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America COMPETES 2010 and the FY2013 Budget

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Summary

Signed on January 4, 2011, the America COMPETES Reauthorization Act of 2010 (COMPETES 2010, P.L. 111-358) sought to improve U.S. competitiveness and innovation by authorizing, among other things, increased federal support for research in the physical sciences and engineering, as well as science, technology, engineering, and mathematics (STEM) education. Certain provisions of the law, including major funding authorizations, expired in FY2013. This report describes the President's FY2013 budget request for selected COMPETES 2010 provisions and tracks the status of FY2013 funding for these appropriations accounts.

The President's FY2013 budget requested an increase of 4.1% for the "doubling path" accounts at the National Science Foundation (NSF), Department of Energy's Office of Science, and National Institute of Standards and Technology's (NIST's) core laboratory and construction. This growth rate was less than the COMPETES 2010 authorized rate of 6.3% and equal to the FY2012 enacted appropriations rate. At the end of the COMPETES 2010 authorization period in FY2013, the growth rate in the targeted accounts was 3.0% (from the FY2006 baseline). Funding levels for the targeted accounts—individually and combined—were generally below FY2010 levels. The sole exception was the NIST core laboratory account, which was higher in FY2013 than in FY2010.

For FY2013, Congress provided both regular and continuing appropriations to COMPETES 2010 agencies. NSF and NIST received regular appropriations, while the Office of Science and Department of Education received continuing funding. The combined effects of sequestration and rescissions in P.L. 113-6 (FY2013 Consolidated and Further Continuing Appropriations Act) resulted in year-over-year reductions for the Office of Science, the Advanced Research Projects Agency-Energy (ARPA-E), and most NSF accounts. FY2013 funding for most NIST accounts increased slightly over FY2012 enacted levels. All of the selected COMPETES 2010 accounts were funded below authorized levels. **Table A-1** contains information about the FY2013 funding status of selected provisions from COMPETES 2010.

Both the House and the Senate Committee on Appropriations approved FY2013 appropriations bills for the NSF, NIST, and Office of Science before Congress enacted P.L. 113-6. As initially proposed, differences between House and Senate top line funding levels for NSF and NIST were less than 1%, while the difference in funding for the Office of Science was 2.2%. Proposed FY2013 funding for ARPA-E revealed larger differences between the chambers. The House would have provided $200 million while the Senate Committee on Appropriations sought the authorized amount ($312.0 million). FY2013 funding for COMPETES 2010's STEM education provisions were largely consistent with previous appropriations cycles, which have not typically included specific funding levels for these activities. A notable exception to this rule is the main education account at NSF. As initially requested, passed, and recommended, the President's, House, and Senate Committee on Appropriations each provided $875.6 million for this account in FY2013. Post-rescission, post-sequestration FY2013 funding for this account was $833.3 million.

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On January 4, 2011, President Obama signed P.L. 111-358, the America COMPETES Reauthorization Act of 2010. The law responds to concerns about U.S. competitiveness by increasing funding for research in the physical sciences and engineering; authorizing certain federal science, technology, engineering, and mathematics (STEM) education programs and policies; as well as addressing other related issues. COMPETES 2010 reauthorized selected provisions of the 2007 America COMPETES Act (P.L. 110-69).[1]

The purpose of this report is to provide information on the President's FY2013 budget request—and the status of FY2013 congressional appropriations—for the agencies, programs, and activities authorized by COMPETES 2010.[2] For a broader treatment of the America COMPETES Reauthorization Act of 2010, see CRS Report R41819, *Reauthorization of the America COMPETES Act: Selected Policy Provisions, Funding, and Implementation Issues*, by (name redac ted). For information about prior year fu nding for both COMPETES acts, see CRS Report R42779, *America COMPETES Acts: FY2008-FY2013 Funding Tables*, by (name redacted).

The America COMPETES Reauthorization Act of 2010

COMPETES 2010—like COMPETES 2007—was designed to "invest in innovation through research and development, to improve the competitiveness of the United States, and for other purposes."[3] In total, COMPETES 2010 authorized approximately $45.5 billion in funding between FY2010 and FY2013 for federal research in the physical sciences and engineering, STEM education, and other related programs. Certain provisions of the law, including many funding authorizations, expired at the end of FY2013.

Among other things, COMPETES 2010 increased funding authorizations for the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST) core laboratories and construction accounts,[4] and the Department of Energy (DOE) Office of Science. It also authorized new technology transfer and commercialization activities at these agencies. In addition, COMPETES 2010 authorized inducement prizes at federal agencies, established a loan guarantee program for manufacturers, and established a Regional Innovation Program (RIP). In STEM education, COMPETES 2010 sought to provide greater coordination of federal STEM education programs, authorized support for academic programs that provide teacher certification concurrent with a bachelor's degree in a STEM field, and repealed certain unfunded STEM education programs authorized by COMPETES 2007.

[1] The full title of the 2007 America COMPETES Act is the "America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act." This report refers to the America COMPETES Reauthorization Act of 2010 as "COMPETES 2010" and to the 2007 America COMPETES Act as "COMPETES 2007."

[2] Numbers reported are rounded, therefore small inconsistencies may occur in some cases.

[3] P.L. 111-358, Purpose.

[4] The formal names for these accounts are the "Scientific and Technical Research and Services" or STRS account and the "Construction of Research Facilities" or CRF account. STRS and CRF are known colloquially as the "core laboratories" and "construction" accounts, respectively. NIST is part of the U.S. Department of Commerce.

The President's FY2013 Budget Request

Like its predecessor, COMPETES 2007, the central policy contributions of COMPETES 2010 were the "doubling path" policy for the NSF, NIST core laboratories and construction accounts, and the DOE Office of Science, as well as the authorization of STEM education activities at various federal agencies.[5] The President's FY2013 budget requested increased funding for the doubling path accounts (albeit at levels below those authorized)[6] but included support for few COMPETES 2010 authorized STEM education programs. In this regard the President's FY2013 budget request was generally consistent with prior year Obama Administration requests and appropriations activity for both COMPETES acts.

Of the new programs with defined[7] funding authorizations in COMPETES 2010, only the Regional Innovation Program (RIP) at the Department of Commerce (DOC) was specifically included in the Administration's FY2013 budget request.[8] The Administration's budget request did not seek funding for the NIST Green Jobs Act, Federal Loan Guarantees for Innovative Technologies in Manufacturing, or the STEM-Training Grant program. COMPETES 2010 also authorized new programs without providing a defined funding amount. One example of this type of authorization was the Green Chemistry Basic Research program at NSF. The FY2013 budget request included funding for a green chemistry program at NSF.

The following sections discuss in greater detail the President's FY2013 budget request for selected programs and agencies authorized by COMPETES 2010. Where possible, this report has been updated to reflect FY2012 actual funding.[9] Earlier versions of this report used FY2012 enacted, estimated, or current plan funding levels. This change provides a more accurate view of the difference between FY2012 funding levels and the President's FY2013 request. **Table A-1** summarizes the FY2013 funding status of selected COMPETES 2010 provisions, including the President's FY2013 requests for these accounts.

Research

This section highlights the Administration's FY2013 budget request for selected research programs and accounts included in COMPETES 2010, including the doubling path accounts.

[5] For more information on the doubling path policy see, CRS Report R41951, *An Analysis of Efforts to Double Federal Funding for Physical Sciences and Engineering Research*, by (name redacted)

[6] Neither COMPETES act specifies a compound annual growth rate (CAGR or "growth rate") as such. To help Congress evaluate the effect of various funding proposals or authorizations on targeted accounts, CRS calculates the CAGR implicit in the budget request, authorization, or appropriation by comparing each to the baseline year (FY2006). The CAGR is used to calculate the number of years required for a doubling from the baseline.

[7] A "defined" funding authorization includes a specific funding level or amount, such as $4.0 million. Defined appropriations may be contrasted with funding levels that are not defined, such as "such sums as may be necessary" or program provisions that do not include an authorized funding level at all.

[8] This includes both the RIP program as a whole and the science park infrastructure loan component.

[9] FY2012 actual funding levels in this report are from FY2014 federal agency budget justifications and related budget materials. In some cases, agency FY2014 budget justifications do not include actual FY2012 funding levels for each of the programs included in this report. In such cases this report references the FY2012 enacted, estimated, or current plan funding level (if available).

National Institute of Standards and Technology

At NIST, the President sought a total of $857.0 million in FY2013. This funding level was $106.2 million (14.1%) more than the FY2012 enacted level of $750.8 million and $182.7 million (17.6%) less than the authorized level of $1.040 billion. Within the NIST total, the President requested $648.0 million, or $81.0 million (14.3%) more than the FY2012 enacted level of $567.0 million and $28.7 million (4.2%) less than the authorized level of $676.7 million, for the core laboratories account. The President also sought $60.0 million, or $4.6 million (8.3%) more than the FY2012 enacted level of $55.4 million and $61.3 million (50.5%) less than the authorized amount of $121.3 million, for the construction account.

