, in P.L. 112-74 was \$818.0 million prior to the rescission.

⁹⁶ The FY2013 President's Budget request had proposed the elimination of the Clean Automotive Technology (CAT) program in FY2013, and a reallocation of a portion of the resources (including technical experts) that previously supported the CAT program FY2012, to support the growing implementation and compliance activities associated with National Highway Traffic Safety Administration (NHTSA) Corporate Average Fuel Economy (CAFE) and EPA greenhouse gas (GHG) emission standards for light-duty and heavy-duty vehicles and engines, and to support GHG standard setting actions regarding advanced vehicle and engine technologies, including light-duty and heavy-duty trucks. U.S. EPA, *Fiscal year FY2013 Justification of Appropriation Estimates for the Committee on Appropriations: Science and Technology*, <http://www2.epa.gov/planandbudget>, PDF pp. 88-90.

accounts, which had been in place until FY1996.⁹⁷ Although the Office of Management and Budget (OMB) reports⁹⁸ historical and projected budget authority (BA) amounts for R&D at EPA (and other federal agencies), OMB documents do not describe how these amounts explicitly relate to the requested and appropriated funding amounts for the many specific EPA program activities. The R&D BA amounts reported by OMB are typically significantly less than amounts appropriated and requested for the S&T account as a whole. (BA as reported by OMB is included in **Table 16** for purposes of comparison.) This is an indication that not all of the EPA S&T account funding is allocated to R&D activities.

In addition to funding priorities among the various EPA programs and activities, several recent and pending EPA regulatory actions,⁹⁹ including EPA scientific research in support of these actions, were again prominent in the debate regarding the FY2013 appropriations as interest in the potential impacts of EPA regulations has continued.¹⁰⁰ Regulatory actions under the Clean Air Act, including EPA controls on emissions of greenhouse gases, as well as those 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 EPA S&T oversight and appropriations deliberations, and authorizing committees continue to address EPA regulatory actions through hearings and legislation.

In its report on H.R. 6091, the House Appropriations Committee included directive language within the S&T account regarding specific EPA scientific research activities upon which some of the agency's pollution control decisions may be based. Certain directives for FY2013 built upon those included in the conference report on the FY2012 appropriations bill (H.Rept. 112-331). For example, the House Appropriations Committee included a directive that for FY2013 EPA would need to make specific refinements and modifications to the agency's policies and practices for conducting human health risk assessments under the Integrated Risk Information System (IRIS).¹⁰¹ EPA uses this system to establish toxicity concentrations and risk thresholds for various chemical substances, which often inform the agency's regulatory decisions under multiple pollution control statutes.

⁹⁷ Since FY1997, EPA's annual appropriations have been requested, considered, and enacted according to eight statutory appropriations accounts established by Congress during the FY1996 appropriations process. Because of the differences in the scope of the activities included in these accounts, apt comparisons before and after FY1996 are difficult.

⁹⁸ The Office of Management and Budget (OMB) reports R&D budget authority (BA) amounts in its Analytical Perspectives accompanying the annual President's budget request. See OMB, *Fiscal Year 2013 Budget of the United States: Analytical Perspectives—Special Topics/Research and Development*, pp. 365-371, <http://www.whitehouse.gov/sites/default/files/omb/budget/fy2013/assets/topics.pdf>.

⁹⁹ 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.

¹⁰⁰ For example, see House Committee on Science, Space and Technology-Energy and Environment Subcommittee February 1, 2012, hearing "EPA Hydraulic Fracturing Research," <http://science.house.gov/hearing/energy-and-environment-subcommittee-epa-hydraulic-fracturing-research>. See also testimony and discussion congressional hearings regarding FY2013 Budget Request for EPA: February 29, 2012, House Committee on Appropriations, Interior, Environment, and Related Agencies Subcommittee, <http://appropriations.house.gov/Calendar/EventSingle.aspx?EventID=277064>; and February 28, 2012, House Energy and Commerce Committee, Subcommittee on Energy and Power and the Subcommittee on Environment and the Economy, <http://energycommerce.house.gov/hearings/hearingdetail.aspx?NewsID=9317>.

¹⁰¹ H.Rept. 112-589, p. 48-49.

