



America COMPETES 2010 and the FY2013 Budget

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March 20, 2012

Congressional Research Service

7-5700

www.crs.gov

R42430

Summary

The 112th Congress faces several budget and appropriations decisions that may affect implementation of the America COMPETES Reauthorization Act of 2010 (America COMPETES 2010, P.L. 111-358). Signed on January 4, 2011, this law seeks to improve U.S. competitiveness and innovation by authorizing, among other things, increased federal support for research in the physical sciences and engineering; and science, technology, engineering, and mathematics (STEM) education. P.L. 111-358 reauthorizes the 2007 America COMPETES Act (America COMPETES 2007, P.L. 110-69), which authorized similar federal activities and programs from FY2008 to FY2010.

The specific debate about FY2013 funding for America COMPETES 2010 provisions will occur within the broader context of the national conversation about U.S. competitiveness. Few analysts dispute the contention that the path to competitiveness in the 21st century runs through the twin pillars of scientific and technological advancement. What this means for federal policy is widely debated, though general consensus supports the broad approach—e.g., funding for research in the physical sciences and engineering and STEM education—of the COMPETES acts. Some analysts have raised concerns about the acts’ fundamental assumptions, about policy alternatives, and about cost—particularly in light of the current federal fiscal condition, deficit, and debt.

Overall, the President’s FY2013 budget request seeks increased funding for many America COMPETES 2010 authorized research and research-related activities and includes few specific funding requests for the law’s STEM education programs. For example, the FY2013 request seeks funding levels that largely equal or exceed FY2012 enacted levels for all America COMPETES 2010 research accounts. On the other hand, the request does not include specified funding for most America COMPETES 2010 STEM education programs at the Departments of Education or Energy. This approach is largely consistent with previous legislative and executive actions. One exception to the overall trend is the President’s request for a 5.6% increase in the main education account at the National Science Foundation (NSF).

The President’s FY2013 budget request expresses a continued commitment to the so-called “doubling path policy”—which America COMPETES 2010 reauthorized—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”). However, the FY2013 request seeks an overall increase of 4.1% for the targeted accounts. This growth rate is less than the authorized growth rate of 6.3% and equal to the FY2012 enacted growth rate (4.1%). Some legislators have raised concerns about the feasibility of pursuing the doubling effort given the nation’s current fiscal challenges.

Other America COMPETES 2010 authorized programs with specified funding in the FY2013 budget request include the Regional Innovation Partnership and Loan Guarantees for Science Park Infrastructure programs at the Department of Commerce and the Advanced Research Projects Agency-Energy (ARPA-E) initiative at the Department of Energy. The FY2013 budget request does not appear to specify funding for the Loan Guarantees for Innovative Technologies in Manufacturing program or for activities authorized by the NIST Green Jobs Act of 2010.

Table 1 summarizes the FY2013 appropriations status of selected provisions from the 2010 law.

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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, among other things, increasing funding for research in the physical sciences and engineering; and by authorizing certain federal science, technology, engineering, and mathematics (STEM) education programs. America 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 actions—for the agencies, programs, and activities authorized by America COMPETES 2010.² For a broader policy discussion 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 Heather B. Gonzalez. For information about prior year funding for America COMPETES 2007 and 2010, see CRS Report R41906, *America COMPETES 2010: FY2012 Funding and FY2008-FY2011 Funding Summary*, by Heather B. Gonzalez.

The America COMPETES Reauthorization Act of 2010

America COMPETES 2010—like America COMPETES 2007—is designed to “invest in innovation through research and development, to improve the competitiveness of the United States, and for other purposes.”³ In total, America COMPETES 2010 authorizes approximately \$45.6 billion in funding between FY2010 and FY2013 for federal research in the physical sciences and engineering, STEM education, and other programs. Provisions of the law expire at the end of FY2013 unless Congress acts to reauthorize.