The President's FY2013 request for NIST's Industrial Technology Services (ITS) account was $149.0 million, including $128.0 million for the Hollings Manufacturing Extension Partnership (MEP). The FY2013 Administration request for MEP was $400,000 less than the FY2012 enacted amount. The President did not seek funding for the Baldrige Performance Excellence Program in FY2013. The President did not specifically request FY2013 funds for activities authorized by the NIST Green Jobs Act.

National Science Foundation

President Obama's FY2013 budget request for the NSF's Research and Related Activities (R&RA) account—which is the primary source of research funding at the foundation—was $5.983 billion. This amount was $225.0 million (3.9%) more than the FY2012 actual level of $5.758 billion and $654.5 million (9.9%) less than the COMPETES 2010 authorized amount of $6.638 billion.[10]

The President's FY2013 budget request for R&RA included specific funding for two COMPETES 2010 programs—the Experimental Program to Stimulate Competitive Research (EPSCoR) and Partnerships for Innovation (PFI). COMPETES 2010 reauthorized but did not specify funding levels for these programs. The President requested $158.2 million for EPSCoR in FY2013, $7.3 million (4.9%) more than the FY2012 actual funding level of $150.9 million.[11] The FY2013 NSF budget request stated that the National Academy of Sciences was studying NSF's EPSCoR programs in accordance with Section 517 of COMPETES 2010. This report was published in 2013.[12] The FY2013 request for PFI was $8.2 million, $200,000 more than the FY2012 estimate of $8.0 million. NSF FY2013 budget documents indicate that the foundation would dedicate the requested $200,000 increase to the Building Innovation Capacity track, which funds partnerships between academic researchers and small businesses.[13]

[10] FY2012 actual NSF funding levels are from the foundation's *FY2014 Budget Request to Congress*, available at http://www.nsf.gov/about/budget/fy2014/toc.jsp. FY2012 R&RA funding excludes a one-time transfer of $30.0 million to the Major Research Equipment and Facilities Construction (MREFC) account as authorized by P.L. 112-55.

[11] For more information on the EPSCoR program, see CRS Report RL30930, *U.S. National Science Foundation: Experimental Program to Stimulate Competitive Research (EPSCoR)*, by (name redacted).

[12] See, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, Committee to Evaluate the Experimental Program to Stimulate Competitive Research (EPSCoR) and Similar Federal Agency Programs, Committee on Science, Engineering, and Public Policy, Policy and Global Affairs, *The Experimental Program to Stimulate Competitive Research* (Washington, D.C.: National Academies Press, 2013), http://www.nap.edu/catalog.php?record_id=18384.

[13] More information about the PFI program is available at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504708&org=IIP&from=home.

Section 509 of COMPETES 2010 directed NSF to establish a Green Chemistry Basic Research program. In response to these provisions, the FY2013 NSF budget request included funding for a new Sustainable Chemistry, Engineering and Materials (SusCHEM) program as part of NSF's Science, Engineering, and Education for Sustainability (SEES) portfolio. The President sought $76.7 million in FY2013 for SusCHEM and four other new related SEES programs.[14]

The FY2013 NSF budget request emphasized the "OneNSF Framework," which sought to enable "seamless operations across organizational and disciplinary boundaries."[15] Although the OneNSF Framework applied across all NSF directorates, most of the OneNSF Framework priorities were funded in the R&RA account. Other NSF-wide priorities included clean energy, advanced manufacturing, multidisciplinary research, and STEM education and workforce.

The FY2013 NSF budget proposed $67.0 million in research program terminations, including reductions in Computer and Information Science and Engineering (CISE), Cyber-enabled Discovery and Innovation (CDI), Mathematics and Physical Sciences (MPS), Nanoscale Science & Engineering Centers (NSECs), and public outreach.[16] The NSF FY2013 budget request described these programs as either duplicative or obsolete (either because the program had achieved its original goals or as a result of maturation in the field).

In September 2012, NSF announced its intention to realign some of its research-related programs beginning in FY2013. The foundation moved two programs from the Office of the Director to the research directorates. The Office of Cyberinfrastructure became a division within the Directorate for Computer and Information Sciences, and the Office of Polar Programs became a division within the Directorate for Geosciences. The NSF also merged two other offices, the Office of International Science and Engineering and the Office of Integrative Activities, into the Office of International and Integrative Activities.[17] It is not yet clear how or if these changes will affect foundation activities in these fields. NSF's FY2013 budget request to Congress did not reflect these consolidations. The foundation's FY2013 current plan does.[18]

[14] The FY2012 request for SEES was $998.2 million. This amount was $337.5 million (51.1%) more than the annualized FY2011 level of $660.7 million as reported in the *FY2012 NSF Budget Request to Congress*. The total request for SEES in FY2013 was $202.5 million, which is less than a third of the FY2011 annualized level and a fifth of the FY2012 request. NSF attributes the large differences between the FY2011-FY2013 SEES funding levels to accounting changes. According to NSF, the foundation "has requested $202.50 million in FY2013 [for SEES], an increase of $45.50 million over the comparable FY2012 current plan total of $157.0 million. The SEES program was re-baselined in FY2012 to reflect more stringent criteria for investments, including strong requirements for interdisciplinarity and systems-based research, including social and economic aspects. All SEES programs established after FY2010 are included in the re-baselined SEES, while legacy programs are excluded." E-mail communication between CRS and NSF Senior Legislative Policy Analyst Karen Pearce, March 7, 2012.

[15] National Science Foundation, *FY2013 Budget Request to Congress*, February 13, 2012, p. Overview-3, http://www.nsf.gov/about/budget/fy2013/index.jsp.

[16] The public outreach programs slated for termination in FY2013 were Communicating Science Broadly and Connecting Researchers with Public Audiences. Communicating Science Broadly is an R&RA program. Connecting Researchers with Public Audiences is an Education and Human Resources (E&HR) program.

[17] National Science Foundation, "National Science Foundation Realignment Plans," press release, September 7, 2012.

[18] The term "current plan" usually refers to enacted appropriations adjusted for the effects of sequestration or other post-enactment changes (including transfers and reprogramming) to agency budget authority. In other words, it is roughly analogous to an agency operating budget.

DOE Office of Science

The President's FY2013 budget request for the DOE Office of Science was $4.992 billion. This funding level was $57.0 million (1.2%) more than the FY2012 current plan funding level of $4.935 billion and $1.009 billion (16.8%) less than the authorized level in COMPETES 2010 ($6.001 billion).[19] The President also sought $350.0 million for the ARPA-E account at DOE, which was $75.0 million (27.3%) more than the FY2012 current plan level of $275.0 million and $38.0 million (12.2%) more than the amount authorized in COMPETES 2010 ($312.0 million).

The Doubling Path

Many federal policymakers have sought to increase federal funding for research in the physical sciences and engineering—and thereby, advocates assert, improve U.S. global economic competitiveness. Congress and the Bush and Obama Administrations have 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") from their FY2006 levels.[20] To date, the main legislative acts authorizing the doubling path policy for the targeted accounts have been the COMPETES acts.[21]

Under COMPETES 2010, targeted account funding was authorized to increase at a compound annual growth rate of 6.3%. This growth rate was similar to the growth rate in actual appropriations for the targeted accounts during the COMPETES 2007 authorization period (6.4%).[22] At the COMPETES 2010 authorized rate, it would have taken approximately 11 years to double funding for the targeted accounts. The President's FY2013 budget request re-asserted the Administration's ongoing support for the doubling path policy, but sought an overall increase of 4.1% for the targeted accounts. This increase was equal to the FY2012 enacted appropriations growth rate for the targeted accounts and, and if maintained, would have resulted in an 18-year doubling.

STEM Education

The President's FY2013 STEM education request focused primarily on two groups: STEM graduates and STEM teachers. Specifically, the FY2013 budget request established a new "government-wide goal to increase, over the next decade, the number of well-prepared college graduates with STEM degrees by one-third, or one million" and continued the Administration's previous commitment to prepare 100,000 STEM teachers over the next decade (the "100Kin10"

[19] Office of Science FY2012 current plan funding levels reflect the original appropriation after the allocation of a general reduction for a contractor pay freeze and changes due to the annual reallocation of Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) funding. These (and other) account changes are documented in the August 19, 2013, *FY2012-FY2014 Office of Science Funding Summary*, available at http://science.energy.gov/~/media/budget/pdf/sc-congressional-appropriations/fy-2014/FY-2012_FY_2014_Request_Science_Stat_Table.pdf.

[20] 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 (name redacted)

[21] FY2008 and FY2009 Office of Science funding levels were provided by the Energy Policy Act of 2005 (P.L. 109-58). Other than for this exception, FY2008 to FY2013 funding authorizations for the targeted accounts were provided by the COMPETES acts.

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

initiative).[23] To achieve these goals, the President's FY2013 budget request sought program and funding changes to some existing COMPETES 2010 authorized programs and agencies.[24] The President's FY2013 budget did not include specific requests for new STEM education programs authorized by COMPETES 2010, such as the STEM-Training Grant Program.