Also within the S&T account, the committee would not have provided a \$4.25 million increase for hydraulic fracturing research that the President had requested, and would have disallowed EPA from using any of the funds that would be provided in H.R. 6091 to research environmental justice impacts related to hydraulic fracturing.¹⁰² Although the conferees on the FY2010 appropriations bill had urged EPA to study the relationship between hydraulic fracturing and drinking water,¹⁰³ the House Appropriations Committee noted in its report on H.R. 6091 that EPA had expanded its research beyond the scope of the congressionally directed study. With respect to other research related to drinking water, the committee rejected the \$2.33 million reduction that the President had requested for research of innovative technologies for small drinking water systems.¹⁰⁴

Table 16. Environmental Protection Agency S&T Account
(in millions of dollars)

	FY2012 Enacted (P.L. 112-74)	FY2013 Request	FY2013 House Committee H.R. 6091	FY2013 P.L. 113-6 (Post- Sequester)
Science and Technology Approps. Account				
Clean Air and Climate	124.4	127.1	115.8	118.1
- Climate Protection Program	16.3	7.8	7.8	15.9
Enforcement	15.3	15.6	15.3	14.4
Homeland Security	42.0	40.1	40.1	39.3
Indoor Air and Radiation	6.8	6.7	6.7	6.3
IT/Data Management/Security	3.7	4.0	3.7	3.5
Operations & Administration	72.0	75.5	69.0	67.7
Pesticide Licensing	6.6	7.1	6.6	6.2
Research: Air, Climate, and Energy	98.8	105.9	95.0	92.9
Research: Safe and Sustainable Water	113.5	121.2	101.9	106.7
Research: Chemical Safety and Sustainability	131.3	134.7	123.0	123.3
Research: Sustainable and Healthy Communities	170.7	165.7	152.7	157.4
Water: Human Health Protection	3.8	3.6	3.6	3.6
Research: National [Congressional] Priorities (Water Quality and Availability)	5.0	0.0	5.0	4.2
—Subtotal S&T Account Base Appropriations	\$793.7	\$807.3	\$738.4	\$743.8
—Transfer in from Hazardous Substance Superfund Account	\$23.0	\$23.2	\$23.0	\$21.7
Total Science and Technology	\$816.7	\$830.5	\$761.4	\$765.5
R&D Budget Authority Reported by OMB	\$568.0 est.	\$580.0 est.	\$580.0 est.	\$580.0 est.

¹⁰² Ibid., p. 48.

¹⁰³ H.Rept. 111-316, p. 109.

¹⁰⁴ H.Rept. 112-589, p. 48.

Source: Prepared by CRS. FY2012 enacted amounts, and the FY2013 proposed amounts, are as presented by the House Appropriations Committee in its report accompanying the Interior, Environment, and Related Agencies Appropriations Bill, 2013 (H.R. 6091, H.Rept. 112-589, pp. 170-177), as reported July 10, 2012. The FY2012 enacted amounts reflect applicable rescissions. The FY2013 enacted and supplemental amounts are as reported in EPA's FY2013 Operating Plan submitted to the House and Senate Appropriations Committees on May 7, 2013, and reflect automatic spending reductions triggered by the Budget Control Act (BCA; P.L. 112-25) as amended. The FY2013 enacted levels also reflect the 0.2% across-the-board rescission required by the Consolidated and Further Continuing Appropriations Act, 2013 (P.L. 113-6). OMB amounts of R&D budget authority are as reported in *OMB Fiscal Year 2013 Budget of the United States: Analytical Perspectives—Special Topics/Research and Development*, pp. 365-371, <http://www.whitehouse.gov/sites/default/files/omb/budget/fy2013/assets/topics.pdf>. Totals may differ from the sum of the components due to rounding. N/A = not available.

Department of Transportation¹⁰⁵

The Department of Transportation (DOT) reports total R&D funding of \$816.6 million for FY2013, \$138.9 million (14.5%) below the FY2012 funding level and \$288.2 million (26.1%) below the President's FY2013 request of \$1,104.8 million.¹⁰⁶ (See **Table 17**.) Two DOT agencies—the Federal Highway Administration (FHWA) and the Federal Aviation Administration (FAA)—accounted for approximately 84% of the department's FY2013 R&D funding.

The FAA budget justification¹⁰⁷ included \$354.0 million for R&D and R&D facilities in FY2013, a decrease of \$12.7 million (3.5%) from the FY2012 enacted level.¹⁰⁸ The request included \$180.0 million for Research, Engineering, and Development (RE&D), an increase of \$12.4 million (7.4%) above the FY2012 level. The Senate Committee on Appropriations recommended \$160.0 million for RE&D, a decrease of \$7.6 million (4.5%) from the FY2012 enacted level, and \$20 million (11.1%) below the request. The NextGen R&D portfolio would have been funded at \$67 million under the President's FY2013 budget request, up \$7.3 million (12.2%) from the FY2012 level.¹⁰⁹ The Senate Committee on Appropriations recommended \$54.9 million for NextGen R&D, \$4.9 (8.2%) million less than the FY2012 enacted level, and \$12.1 million (18.1%) less than the request. Under the President's budget, the FAA's Environment and Energy program (including funding for NextGen environmental research, aircraft technologies fuel, and metrics) would have received \$34.6 million in FY2013, down \$3.9 million (10.2%) from FY2012; the Senate Committee on Appropriations recommended \$35.1 million, down \$3.5 million (9.1%) from FY2012 and up \$0.4 million (1.2%) from the FY2013 request. The DOT reported \$315.1 million in total FAA R&D funding for FY2013, a decrease of \$51.6 million (14.1%) from the FY2012 level. FY2013 funding includes \$158.8 million for the RE&D account, \$8.8 million (5.3%) below the FY2012 level.¹¹⁰

¹⁰⁵ This section was written by John F. Sargent, Specialist in Science and Technology Policy, CRS Resources, Science, and Industry Division.