Among other things, America COMPETES 2010 increases funding authorizations for the National Science Foundation (NSF), National Institute of Standards and Technology (NIST) laboratories,⁴ and the Department of Energy (DOE) Office of Science (SC); and authorizes new technology transfer and commercialization activities at these agencies. It also authorizes inducement prizes at federal agencies; establishes a loan guarantee program for manufacturers; and establishes a Regional Innovation Program. In STEM education, America COMPETES 2010 seeks to provide greater coordination of federal STEM education programs, authorizes support for academic programs that provide teacher certification concurrent with a bachelors degree in a STEM field, and repeals certain unfunded STEM education programs.

¹ The full title of the 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 “America COMPETES 2010” and to the America COMPETES Act as “America COMPETES 2007”; and refers to both America COMPETES 2010 and America COMPETES 2007 as “America COMPETES 2007 and 2010” or as “both COMPETES acts.”

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

³ P.L. 111-358, Purpose.

⁴ NIST is part of the U.S. Department of Commerce.

America COMPETES 2010 is an authorization measure. New programs—and funding increases for existing programs—authorized by the law will not be established or realized unless funded by an appropriations act.

The President’s FY2013 Budget Request

Two central policy contributions of America COMPETES 2010 are the so-called “doubling path” policy for targeted accounts at the NSF, NIST laboratories, and the DOE Office of Science; and the authorization of STEM education activities at various federal agencies.⁵ The President’s FY2013 budget request increases funding for the targeted accounts (albeit at a lower-than-authorized rate)⁶ but includes support for few America COMPETES 2010 authorized STEM education programs. In this regard the President’s FY2013 budget request is generally consistent with prior year requests and appropriations activity for both COMPETES acts.

Of the new programs with defined funding authorizations in America COMPETES 2010,⁷ only the Regional Innovation Program (RIP) at the Department of Commerce is specifically included in the FY2013 budget request.⁸ The President does not appear to seek funding for the program provisions of the NIST Green Jobs Act, Federal Loan Guarantees for Innovative Technologies in Manufacturing, or the STEM-Training Grant program, which were also established by America COMPETES 2010. America COMPETES 2010 also authorizes new programs without providing a defined funding amount. One example of this type of authorization is the Green Chemistry Basic Research program at NSF. The FY2013 budget request includes funding for a green chemistry program at NSF.

The following section discusses the President’s FY2013 budget request for programs and agencies authorized by America COMPETES 2010 in greater detail.

Research

This section highlights the Administration’s FY2013 requests for selected agencies and programs included in America COMPETES 2010 and examines the budgetary status of the doubling path target accounts.

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—is \$5.983

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 John F. Sargent Jr.

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 (2006). 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.

billion. This amount is \$294.3 million (5.2%) more than the FY2012 estimated level of \$5.689 billion, and \$654.5 million (9.9%) less than the COMPETES 2010 authorized amount of \$6.638 billion.⁹

The President's budget request for R&RA includes specific funding for two America COMPETES 2010 programs—the Experimental Program to Stimulate Competitive Research (EPSCoR) and Partnerships for Innovation (PFI) programs. America COMPETES 2010 reauthorizes but does not specify funding levels for these two programs. The President requests \$158.2 million for EPSCoR, or \$7.3 million more than the FY2012 estimate of \$150.9.¹⁰ The FY2013 NSF budget request states that the National Academy of Science is studying NSF's EPSCoR programs in accordance with Section 517 of America COMPETES 2010. Findings are expected in late 2013. The FY2013 request for PFI is \$8.2 million, or \$200,000 more than the FY2012 estimate of \$8.0 million. NSF indicates that it intends to dedicate the requested \$200,000 increase to the Building Innovation Capacity track, which funds partnerships between academic researchers and small businesses.¹¹

Section 509 of America COMPETES 2010 directs NSF to establish a Green Chemistry Basic Research program. In response to these provisions, the FY2013 NSF budget request includes 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 seeks \$76.7 million in FY2013 for SusCHEM and four other new related SEES programs.¹²