Department of Education

The President's FY2013 budget request for the Department of Education (ED) proposed to reorganize the department (as it had previously proposed in the FY2011 and FY2012 requests).[25] The proposed reorganization would have eliminated and consolidated certain programs, including COMPETES 2010 programs.[26] For example, under the reorganization plan, both the Teachers for a Competitive Tomorrow (TCT) and Advanced Placement (AP) programs would have been eliminated and their program functions absorbed into the newly created Teacher and Leader Pathways (TLP)[27] and College Pathways and Accelerated Learning (CPAL)[28] programs, respectively.[29]

The status of both the TCT and AP programs, as authorized by the COMPETES acts, is unclear. Congress has not funded the TCT program since FY2010 and the President's FY2013 ED budget request did not specify funding for the program. Although ED operates an AP program, it typically does so under the authority of the Elementary and Secondary Education Act of 1965, as amended by No Child Left Behind (ESEA, P.L. 107-110), not under the authority of either COMPETES Act. The AP programs authorized by ESEA and COMPETES are substantively different, though they share some features. It is unclear if the AP program at ED complies with the AP program authorized by the COMPETES acts. The FY2013 ED request for CPAL, including the AP program authorized by ESEA, was $81.0 million. Of this amount, $24.1 million was dedicated to the advanced course test fee component of the AP program. The FY2012 enacted appropriation for the ESEA authorized AP program was $30.1 million.[30]

[23] See Executive Office of the President, Office of Science and Technology Policy, "Preparing a 21st Century Workforce: Science, Technology, Engineering, and Mathematics (STEM) Education in the 2013 Budget," press release, February 13, 2012, p. 1, http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy2013rd_stem.pdf.

[24] COMPETES 2010 directed the National Science and Technology Council to develop a STEM education strategic plan. Although Administration officials had not published that plan when the FY2013 President's budget request was released, the request appears to anticipate at least parts of the Administration's plan by prioritizing certain policy strategies (e.g., increasing the number of STEM graduates) and establishing long-term objectives.

[25] This reorganization would require congressional authorization. FY2011, FY2012, and FY2013 congressional appropriations to ED retained the existing department structure and organization.

[26] For more information, see CRS Report R41355, *Administration's Proposal to Reauthorize the Elementary and Secondary Education Act: Comparison to Current Law*, by (name redacted) et al.

[27] TLP included funding for five existing programs: Transition to Teaching, Teacher Quality Partnership, Teachers for a Competitive Tomorrow, Teach for America, and School Leadership.

[28] CPAL included funding for three existing programs: the High School Graduation Initiative, Advanced Placement, and Javits Gifted and Talented Education.

[29] It is not clear how the Department of Education would operate these merged programs or what their future functional relationship would be compared to the current separate programs.

[30] The President's FY2013 ED budget request contained other STEM education items that, while not authorized by either COMPETES Act, may interest COMPETES analysts. For more information on these proposals, go to: http://www2.ed.gov/about/overview/budget/budget13/crosscuttingissues/stemed.pdf.

Department of Energy

DOE does not typically request funding for COMPETES-acts-authorized STEM education programs. However, the department asserts that it operates programs that correspond with its responsibilities under the law.[31] Among these is the DOE Office of Science's Science Graduate Fellowship (SCGF) program, which the department asserts is one of two fellowships that correspond with the Protecting America's Competitive Edge (PACE) graduate fellowship program.[32] The President's FY2013 request for DOE included no funding for SCGF. This was consistent with FY2012 congressional appropriations actions. For example, House Committee on Appropriations FY2012 DOE appropriations report language directed the Office of Science to "justify to the Committee why fellowships should be funded within the Office of Science when other agencies, in particular the National Science Foundation, are the primary federal entities for such purposes."[33] Current plan funding for SCGF in FY2012 was $5.0 million, which was to support a third year of funding for the FY2010 cohort of fellows.

DOE also asserts that the Academies Creating Teacher Scientists (DOE ACTS) program corresponds with the Summer Institutes program and that the Office of Science Early Career Research Program corresponds with the Early Career Awards program. (COMPETES 2010 reauthorized both the Summer Institutes and Early Career Awards programs.) Based on the recommendation of a 2010 DOE Committee of Visitors report,[34] DOE terminated DOE ACTS in FY2012.[35] Accordingly, the President did not seek funding for DOE ACTS in FY2013.

According to the DOE, each of the six Office of Science research programs supports Early Career Research Program awards out of their core research program offices. However, these research programs do not typically specify funding for Early Career Research program awards. DOE representatives state that, "Office of Science support for Early Career Research awards is approximately $16.0 million per year."[36] CRS identified one specific request for the Early Career Research Program in the FY2013 Office of Science budget request. That specific request was in the Fusion Energy Sciences budget in the "Other" activity. In FY2012, enacted funding for the Fusion Energy Sciences "Other" activity was $11.9 million. These funds supported the Office of Science Early Career Research, Historically Black Colleges and Universities (HBCU), and summer internships for undergraduates programs. The FY2013 request for the Fusion Energy

[31] Telephone and e-mail communications between the author and Jane Wise, special assistant, Office of Congressional and Intergovernmental Affairs, U.S. Department of Energy, March 21, 2012, identified programs in the FY2013 DOE budget request that correspond with DOE's STEM education responsibilities under COMPETES 2010.

[32] The second fellowship program that DOE has identified as consistent with PACE is the Computational Science Graduate Fellowship (CSGF) in the Office of Science, Advanced Scientific Computing Research. The FY2013 request for CSGF was $6.0 million. PACE was authorized and reauthorized by the COMPETES acts.

[33] H.Rept. 112-118, p. 114. DOE stated that it was preparing a 10-year plan for the SCGF program, as directed by the House Committee on Appropriations. Funding for SCGF was $8.0 million in FY2011.

[34] U.S. Department of Energy, *Report of the Committee of Visitors of the Office of Workforce Development for Teachers and Scientists (WDTS) in the Department of Energy*, May 17-19, 2010, http://science.energy.gov/~/media/bes/besac/pdf/Wdts_cov_2010_f.pdf.

[35] See U.S. Department of Energy, Office of Science, *FY2012 Budget Request to Congress*, p. 370, http://science.energy.gov/~/media/budget/pdf/sc-budget-request-to-congress/fy-2012/Cong_Budget_2012_Science.pdf.

[36] E-mail communications between CRS and Jane Wise, special assistant, Office of Congressional and Intergovernmental Affairs, U.S. Department of Energy, March 21, 2012.

Sciences "Other" activity was $9.2 million. This amount was $2.7 million, or 22.7%, less than the FY2012 enacted amount.[37]

In FY2012 the Senate Committee on Appropriations urged Office of Science to consider redirecting funds from terminated education programs to the Distinguished Scientist Program authorized by the COMPETES acts. The President's FY2013 request for Office of Science did not include funding for this program, which DOE had not initiated.

National Science Foundation

The primary source of funding for STEM education activities at NSF is the Education and Human Resources (E&HR) account.[38] The President sought $875.6 million for E&HR in FY2013. This amount was $45.1 million (5.4%) more than the FY2012 actual level of $830.5 million and $166.2 million (15.9%) less than the COMPETES 2010 authorized level of $1.042 billion.

The FY2013 NSF budget request highlighted certain NSF-wide and E&HR-specific proposals for STEM education. NSF-wide efforts centered on the planned new Expeditions in Education (E^2) initiative, which sought to "address a challenge in STEM learning or education using current or emerging areas of science."[39] E^2 was a $49.0 million co-funded initiative that was to be supported through contributions from various Research and Related Activities (R&RA) accounts ($28.5 million) and from E&HR ($20.5 million). The FY2013 NSF request also sought increased co-funding for the Graduate Research Fellowship (GRF) program. The FY2013 request for the GRF was $243.0 million, which was $45.1 million (22.8%) more than FY2012 actual. About half of FY2013 funding for the GRF was to come from R&RA, up from 7.4% in FY2009.[40] NSF's FY2013 budget request stated that the increased funding would provide for 2,000 new fellows in FY2013 (8,900 total) at a cost of education (COE) level of $12,000 per fellow. NSF's FY2013 budget request asserted that the FY2013 COE level was consistent with COMPETES 2010.[41]

Other major E&HR initiatives in FY2013 included increased coordination with the Department of Education (ED) on the Mathematics and Science Partnership (MSP) program, on STEM education research, and on a proposed K-16 mathematics education program. E&HR and ED proposed a jointly funded, new $60.0 million K-16 mathematics program. E&HR contributions to the program were to come from the Discovery Research K-12 (DR-K12) program and from the Transforming Undergraduate Education in STEM (TUES) program.[42] Finally, the FY2013 request

[37] Authorized funding for the Early Career Awards program was $25.0 million in FY2013. Information about the Early Career Research program is available at http://science.energy.gov/early-career/.

[38] The NSF Research and Related Activities account also supports some STEM education activities. For more information on STEM education funding at NSF, see CRS Report R42470, *An Analysis of STEM Education Funding at the NSF: Trends and Policy Discussion*, by (name redacted).

[39] National Science Foundation, *FY2013 Budget Request to Congress*, February 13, 2012, p. NSF-Wide Investments-15, http://www.nsf.gov/about/budget/fy2013/index.jsp.

[40] Section 510 of P.L. 111-358 (COMPETES 2010) requires NSF to provide at least 50% of total GRF program funding from amounts allocated to the Research and Related Activities account.