¹⁰⁶ Department of the Transportation, private e-mail communication, November 18, 2013.

¹⁰⁷ FAA, *Budget Estimates Fiscal Year 2013: Federal Aviation Administration*, http://www.dot.gov/budget/2013/faa_%20fy_%202013_budget_estimate.pdf.

¹⁰⁸ Data provided by OMB to CRS on February 14, 2012 shows FAA R&D funding requested for FY2013 to be \$326 million.

¹⁰⁹ According to the FAA, this funding supports NextGen-specific research into wake turbulence, human factors, and 'clean' aircraft technologies, as well as \$12 million for the Joint Planning and Development Office for the coordination of interagency initiatives. See Federal Highway Administration, U.S. Department of Transportation, *Budget Estimates Fiscal Year 2013*, February 2012.

¹¹⁰ Department of the Transportation, private e-mail communication, November 18, 2013.

The FHWA would have received \$528.4 million in R&D funding in FY2013 under the President's request, an increase of \$116.9 million (28.4%) from the FY2012 level. Highway Research and Development funding would have increased to \$200.0 million, up \$45.0 million (29.0%) from FY2012 funding of \$155.0 million. Funding for Intelligent Transportation Systems R&D would have increased to \$94.6 million in FY2013, up \$8.2 million (9.5%) from its FY2012 funding level. Two new efforts, the Multimodal Innovation Research Program and the University Transportation Center Multimodal Competitive Research Grants program, would each have received \$20 million in FY2013. In addition, R&D funding for the State Planning and Research program would have grown to \$177.5 million in FY2013, up \$23.7 million (15.4%) over FY2012. The Senate Committee on Appropriations recommended \$429.8 million for "transportation research," which it stated was the same as the FY2012 enacted level.¹¹¹ This appropriation appears to have incorporated a different set of activities than what the Administration characterized as R&D. According to S.Rept. 112-157, this funding would have supported the transportation research and technology programs of the FHWA, as well as intelligent transportation systems; surface transportation research; technology deployment, training, and education; university transportation research; and the Bureau of Transportation Statistics. The DOT reported \$369.2 million in total FHWA R&D funding for FY2013, a decrease of \$42.3 million (10.3%) from the FY2012 level.

The FY2013 DOT budget justification sought to replace the Research and Innovative Technology Administration (RITA) with an Office of the Assistant Secretary for Research and Technology in the office of the Secretary. The department asserted that this would "strengthen research functions across the Department by providing a prominent centralized focus on research and technology, which will improve collaboration and coordination among operating administrations."¹¹²

Table 17. Department of Transportation R&D

(in millions of dollars)

	FY2012 Enacted^a	FY2013 Request^a	H.R. 5972 House- passed^b	S. 2322 Committee- reported^b	FY2013 Agency Reported (Post- Sequester)^c
Federal Highway Administration	411.5	528.4	n/a	n/a	369.2
Federal Aviation Administration	366.7	354.0	n/a	n/a	315.1
Other DOT agencies	177.3	222.4	n/a	n/a	132.3
Total, DOT R&D^d	955.5	1,104.8	n/a	n/a	816.6

Source:

- a. Agency FY2013 budget estimates, <http://www.dot.gov/mission/budget/fy2013-budget-estimates>.
- b. R&D levels cannot be determined from bill or report language.
- c. As reported by the Department of the Transportation to CRS in a private e-mail communication on November 18, 2013.
- d. Totals may differ from the sum of the components due to rounding.

¹¹¹ S.Rept. 112-57.

¹¹² U.S. Department of Transportation, *Budget Highlights: Fiscal Year 2013*, http://www.dot.gov/budget/2013/dot_budget_highlights_fy_2013.pdf.

Author Contact Information

John F. Sargent Jr.
Specialist in Science and Technology Policy
jsargent@crs.loc.gov, 7-9147

Heather B. Gonzalez
Specialist in Science and Technology Policy
hgonzalez@crs.loc.gov, 7-1895

John D. Moteff
Specialist in Science and Technology Policy
jmoteff@crs.loc.gov, 7-1435

Daniel Morgan
Specialist in Science and Technology Policy
dmorgan@crs.loc.gov, 7-5849

Robert Esworthy
Specialist in Environmental Policy
resworthy@crs.loc.gov, 7-7236

Harold F. Upton
Analyst in Natural Resources Policy
hupton@crs.loc.gov, 7-2264

Wendy H. Schacht
Specialist in Science and Technology Policy
wschacht@crs.loc.gov, 7-7066

Judith A. Johnson
Specialist in Biomedical Policy
jajohnson@crs.loc.gov, 7-7077