In FY2013 the NSF intends to emphasize the new "OneNSF Framework," which seeks to enable "seamless operations across organizational and disciplinary boundaries."¹³ Although the OneNSF Framework applies across all NSF directorates, most of the OneNSF Framework priorities are funded in the R&RA account. Other NSF-wide priorities include clean energy, advanced manufacturing, multidisciplinary research, and STEM education and workforce. The FY2013 NSF budget proposes \$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

⁹ FY2012 funding levels in the *FY2013 NSF Budget Request to Congress* are as estimated, not enacted. Congress typically appropriates to NSF at the major account level. Funding levels for sub-accounts included in the budget request are therefore generally what NSF estimates it will provide. The FY2012 estimated amount for R&RA also 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.

¹⁰ For more information on the EPSCoR program, see CRS Report RL30930, *U.S. National Science Foundation: Experimental Program to Stimulate Competitive Research (EPSCoR)*, by Christine M. Matthews.

¹¹ More information about the PFI program is available at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504708&org=IIP&from=home.

¹² 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 is \$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. Specifically, the NSF says that SEES "has requested \$202.50 million in FY 2013, 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.

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

Centers (NSECs), and public outreach.¹⁴ The NSF FY2013 budget request describes these programs as either duplicative or obsolete (either because the program has achieved its original goals or as a result of maturation in the field).

Department of Energy, Office of Science

The President's FY2013 budget request for the **DOE Office of Science** is \$4.992 billion. This funding level is \$118.4 million (2.4%) more than the FY2012 enacted level of \$4.874 billion and \$1.009 billion (16.8%) less than the authorized level in America COMPETES 2010 (\$6.001 billion). The President also seeks \$350.0 million for the ARPA-E account at DOE, which is \$75.0 million (27.3%) more than the FY2012 enacted level of \$275.0 million and \$38.0 million (12.2%) more than the amount authorized in America COMPETES 2010 (\$312.0 million).

National Institute of Standards and Technology

At **NIST**, the President seeks a total of \$857.0 million in FY2013. This funding level is \$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 budget, the President requests \$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 authorized level of \$676.7 million, for the Scientific and Technology Research and Services (STRS) account. The President also seeks \$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 Construction of Research Facilities (CRF) account. Within NIST's Industrial Technology Services (ITS) account (\$149.0 million total request), the Administration requested \$128.0 million for the Hollings Manufacturing Extension Partnership (MEP), which is \$400,000 less than the FY2012 enacted amount; and seeks no funding for the Baldrige Performance Excellence program, which is the same as the FY2012 enacted levels. The President does not specifically request FY2013 funds for activities authorized by the NIST Green Jobs Act.

The Doubling Path

The President's FY2013 budget request states that the Administration seeks to continue the so-called "doubling path" policy in FY2013. First initiated in FY2006, Congress and successive 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").¹⁵ Under current authorizations for FY2011 to FY2013, targeted account funding levels would have increased at a compound annual growth rate of 6.3%, a pace that would have resulted in doubling in approximately 11 years.¹⁶ However, appropriations in FY2011 and FY2012 for the targeted accounts increased at rates of 4.6% and 4.1%, respectively (about an 18-year doubling pace). Although the President's FY2012 budget

¹⁴ The public outreach programs slated for termination in FY2013 are 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.

¹⁵ 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.