[41] National Science Foundation, *FY2013 Budget Request to Congress*, February 13, 2012, p. NSF-Wide Investments-68, http://www.nsf.gov/about/budget/fy2013/index.jsp.

[42] The reductions to TUES may be partially off-set by E&HR and R&RA contributions to the proposed E^2 initiative project, Transforming Undergraduate STEM Learning through Science and Engineering (TUSLSE). According to the NSF, the TUSLSE initiative builds on TUES and other NSF undergraduate programs. Both TUSLSE and TUES appear to have similar goals.

for E&HR sought to "reframe" E&HR programs and activities such that each division's programs and activities would align with one of three new categories of activity (e.g., core research and development investments, leadership investments, and expedition investments). The Administration sought $20.0 million in new funding ($5.0 million for each E&HR division) for a "Core Launch Fund" to support the reframing.

The FY2013 NSF budget request included funding for existing STEM education programs authorized under COMPETES 2010, but for which the act does not specify funding levels. These include the Integrative Graduate Education and Research Traineeship (IGERT), the Robert Noyce Teacher Scholarship (Noyce) program, Research Experiences for Undergraduates (REU), and the STEM Talent Expansion Program (STEP), among others. The Administration's FY2013 requests for these programs were $51.7 million for IGERT ($8.1 million below the FY2012 estimate),[43] $54.9 million for Noyce (same as FY2012 actual), $68.4 million for REU ($11.2 million below FY2012 actual), and $17.3 million for STEP ($7.0 million below FY2012 actual).

Both America COMPETES acts authorized an NSF program to support Hispanic-serving institutions (HSIs). Section 7033 of COMPETES 2007 directed NSF to establish a program for HSIs. Section 512 of COMPETES 2010 directed the NSF to maintain its HSI program—and all other minority-serving institution (MSI) programs, such as the Historically Black Colleges and Universities Undergraduate Program (HBCU-UP)—as separate programs.[44] Although NSF's FY2013 budget request maintained existing MSI programs separately, NSF has not established an HSI-specific program. The FY2013 request listed "research to examine the particular STEM student and institutional capacity needs in Hispanic-serving institutions"[45] as one of the emphases of the Division of Human Research Development within E&HR, but did not otherwise specifically mention HSIs.[46]

Other Provisions

The President's FY2013 budget requested funding for other COMPETES 2010 provisions as well. These include $25.0 million for the new RIP program at the DOC's Economic Development Administration (EDA). Of this amount, the President sought $7.0 million for the Science Park Infrastructure Loan Guarantee program, which COMPETES 2010 authorized as a separate component of the RIP program. The Administration's FY2013 budget request did not include specific funding for the new Federal Loan Guarantees for Innovative Technologies in Manufacturing program at the DOC or for the activities authorized by the NIST Green Jobs Act of 2010, both of which were authorized by COMPETES 2010. FY2012 funding for the DOC

[43] The Administration's FY2014 budget request consolidates IGERT funding into a new program called "NSF Research Traineeships" or NRT. As such, the FY2014 NSF budget request provides FY2012 actual funding for the NRT (including IGERT) but does not include a comparable, separate FY2012 actual funding level for IGERT. This report, therefore, uses the FY2012 estimated IGERT funding level from the FY2013 NSF budget request.

[44] NSF previously proposed consolidating its minority-serving institution programs. Congressional authorizers and appropriators both rejected that proposal.

[45] National Science Foundation, *FY2013 Budget Request to Congress*, February 13, 2012, p. EHR-1, http://www.nsf.gov/about/budget/fy2013/index.jsp.

[46] Other federal agencies with HSI programs include the National Aeronautics and Space Administration (NASA) and ED. NASA seeks $30.0 million in FY2013 (same as FY2012) for its Minority University Research and Education Program (MUREP), which includes funding for HSIs. The FY2013 ED budget request for HSIs is $220.9 million. (No change from FY2012.) Of this amount, $100.0 million in mandatory funds would support 111 non-competing continuation awards under the HSI STEM and Articulation program.

included $5.0 million each for the science park and manufacturing loan guarantee programs and encouraged EDA to support RIP activities through the Economic Adjustment Assistance account.[47]

FY2013 Congressional Action

Funding for COMPETES 2010 programs and agencies is typically included in three appropriations acts:[48]

- *Commerce, Justice, Science, and Related Agencies* (CJS), for NSF, NIST, and other Department of Commerce programs;[49]
- *Energy and Water Development* (Energy-Water), for DOE programs; and[50]
- *Labor, Health and Human Services, Education, and Related Agencies* (Labor-HHS-Education), for ED programs.[51]

As appropriations measures often include a variety of provisions and programs, this section focuses on funding provisions that relate most closely to policies, programs, agencies, and activities specifically authorized by COMPETES 2010. **Table A-1** summarizes the FY2013 funding status of these selected provisions, including House-passed, Senate Committee on Appropriations recommended, and final (post-rescission, post-sequestration) FY2013 appropriations to these accounts.

Continuing Resolutions, Regular Appropriations, and Sequestration

Congressional appropriations for COMPETES 2010-related agencies in FY2013 were provided in two sequential acts. On September 28, 2013, the President signed P.L. 112-175 (Continuing Appropriations Resolution, 2013). Among other things, this law provided continuing appropriations to federal agencies at FY2012 levels with an across-the-board increase of 0.612% through March 27, 2013. On March 26, 2013, the President signed P.L. 113-6 (FY2013 Consolidated and Further Continuing Appropriations Act, H.R. 933), which provided regular appropriations for some federal agencies and continuing appropriations for others. P.L. 113-6 also included certain rescissions that applied to COMPETES 2010 accounts. In lieu of a conference report on H.R. 933, the Chairwoman of the Senate Committee on Appropriations published an explanatory statement in the March 11, 2013, *Congressional Record*. Among other things, the

[47] H.Rept. 112-184, p. 216, and P.L. 112-55 (125 Stat. 592).

[48] For more information on the appropriations process, see CRS Report R42388, *The Congressional Appropriations Process: An Introduction*, by (name redacted).

[49] CRS Report R41721, *Commerce, Justice, Science, and Related Agencies: FY2012 Appropriations*, coordinated by (name redacted), (name redacted), and (name redacted)

[50] CRS Report R41908, *Energy and Water Development: FY2012 Appropriations*, coordinated by (name redacted).

[51] CRS Report R42010, *Labor, Health and Human Services, and Education: FY2012 Appropriations*, coordinated by (name redacted).

explanatory statement sought to resolve conflicts between certain House and Senate FY2013 appropriations committee report recommendations.[52]

Of the COMPETES 2010-related agencies, those that received funding through CJS provisions (Division B) were provided with regular appropriations while those that received funding through Energy-Water and Labor-HHS-Education (both in Division F) were provided with continuing appropriations. This distinction is important for congressional policymakers who may assess the status of proposed changes to agency activities included in the President's FY2013 budget request. Agencies that received regular appropriations would typically be allowed to make Administration-requested changes within the constraints of existing federal law and direction from congressional appropriators. On the other hand, agencies that received continuing appropriations would not typically have the authority to make requested changes.

The topic of across-the-board federal budget cuts (known as "sequestration") required under the Budget Control Act of 2011 (P.L. 112-25) dominated much of the FY2013 congressional budget and appropriations debate.[53] COMPETES 2010-related accounts were generally subject to sequestration. Where possible, the following sections include FY2013 funding levels that include the effects of sequestration, as well as any applicable rescissions in P.L. 113-6.

Commerce, Justice, Science, and Related Agencies

The House passed H.R. 5326 (Commerce, Justice, Science, and Related Agencies Appropriations Act, 2013) by a vote of 247-163 on May 10, 2012. The act would have provided FY2013 appropriations for the Department of Commerce (including NIST), NSF, and other CJS agencies. H.R. 5326 was accompanied by H.Rept. 112-463 when it was reported from the House Committee on Appropriations. The Senate Committee on Appropriations reported a bill to provide FY2013 CJS appropriations on April 19, 2012 (S. 2323). The full Senate did not consider that measure. S.Rept. 112-158 accompanied S. 2323 when it was reported from committee.

This section compares FY2013 post-rescission, post-sequestration CJS funding levels (where available) for selected COMPETES 2010 accounts with

- enacted, current, or actual FY2012 funding levels (as noted), and
- FY2013 COMPETES 2010 authorized funding levels.

This section also compares FY2013 House-passed funding levels for selected COMPETES 2010 accounts with Senate Committee on Appropriations recommendations and Administration budget requests. (See **Table A-1** for details.) Selected COMPETES 2010-related policy provisions from H.Rept. 112-463, S.Rept. 112-158, and the March 11, 2013, explanatory statement are also noted herein.

[52] Hereafter referred to as the "explanatory statement." See March 11, 2013, *Congressional Record*, starting on page S1287.

[53] The Budget Control Act of 2011 (P.L. 112-25) included provisions to automatically reduce, or "sequester," federal budgets. This largely across-the-board reduction occurred on January 2, 2013. For more information about sequestration, see CRS Report R42050, *Budget "Sequestration" and Selected Program Exemptions and Special Rules*, coordinated by (name redacted).

Department of Commerce

The following sections describe the FY2013 funding status for COMPETES-related provisions at the DOC. These include "top line," or full agency funding, for NIST programs and accounts, as well as provisions for various economic development programs.

NIST

Top line Allocations. FY2013 post-rescission, post-sequestration funding for NIST was $769.4 million. This amount was $18.6 million (2.5%) more than the FY2012 enacted funding level of $750.8 million and was $270.3 million (26.0%) less than the COMPETES 2010 authorized funding level of $1.040 billion. H.R. 5326, as passed by the House, would have provided a total of $830.6 million to NIST in FY2013. This amount was $4.6 million (0.6%) more than the Senate Committee on Appropriations recommendation of $826.0 million and $26.4 million (3.1%) less than the Administration's request for $857.0 million.

STRS (core laboratories). FY2013 post-rescission, post-sequestration funding for STRS was $579.8 million. This amount was $12.8 million (2.3%) more than the FY2012 enacted funding level of $567.0 million and was $96.9 million (14.3%) less than the COMPETES 2010 authorized funding level of $676.7 million. H.R. 5326, as passed by the House, would have provided $621.2 million to STRS in FY2013. This amount was $1.8 million (0.3%) less than the Senate Committee on Appropriations recommendation of $623.0 million and $26.8 million (4.1%) less than the Administration's request for $648.0 million. The March 11, 2013, explanatory statement included language allowing NIST to locally transport Summer Undergraduate Research Fellowship (SURF) participants.

CRF (construction). FY2013 post-rescission, post-sequestration funding for CRF was $56.0 million. This amount was $4.6 million (8.3%) more than the FY2012 enacted funding level of $55.4 million and was $61.3 million (50.5%) less than the COMPETES 2010 authorized funding level of $121.3 million. H.R. 5326 (as passed by the House), S. 2323 (as recommended by the Senate Committee on Appropriations), and the March 11, 2013, explanatory statement would have provided $60.0 million to CRF in FY2013. This amount was equal to the Administration's request.

MEP. FY2013 post-rescission, post-sequestration funding for the MEP program was $119.4 million. This amount was $9.0 million (7.0%) less than the FY2012 enacted funding level of $128.4 million and $45.7 million (27.7%) less than the authorized funding level of $165.1 billion. H.R. 5326 would have provided $128.4 million to the MEP in FY2013. This amount was about the same as the Senate Committee on Appropriations recommendation of $128.5 million and $400,000 more than the Administration's request for $128.0 million.

Economic Development Administration

Regional Innovation Program (RIP) and Innovative Technologies in Manufacturing. COMPETES 2010 authorized two regional economic development programs at the EDA: RIP, which included funding for loan guarantees for science parks, and the Federal Loan Guarantees for Innovative Technologies in Manufacturing program. P.L. 113-6 provided $5.0 million each (pre-rescission, pre-sequestration) for the loan guarantee programs. These amounts were equal to FY2012 enacted funding levels and were, respectively, $15.0 million and $2.0 million less than

COMPETES 2010 authorized funding levels of $20.0 million for manufacturing loan guarantees and $7.0 million for science park loan guarantees. The DOC's FY2014 budget request states that the department anticipates initial execution of loan guarantees (from both programs) in FY2015.

H.R. 5326 would have authorized unspecified funding for the RIP and would have provided up to $5.0 million for the manufacturing loan guarantee program in FY2013. S. 2323 and S.Rept. 112-158 would have provided $25.0 million for RIP, and up to $7.0 million for loan guarantees for science parks, but did not specify funding for the manufacturing loan guarantee program. Senate provisions were consistent with the President's FY2013 request.[54] Provisions in the House committee report directed EDA to provide details of its efforts to implement the manufacturing loan guarantee program with its FY2014 budget request. Provisions in the Senate committee report directed EDA to continue providing grants and technical assistance to entities supporting clean energy technology commercialization; to consider new competitions in industries not previously targeted; and to consider geographic equity when making award decisions.

National Science Foundation

Top Line Allocations. FY2013 post-rescission, post-sequestration funding for NSF was $6.884 billion. This amount was $220.6 million (3.1%) less than the FY2012 actual funding level of $7.105 billion and $1.416 billion (17.1%) less than the COMPETES 2010 authorized funding level of $8.300 billion.

FY2013 funding levels in H.R. 5326 and S. 2323 were identical for five of NSF's six major accounts. A $59.4 million difference in funding for the main research account (Research and Related Activities, or R&RA) led to an equivalent difference between the two top lines, which were $7.333 billion (House) and $7.273 billion (Senate Committee on Appropriations). Other than this difference, the House and the Senate Committee on Appropriations agreed on major funding levels for the NSF in FY2013. At the top line, both the full House and Senate committee-proposed funding levels for NSF were between $40.6 and $100.0 million less than the President's request for $7.373 billion. The Senate report directed NSF to report on its progress implementing and responding to various Office of the Inspector General reports and recommendations. An amendment (H.Amdt. 1088) adopted during House floor debate on H.R. 5326 would have eliminated funding for NSF's Climate Change Education program. A second 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.

Research Funding. FY2013 post-rescission, post-sequestration funding for 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.

H.R. 5326 would have provided $5.943 billion for R&RA in FY2013. This amount was $59.4 million (1.0%) more than the Senate Committee on Appropriations recommendation of $5.883 million and $40.6 million (0.7%) less than the President's FY2013 request for $5.983 billion.

[54] The FY2013 request and S.Rept. 112-158 referred to the Regional Innovation Program authorized under COMPETES 2010 as the "Regional Innovation Strategies Program."

Research provisions in the House committee report directed NSF to give priority to research in the following fields: cybersecurity; advanced manufacturing; materials research; and research in the natural and physical sciences, mathematics, and engineering. Other provisions from the House committee report directed I-Corps participants to commit to the domestic production of goods or services commercialized with NSF assistance, encouraged the foundation to establish neuroscience as a cross-cutting budget theme, required NSF to report on plans to recompete certain major facilities awards, and required NSF to report on interdisciplinary activities at NSF-funded research facilities.

Research provisions in the Senate committee report directed NSF to reduce funding for new OneNSF activities and to focus on core programs and infrastructure. Other research provisions in the Senate committee report provided the full request—$244.6 million ($161.9 of which was reserved for infrastructure)—for astronomical sciences; provided funding for the Large Synoptic Survey Telescope; and encouraged NSF to allocate adequate funding for domestic radio astronomy facilities while the Atacama Large Millimeter Array transitions to full operation.[55] The Senate committee report also provided funding for cybersecurity security research ($161.0 million) and the Academic Research Fleet ($927.8 million), and supported full funding for scientific facilities and instrumentation. EPSCoR, which was reauthorized by COMPETES 2010, would have received $158.0 million under the Senate committee proposal. (This amount is slightly less than the FY2013 request for $158.2 million and $7.1 million more than the FY2012 actual funding level 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 that prevent implementation, then the foundation was to report those concerns to the appropriations committees immediately. 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 provided $247.6 million (pre-rescission, pre-sequestration) for astronomical sciences, including $164.9 million for infrastructure, and provided $158.2 million (pre-sequester, pre-rescission) for EPSCoR.

STEM Education. FY2013 post-rescission, post-sequestration funding for NSF's main education account, Education and Human Resources (E&HR), was $833.3 million. This amount was $2.8 million (0.3%) more than the FY2012 actual funding level of $830.5 million and was $208.5 million (20.0%) less than the COMPETES 2010 authorized funding level of $1.041 billion.

The full House and the Senate Committee on Appropriations agreed on E&HR funding levels in FY2013. Both legislative bodies proposed $875.6 million for E&HR in FY2013. This amount was equal to the President's budget request.

[55] In August 2012, the Portfolio Review Committee of the National Science Foundation Division of Astronomical Sciences released a report with recommendations for ground-based astronomy in the United States. See National Science Foundation, Division of Astronomical Sciences, Portfolio Review Committee, *Advancing Astronomy in the Coming Decade: Opportunities and Challenges*, August 14, 2012, http://www.nsf.gov/mps/ast/portfolioreview/reports/ast_portfolio_review_report.pdf.

STEM education provisions in the House committee report incorporated NSF's proposed program reductions; directed the foundation to continue work on a tracking and evaluation system to assess implementation of the National Research Council (NRC) report on best practices in STEM education; and accepted proposed changes to the Informal Science Education (ISE) program, but encouraged NSF to work with stakeholders as it transitions ISE toward activities intended to increase focus on innovative learning and engagement strategies. The House committee report also encouraged NSF to use existing resources to promote collaboration between research institutions and STEM-focused K-12 schools.

The Senate committee report encouraged NSF to continue support for undergraduate science and engineering education; rejected the Administration's proposed cuts to the ISE program; urged NSF to ensure that GRF applications are reviewed on their merit, and not rejected for reasons other than the quality of the proposal;[56] and directed NSF to fund the Research in Disabilities Education and Research on Gender in Science and Engineering programs at FY2012 levels (and to maintain these two programs as separate programs). S.Rept. 112-158 also provided: the full requests for the Advanced Technological Education ($64.0 million) and Noyce ($54.9 million) programs, as well as $45.0 million ($20.0 million more than the request) for the Federal Cyber Service: Scholarships for Service program.