¹⁶ As authorized by the America COMPETES Reauthorization Act of 2010 (P.L. 111-358).

request initially sought funding for targeted accounts consistent with a 12-year doubling period (about 6.0% growth rate), the September 1, 2011, *Mid-Session Review* stated that the doubling goal would need to be delayed. The President's FY2013 budget request once again asserts support for the doubling path policy, but seeks an overall increase of 4.1% for the targeted accounts. This growth rate is closer to FY2012 enacted appropriations of 4.1% than to the authorized growth rate of 6.3%. Some legislators have raised concerns about pursuing the doubling effort given the nation's current fiscal challenges, including one who urged observers "to be realistic about the notion of doubling the NSF budget" in FY2013.¹⁷

STEM Education

The President's FY2013 STEM education request primarily targets two central groups: STEM graduates and STEM teachers. The FY2013 budget request establishes 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 continues the Administration's previous commitment to prepare 100,000 STEM teachers over the next decade (the so-called "100Kin10" initiative).¹⁸ To achieve these goals, the President's FY2013 budget request seeks program and funding changes to some existing America COMPETES 2010 authorized programs and agencies.¹⁹ The President's FY2013 budget does not appear to include specific requests for new STEM education programs authorized by America COMPETES 2010, such as the STEM-Training Grant Program.

National Science Foundation

The primary source of funding for STEM education activities at NSF is the Education and Human Resources (E&HR) account.²⁰ The President seeks \$875.6 million for E&HR in FY2012. This amount is \$46.6 million (5.6%) more than the FY2012 enacted level of \$829.0 million and \$166.2 million (16.0%) less than America COMPETES 2010 authorized level of \$1.042 billion.

The FY2013 NSF budget request highlights certain NSF-wide and E&HR-specific proposals for STEM education. NSF-wide efforts center on the planned new Expeditions in Education (E²) initiative, which would "address a challenge in STEM learning or education using current or emerging areas of science."²¹ E² is a \$49.0 million co-funded initiative that would 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 seeks increased co-

¹⁷ Opening Statement of Ranking Member Dan Lipinski, in U.S. Congress, House Committee on Science, Space, and Technology, Subcommittee on Research and Science Education, "The National Science Foundation's FY2013 Budget Request," hearings, 112th Cong., 2nd sess., February 28, 2012, <http://democrats.science.house.gov/sites/democrats.science.house.gov/files/documents/DWL%20Opening%20Statement%20NSF%20FY13%20Budget.pdf>.

¹⁸ 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.

¹⁹ America COMPETES 2010 directed the National Science and Technology Council to develop a STEM education strategic plan. Although Administration officials have stated that the strategic plan will be published in the spring of 2012, the FY2013 budget 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.

²⁰ The NSF Research and Related Activities account also supports some STEM education activities.

²¹ 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>.

funding for the Graduate Research Fellowship (GRF) program. The FY2013 request for the GRF is \$243.0 million, which is \$45.0 million (22.7%) more than the FY2012 estimate of \$198.1 million. About half of the funding for the GRF in FY2013 would come from R&RA, up from 7.4% in FY2009.²² NSF anticipates that the increased funding will provide for 2,000 new fellows in FY2013 (8,900 total) at a cost of education (COE) level of \$12,000 per fellow. NSF asserts that the FY2013 COE level is consistent with America COMPETES 2010.²³

Other major E&HR initiatives in FY2013 include 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 would jointly fund the new \$60.0 million K-16 mathematics program. E&HR contributions would come from the Discovery Research K-12 (DR-K12) program and from the Transforming Undergraduate Education in STEM (TUES) program.²⁴ Finally, the FY2013 request for E&HR would “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 seeks \$20.0 million in new funding (\$5.0 million for each E&HR division) for a so-called “Core Launch Fund” to support the reframing.

The FY2013 NSF budget request includes funding for existing STEM education programs authorized under America 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 are \$52.0 million for IGERT (13.6% below FY2012), \$54.9 million for Noyce (same as FY2012), \$68.4 million for REU (3.7% over FY2012), and \$17.3 million for STEP (31.6% less than FY2012).

Both America COMPETES 2007 and 2010 authorize an NSF program to support Hispanic-serving institutions (HSIs). Section 7033 of America COMPETES 2007 directed NSF to establish a program for HSIs. Section 512 of America COMPETES 2010 directs 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.²⁵ Although the FY2013 budget request appears to maintain existing NSF MSI programs separately, NSF has not established an HSI-specific program. The FY2013 request lists “research to examine the particular STEM student and institutional capacity needs in Hispanic-serving institutions”²⁶ as

²² From FY2004 to FY2009 R&RA contributions to GRF were approximately 7%-8% of the GRF total. In FY2010, R&RA contributions increased to about 25%.