Provisions in the March 11, 2013, explanatory statement incorporated most of NSF's proposed reductions, with the exception of the reductions in the ISE (now renamed Advancing Informal Science Learning or AISL). The explanatory statement directed NSF to fund AISL as described in the Senate report; provided $69.0 million for ATE; adopted by reference House report language on tracking implementation of the recommendations contained in the NRC report on best practices in STEM education; and adopted by reference Senate report language on the Federal Cyber Service: Scholarships for Service program.

Broadening Participation. NSF had not published, as of the date of this report, post-rescission, post-sequestration FY2013 funding levels for all its various broadening participation programs. Total FY2012 actual funding for programs that NSF identifies as broadening participation programs was $761.1 million.

Although FY2013 funding information for all NSF broadening participation programs was not yet available as of the date of this report, the NSF supplied CRS with current plan funding levels for some COMPETES 2010-related broadening participation programs. In particular, FY2013 current plan funding for the Historically Black Colleges and Universities Undergraduate Program (HBCU-UP) was $30.3 million, compared to $31.9 million in FY2012 actual. The Tribal Colleges and Universities Program (TCUP) received $12.3 million, compared to $13.4 million in FY2012 actual. The Louis Stokes Alliances for Minority Participation (Stokes) program received $42.1 million, compared to $45.5 million in FY2012 actual; and the Centers for Research Excellence in Science and Technology (CREST) program received $23.0 million, compared to $24.2 million in FY2012 actual.[57]

[56] NSF had previously announced that it would reject research proposals—even basic research proposals—without review if the proposal was submitted by students in clinical or counseling psychology graduate programs. The foundation has since changed this decision. See Siri Carpenter, "NSF Gives Clinical Students a Shot at Winning Graduate Fellowships," *Science*, vol. 336, no. 6084 (May 25, 2012), http://www.sciencemag.org/content/336/6084/972.short.

[57] CRS e-mail communication with NSF staff, dated August 30, 2013.

The House committee report provided the FY2013 request for HBCU-UP ($31.9 million), Stokes ($45.6 million), and T-CUP ($13.3 million). The Senate committee report provided $33.0 million for HBCU-UP, $47.8 million for Stokes, and $13.4 million for TCUP. Additionally, the Senate committee report provided $25.0 million for the Centers for Research Excellence in Science and Technology (CREST) program. The March 11, 2013, explanatory statement incorporated Senate report funding levels for these programs.

Provisions in the House committee report also directed NSF to report on how the needs of Hispanic Serving Institutions (HSIs) would be addressed in FY2013 and on any plans to establish an HSI-focused program in FY2014. Provisions in the Senate committee report encouraged NSF to prioritize proposals that have "demonstrated maturity, including previous partnerships with other federal agencies."[58]

Energy and Water Development

The House passed H.R. 5325 (Energy and Water Development Appropriations Bill, 2013) by a vote of 255-165 on June 6, 2012. Among other things, the act provided FY2013 appropriations for the Department of Energy's Office of Science and the Advanced Research Projects Agency–Energy (ARPA-E). COMPETES 2010 provided authorizations for both the Office of Science and ARPA-E. The Senate Committee on Appropriations reported an FY2013 Energy and Water Development appropriations bill on April 26, 2012 (S.Rept. 112-164, S. 2465). The full Senate did not consider that measure.

As previously noted, P.L. 112-175 provided continuing appropriations to Energy-Water agencies through March 26, 2013. P.L. 113-6 provided continuing appropriations to Energy-Water agencies from March 27, 2013, through the end of the fiscal year. This section compares FY2013 post-rescission, post-sequestration Energy-Water funding levels (where available) for selected COMPETES 2010 accounts with

- enacted, current, or actual FY2012 funding levels (as noted), and
- FY2013 COMPETES 2010 authorized funding levels.

This section also compares House-passed FY2013 funding levels for selected COMPETES 2010 accounts with Senate Committee on Appropriations FY2013 recommendations and FY2013 Administration budget requests. (See **Table A-1** for details.) Selected COMPETES 2010-related policy provisions in H.Rept. 112-463 and S.Rept. 112-158 are also noted herein.

Department of Energy

Office of Science. FY2013 post-rescission, post-sequestration funding for the Office of Science was $4.621 billion. This amount was $313.9 million (6.4%) less than FY2012 current funding level of $4.935 billion[59] and $1.380 billion (23.0%) less than the COMPETES 2010 authorized funding level of $6.001 billion.

[58] S.Rept. 112-158, p. 110-111.

[59] This amount includes the original appropriation after the allocation of a general reduction for a contractor pay freeze; as well as the reallocation and transfer of Small Business Innovation Research(SBIR)/Small Business Technology Transfer(STTR) funding.

H.R. 5325 would have provided $4.801 billion for the Office of Science in FY2013. This amount was $107.6 million (2.2%) less than the Senate Committee on Appropriations' recommendation of $4.909 billion and $190.6 million (3.8%) less than the President's FY2013 request for $4.992 billion.

Office of Science provisions in the House committee report included the expectation that the office would continue to support minority serving institutions. Office of Science provisions in the Senate committee report expressed continued support for research priorities in new materials, biofuels, and computing. However, the Senate committee report also expressed concerns about how the office manages lower priority research activities. In particular, the Senate committee report noted that the office has not provided sufficient strategic guidance on how lower priority research areas may or should adjust their scope of work in response to decreasing budgets. Both House and Senate committee reports also contained specific provisions for Office of Science research programs.

STEM Education. Although not the only source of funding for STEM education at the Department of Energy, the Office of Science's Workforce Development for Teachers and Scientists (WDTS) account provides funding for internships, fellowships, and the National Science Bowl (among other activities). FY2013 post-rescission, post-sequestration funding for WDTS was $17.5 million. This amount was $1.0 million (5.5%) less than the FY2012 current funding level of $18.5 million.

The House committee report would have provided $14.5 million for the WDTS account in FY2013.[60] This amount was the same as both the Senate committee recommendation and the FY2013 request. H.Rept. 112-462 provided no funds for the Office of Science Graduate Fellowship (SCGF). This was consistent with the Office of Science FY2013 budget request. The Senate committee report commended the Office of Science for its efforts to evaluate its science workforce development programs.

The House committee report included educational activities on its list of "major committee concerns" about DOE (in general, not just in the Office of Science account). Other major committee concerns with a potential COMPETES Act nexus included competitiveness and intellectual property. (See section titled "Other DOE-wide Issues and Competitiveness.") H.Rept. 112-462 prohibited DOE from funding fellowship and scholarship programs in FY2013 unless (1) those programs were specifically requested in FY2013 DOE budget justification and (2) the program was not otherwise excluded from receiving funding. The House committee report also directed DOE to provide the committee with a comprehensive listing of all FY2012 funded educational activities.

ARPA-E. FY2013 post-rescission, post-sequestration funding for ARPA-E was $250.6 million. This amount was $24.4 million (8.9%) less than FY2012 current funding level of $275.0 million and was $61.4 million (19.7%) less than the COMPETES 2010 authorized funding level of $312.0 million.

H.R. 5325 would have provided $200.0 million for ARPA-E in FY2013. This amount was $112.0 million (35.9%) less than the Senate Committee on Appropriations' recommendation of $312.0

[60] Although DOE may provide STEM education funding through various research accounts, WDTS is the main education and training line item in the Office of Science budget.

million and $150.0 million (42.9%) less than the President's FY2013 request for $350.0 million. COMPETES 2010 authorized $312.0 million for ARPA-E in FY2013. ARPA-E provisions in the House committee report expressed support for the program's increased focus on transportation technologies. An amendment added during House floor debate would have prohibited ARPA-E awardees from using federal funds to raise private capital or advertise.[61] ARPA-E provisions in S.Rept. 112-164 encouraged DOE "to continue tracking projects to demonstrate how federal investments have developed more energy efficient technologies and potentially new industries."

Other DOE-wide Issues and Competitiveness. H.Rept. 112-462 expressed a number of general concerns about the DOE, including concerns that the agency has failed to produce committee-requested reports on certain Office of Science activities (e.g., Energy Innovation Hubs, exascale computing, future year funding levels for Office of Science accounts) in a timely manner. The House committee report also encouraged DOE to consider aspects of the ARPA-E project and program management model for application elsewhere in the department and raised general competitiveness concerns about the possibility that foreign manufacturers may be capitalizing on ideas developed in DOE labs. In response to competitiveness concerns, H.Rept. 112-462 directed DOE to report on existing authorities to control intellectual property and help retain domestic manufacturing and to make recommendations for improving domestic intellectual property transfer and retention.[62]

S.Rept. 112-164 also expressed a number of general concerns about DOE. For example, the Senate committee report raised concerns about contractor support at the Office of Science (and elsewhere in the department), noting that the cost of contractor support functions at the office increased by 10% between FY2007 and FY2009. The Senate committee report also directed DOE to maintain existing small business contracting practices at the national laboratories—which the committee report stated the department had considered changing—and directed DOE to consult with Congress, including the Committee on Small Business and Entrepreneurship, before making any changes.

Labor, Health and Human Services, Education, and Related Agencies

Department of Education

Neither chamber considered a regular Labor-HHS-Education appropriations measure in FY2013. However, the Senate Committee on Appropriations reported S. 3295 (Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, 2013) on June 14, 2012. (See S.Rept. 112-176.) The Senate committee report did not specify funding amounts for COMPETES acts-related Department of Education (ED) programs.

As previously noted, P.L. 112-175 provided continuing appropriations to Labor-HHS-Education agencies through March 26, 2013. P.L. 113-6 provided continuing appropriations to Labor-HHS-

[61] H.R. 5325, §524, as passed by the House. Video of the floor debate about this amendment, which was adopted by voice vote, is available at http://www.youtube.com/watch?v=kXLVDNKcn08.

[62] For more information on intellectual property rights, go to the CRS "Issues in Focus/Intellectual Property Rights" webpage at http://www.crs.gov/pages/SubIssue.aspx?CLIID=2688&parentID=14.

Education agencies from March 27, 2013, through the end of the fiscal year. Neither act made specific provisions for COMPETES 2010 authorizations at ED.

The Doubling Path

Under COMPETES 2010, targeted account funding was set to increase at a compound annual growth rate of 6.3%, close to the 6.4% growth rate in actual appropriations for the targeted accounts during the COMPETES 2007 authorization period (FY2008 to FY2010). At the 6.3% COMPETES 2010 authorized rate, it would have taken approximately 11 years to double funding for the targeted accounts.

However, growth in actual appropriations to the targeted accounts during the COMPETES 2010 authorization period—FY2011 to FY2013—slowed in comparison to growth in actual appropriations during the COMPETES 2007 authorization period. As a result, FY2013 post-rescission, post-sequestration appropriations for the targeted accounts represent a growth rate of about 3.0% since the FY2006 baseline. Further, FY2013 funding levels for the targeted accounts—separately and combined—were generally below FY2010 levels. Only the NIST core laboratory account was higher in FY2013 than in FY2010.

Policy Context and Observations

The COMPETES acts were designed to improve the competitive position of the United States by fostering scientific and technological innovation. The primary policy devices that the acts employed—to this end—were increases in authorized funding for physical sciences and engineering research (e.g., the doubling path policy) and STEM education program authorizations. The specific debate about FY2013 funding for COMPETES 2010 provisions occurred within the broader conversation about these policy choices. This section briefly summarizes this policy context.[63]

Few analysts dispute the contention that the path to global competitiveness in the 21st century runs through the twin pillars of scientific and technological advancement. The policy question, then, is what should the federal government do (if anything) to encourage scientific and technological innovation and (thereby) national competitiveness?

A broad coalition of business, academic, and government leaders has concluded that at least part of the answer to this question is that the federal government should encourage innovation by increasing support for physical sciences and engineering research and by increasing the number of U.S. students graduating with STEM degrees and skills. Supporters of this general consensus assert that a combination of external pressures and internal weaknesses threatens the United States' innovation advantage. For example, supporters note that changes in the industrial bases and educational attainment rates of rapidly developing countries like China and India mean that these countries are able to compete for a growing percentage of the world's high-value jobs and industry. Further, these advocates assert that signs of potential weakness in areas that have long been U.S. strengths—such as the U.S. STEM workforce and leading-edge research—appear to

[63] For more in-depth analysis of the COMPETES acts, see CRS Report R41819, *Reauthorization of the America COMPETES Act: Selected Policy Provisions, Funding, and Implementation Issues*, by (name redacted).

accompany these global changes. In particular, COMPETES acts proponents raise concerns about funding for research in the physical sciences and engineering and the U.S. supply of scientists, engineers, and technicians.[64]

Although support for the innovation policy approach embodied in the COMPETES acts is widespread, it is not uniform. Opposition has tended to fall into three broad categories: (1) questions about fundamental assumptions, (2) preferences for alternative policies or approaches, and (3) cost. For example, some analysts dispute fundamental assumptions behind policies designed to increase the supply of STEM workers, arguing that there is no evidence of broad shortages of STEM workers and that the bigger challenge is on the demand side.[65] Another fundamental assumption that some analysts have called into question is whether increased investment in publically funded research will increase U.S. competiveness given that such research is typically publically available.[66] Other analysts prefer other policy tools—such as regulatory changes and tax policy—arguing that direct federal investment in research in the physical sciences and engineering and in STEM education can distort markets.[67] Opponents have also raised concerns about cost, arguing that authorized funding increases are too expensive in light of the federal fiscal condition, deficit, and debt.[68]

Observations

FY2013 was the third and final year for most of COMPETES 2010's major funding authorizations. Although the full House, Senate Committee on Appropriations, and the President all initially sought increases over FY2012 levels for many (not all) key COMPETES 2010 accounts in FY2013; the combined effects of sequestration, as well as rescissions and funding levels in the final FY2013 appropriations act (P.L. 113-6) decreased funding levels for many (not all) of these accounts below FY2010 actual levels. Further, although there has always been a gap between COMPETES act authorizations (total, defined) and appropriations (total, defined), that gap widened in FY2013 and was larger than in all previous authorized years. It remains to be seen whether and how the FY2013 funding status of COMPETES accounts will factor in future congressional conversations about reauthorization of COMPETES 2010 and future appropriations for these accounts.

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[64] This case is laid out more fully in National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, Committee on Prospering in the Global Economy of the 21st Century: An Agenda for America Science and Technology, and Committee on Science, Engineering, and Public Policy, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, National Academies Press, 2007, http://www.nap.edu/catalog/11463.html.

[65] Testimony of Alfred F. Sloan Foundation Vice President Michael S. Teitelbaum, in U.S. Congress, House Committee on Science and Technology, Subcommittee on Technology and Innovation, *The Globalization of R&D and Innovation, Part 4*, hearings, 110th Cong., 1st sess., November 7, 2007, http://archives.democrats.science.house.gov/Media/File/Commdocs/hearings/2007/tech/06nov/Teitelbaum_testimony.pdf.

[66] For more information about these arguments, see CRS Report R41951, *An Analysis of Efforts to Double Federal Funding for Physical Sciences and Engineering Research*, by (name redacted)

[67] Testimony of Competitive Enterprise Institute Vice President for Policy/Director of Technology Studies Wayne Crews, House Committee on Science and Technology, *The Future of Manufacturing: What Is the Role of the Federal Government in Supporting Innovation by U.S. Manufacturers?*, hearings, 111th Cong., 2nd sess., March 17, 2010, http://gop.science.house.gov/Media/hearings/full10/mar17/Crews.pdf.

[68] For example, see House debate, "Conference Report on H.R. 2272, America COMPETES Act," *Congressional Record,* daily edition, vol. 153 (August 2, 2007), pp. H9592-H9604.

Appendix.

Table A-1. America COMPETES Reauthorization Act of 2010 (P.L. 111-358): Selected Programs and FY2013 Funding

(in millions of dollars)

Programs	FY2012 Funding[a]	FY2013 Authorization (P.L. 111-358)	FY2013 Request	House Passed	Senate Committee Reported	FY2013 Final[b]
Department of Education						
Teachers for a Competitive Tomorrow – Baccalaureate (§1003)	n/d[c]	$2.0	n/d	n/a	n/d	n/d
Teachers for a Competitive Tomorrow – Master's (§1003)	n/d	$2.0	n/d	n/a	n/d	n/d
Advanced Placement and International Baccalaureate Programs (§1003)	n/a[d]	$75.0	n/a[e]	n/a	n/d[f]	n/a[g]
Alignment of Education Programs (§1003)[h]	n/d	$120.0	n/d	n/a	n/d	n/d
Department of Energy						
Summer Institutes (§901)	n/d[i]	$25.0	$0.0	n/d	n/d	n/d
Nuclear Science Program Expansion Grants for Institutions of Higher Education (§902)	n/d	$10.4	n/d	n/d	n/d	n/d
Nuclear Science Competitiveness Grants for Institutions of Higher Education (§902)	n/d	$8.8	n/d	n/d	n/d	n/d
Hydrocarbon Systems Science Talent Program Expansion Grants (§902)	n/d	$10.1	n/d	n/d	n/d	n/d
Early Career Awards (§902)[j]	n/d	$25.0	n/d	n/d	n/d	n/d

Programs	FY2012 Funding[a]	FY2013 Authorization (P.L. 111-358)	FY2013 Request	House Passed	Senate Committee Reported	FY2013 Final[b]
Protecting America's Competitive Edge (PACE) Graduate Fellowship Program (§902)[k]	n/d[l]	$21.9	n/d[m]	n/d[n]	n/d	n/d
Distinguished Scientist Program (§902)	n/d[o]	$33.0	n/d	n/d	n/d	n/d
Basic Research (Office of Science, §903)	$4,935.0[p]	$6,000.7	$4,992.1	$4,801.4	$4,909.0	$4,621.1
Advanced Research Projects Agency—Energy (§904)	$275.0	$312.0	$350.0	$200.0	$312.0	$250.6
Department of Commerce						
Federal Loan Guarantees for Innovative Technologies in Manufacturing (New, §602)	$5.0[q]	$20.0	n/d	$5.0	n/d	$5.0[r]
Regional Innovation Program (New, §603)	n/d	$100.0	$25.0[s]	n/d[t]	$25.0[u]	n/d
Loan Guarantees for Science Park Infrastructure (New, §603)	$5.0[q]	$7.0	$7.0[s]	n/d[t]	$7.0[u]	$5.0[r]
National Institute of Standards and Technology						
Total	$750.8	$1,039.7	$857.0	$830.6	$826.0	$769.4
Scientific & Technical Research & Services	$567.0	$676.7	$648.0	$621.2	$623.0	$579.8
Construction of Research Facilities	$55.4	$121.3	$60.0	$60.0	$60.0	$56.0
Industrial Technology Services	$128.4	$241.7	$149.0	$149.0	$143.0	$133.6
Manufacturing Extension Partnership	*$128.4*	*$165.1*	*$128.0*	*$128.4*	*$128.5*	*$119.4*
Baldrige Performance Excellence Program	*$0.0*	*$10.6*	*$0.0*	*n/d*	*n/d*	*n/d*
NIST Green Jobs Act of 2010 (New, §703)	n/d	$7.0	n/d	n/d	n/d	n/d

Programs	FY2012 Funding[a]	FY2013 Authorization (P.L. 111-358)	FY2013 Request	House Passed	Senate Committee Reported	FY2013 Final[b]
National Science Foundation						
Total	$7,104.7	$8,300.0	$7,373.1	$7,332.5	$7,273.1	$6,884.1
Research & Related Activities	$5,758.3	$6,637.9	$5,983.3	$5,942.7	$5,883.3	$5,543.7
Education & Human Resources	$830.5	$1,041.8	$875.6	$875.6	$875.6	$833.3
Major Research Equipment and Facilities Construction	$198.1	$236.8	$196.2	$196.2	$196.2	$196.2
Agency Operations & Award Management	$299.3	$363.7	$299.4	$299.4	$299.4	$293.6
National 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
STEM-Training Grant Program (New, §556)	n/d	$10.0	n/d	n/d	n/d	n/d

Sources: U.S. Department of Commerce, *The Department of Commerce Budget in Brief Fiscal Year 2014*, no date, http://www.osec.doc.gov/bmi/budget/FY14CJ/EDA_FY_2014_CJ_Final_508_Compliant.pdf; U.S. Department of Education, *FY 2014 Department of Education Justifications of Appropriation Estimates to the Congress*, April 10, 2013, http://www2.ed.gov/about/overview/budget/budget14/justifications/index.html; U.S. Department of Energy, *Department of Energy FY2014 Congressional Budget Request: Science, Advanced Research Projects Agency-Energy (ARPA-E)*, volume 4, April 2013, http://energy.gov/cfo/downloads/fy-2014-budget-justification; Department of Commerce, National Institute of Standards and Technology, *Appropriations Summary: FY2012-FY2014*, April 26, 2013, http://www.nist.gov/public_affairs/releases/approps-summary2014.cfm; National Science Foundation, *National Science Foundation FY2014 Budget Request to Congress*, April 10, 2013, http://www.nsf.gov/about/budget/fy2014/toc.jsp; America COMPETES Reauthorization Act of 2010 (P.L. 111-358); U.S. Department of Commerce, *The Department of Commerce Budget in Brief Fiscal Year 2013*, no date, http://www.osec.doc.gov/bmi/budget/FY13BIB/fy2013bib_final.pdf; U.S. Department of Education, *FY 2013 Department of Education Justifications of Appropriation Estimates to the Congress*, February 13, 2012, http://www2.ed.gov/about/overview/budget/budget13/justifications/index.html; U.S. Department of Energy, *FY2013 DOE Budget Request to Congress: Detailed Budget Justifications*, no date, http://www.cfo.doe.gov/budget/13budget/index13.html; Department of Commerce, National Institute of Standards and Technology, National Technical Information Service, *Fiscal Year 2013 OMB Budget Submission*, no date, http://www.osec.doc.gov/bmi/budget/fy13cbj/NIST-NTIS_FY2013_cbj_FINAL.pdf; National Science Foundation, *National Science Foundation FY2013 Budget Request to Congress: Overview*, February 13, 2012, http://www.nsf.gov/about/budget/fy2013/index.jsp; H.R. 5326 and H.Rept. 112-463; S. 2323 and S.Rept. 112-158; H.R. 5325 and H.Rept. 112-462; S. 2465 and S.Rept. 112-164; U.S. Department of Energy, Office of Science, *FY2012-2014 Appropriation Summary*, August 19, 2013, http://science.energy.gov/~/media/budget/pdf/sc-congressional-appropriations/fy-2014/FY-2012_FY_2014_Request_Science_Stat_Table.pdf; and National Science Foundation, *NSF Congressional Highlight: Congress Completes Action on FY 2013 Appropriations*, April 9, 2013, http://www.nsf.gov/about/congress/113/highlights/cu13_0409.jsp.

Notes: n/d = not defined; CRS was unable to identify a specific, defined appropriation or budget request for the authorization. Totals may not add due to rounding.

a. FY2012 funding levels obtained from agency FY2014 agency budget documents. As reported in those documents, FY2012 DOE funding levels are current, FY2012 NIST levels are enacted, and FY2012 NSF levels are actual.

b. Except as otherwise noted, "FY2013 Final" funding levels reflect the effects of applicable rescissions, sequestration, and certain other account changes.

c. Congress has not provided funding for this program since FY2010.

d. ED typically relies on ESEA for authority to operate its AP programs, not the COMPETES acts. As explained previously, it is unclear if ED's AP programs also comply with the COMPETES acts. FY2012 funding for AP programs, as reported in ED's FY2014 budget justification, was $30.1 million.

e. The President's FY2013 request would merge Advanced Placement (AP) programs into the proposed new program, College Pathways and Accelerated Learning (CPAL). The FY2013 request for CPAL was $81.0 million, which included $24.1 million for AP test fees.

f. S. 3295 would have provided funding for AP programs under the authority of ESEA, Title I, Part G; rather than under the authority of the COMPETES acts. The FY2013 funding level for AP programs in S. 3295 was $36.0 million, or $6.0 million (20%) more than the FY2012 enacted level.

g. FY2013 funding for AP programs, as reported in ED's FY2014 budget justification, was $30.1 million.

h. ED does not typically rely on P.L. 111-358 or P.L. 110-69 for general statutory authority to undertake alignment activities. The exception to this rule is for state education data systems, for which ED relies on P.L. 110-69, Section 6401.

i. According to DOE, this program corresponds with the DOE ACTS program. DOE ACTS was eliminated in FY2012.

j. DOE indicates that the Office of Science Early Career Research program corresponds with the Early Career Awards program authorized by the COMPETES acts. The department states that total funding for this program is usually about $16.0 million annually and that funding for the program comes from each of the six Office of Science research program budgets.

k. According to the DOE, the department manages at least two programs that are consistent with PACE provisions: (1) the Computational Science Graduate Fellowship (CSGF) in the Office of Science, Advanced Scientific Computing Research, and (2) the Office of Science Graduate Fellowship (SCGF) program in the Office of Science, Workforce Development for Teachers and Scientists.

l. FY2012 funding for CSGF was $6.0 million, while funding for SCGF (as per the conference report, H.Rept. 112-331) was $5.0 million. According to the Office of Science's FY2014 budget request, prior year money from terminated activities was used to fully fund a cohort of 49 new SCGF fellows for FY2012 to FY2014.

m. The FY2013 request for CSGF was $6.0 million. DOE did not seek funding for SCGF in FY2013.

n. H.Rept. 112-462 did not specify funding for the CSGF and provided $0.0 for the SCGF in FY2013.

o. S.Rept. 112-75 urged DOE to redirect funding from proposed Office of Science, Workforce Development for Teachers and Scientists program terminations to the Distinguished Scientist program in FY2012.

p. This amount reflects a $15.4 million rescission in FY2012 in accordance with the contractor pay freeze, as well as changes associated with Small Business Research Innovation(SBIR)/Small Business Technology Transfer(STTR)program reallocations and transfers.

q. FY2012 enacted appropriations provided $5.0 million each to the science park and innovative technologies in manufacturing loan guarantee programs. DOC's FY2014 budget request indicates that it anticipates initial execution of these programs in FY2015.

r. P.L. 113-6 provided $5.0 million each for DOC's science park and innovative technologies in manufacturing loan guarantee programs. This funding level does not include changes due to sequestration or the rescissions in P.L. 113-6. DOC's FY2014 budget request indicates that it anticipates initial execution of these programs in FY2015.

s. Although COMPETES 2010 authorized a separate $7.0 science park loan guarantee program, the FY2013 DOC budget request included funding for science parks in the total $25.0 million request for the RIP program.

t. H.R. 5326 specified that funding for the EDA account included funding for loan guarantees for manufacturing, but did not provide a defined appropriation for either the RIP (as a whole) or for the science park loan guarantee component (in particular).

u. The Senate Committee on Appropriations recommended $25.0 million for the RIP program in FY2013 (S.Rept. 112-158). S. 2323 provided $7.0 million for science park loan guarantees.

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