²³ 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>.

²⁴ The reductions to TUES may be partially off-set by E&HR and R&RA contributions to the proposed E² 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.

²⁵ NSF previously proposed consolidating its minority-serving institution programs. Congressional authorizers and appropriators both rejected that proposal.

²⁶ National Science Foundation, *FY2013 Budget Request to Congress*, February 13, 2012, p. EHR-1, <http://www.nsf.gov/about/budget/fy2013/index.jsp>.

one of the emphases of the Division of Human Research Development within E&HR, but does not otherwise specifically mention HSIs.²⁷

Department of Education

The President's FY2013 budget request for the Department of Education (**ED**) proposes to reorganize the department (as previously proposed in the FY2011 and FY2012 requests).²⁸ The proposed reorganization would eliminate and consolidate certain programs, including America COMPETES 2010 programs.²⁹ For example, under the reorganization plan, both the Teachers for a Competitive Tomorrow (TCT) and Advanced Placement (AP) programs would be eliminated and their program functions absorbed into the newly created Teacher and Leader Pathways (TLP)³⁰ and College Pathways and Accelerated Learning (CPAL)³¹ programs, respectively.³²

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 request for higher education does not specify funding for the program. Although ED operates an AP program, it 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. As such, 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, is \$81.0 million. Of this amount, \$24.1 million would go to the advanced course test fee component of the AP program. The FY2012 enacted funding level for the ESEA authorized AP program is \$26.9 million.³³

²⁷ 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.

²⁸ Congress must authorize this reorganization for it to take effect. The FY2011 and FY2012 appropriations to ED retained the existing department structure and organization. Legislative debate about the President's proposal has continued in the context of the proposed reauthorization of the Elementary and Secondary Education Act of 1965, as amended by the No Child Left Behind Act (P.L. 107-110). That debate began in the 111th Congress and continues in the 112th.

²⁹ For more information, see CRS Report R41355, *Administration's Proposal to Reauthorize the Elementary and Secondary Education Act: Comparison to Current Law*, by Rebecca R. Skinner et al.

³⁰ TLP includes funding for five existing programs: Transition to Teaching, Teacher Quality Partnership, Teachers for a Competitive Tomorrow, Teach for America, and School Leadership.

³¹ CPAL includes funding for three existing programs: the High School Graduation Initiative, Advanced Placement, and Javits Gifted and Talented Education.

³² 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.

³³ The President's FY2013 ED budget request contains 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 America COMPETES Act authorized STEM education programs. However, in prior years the department has said it operates programs that correspond with its responsibilities under the law.³⁴ Among these is the DOE Office of Science (SC), Science Graduate Fellowship (SCGF) program, which the department has asserted is one of two DOE fellowship programs that correspond with the Protecting America's Competitive Edge (PACE) graduate fellowship program.³⁵ The President's FY2013 request for DOE includes no funding for SCGF. This is consistent with FY2012 congressional appropriations actions. For example, House Committee on Appropriations FY2012 DOE appropriations report language directed SC 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."³⁶ Final enacted funding for SCGF in FY2012 was \$5.0 million, which was to support a third year of funding for the FY2010 cohort of fellows. No funding was provided for new fellows.

DOE has also asserted that the Academies Creating Teacher Scientists (DOE ACTS) program corresponds with the Summer Institutes program and that the SC Early Career Research Program corresponds with the Early Career Awards program. (America COMPETES 2010 reauthorized both the Summer Institutes and Early Career Awards programs.) In accordance with the recommendations of a 2010 DOE Committee of Visitors report, the President terminated DOE ACTS in the FY2012 budget request.³⁷ The SC Early Career Research Program is typically funded in DOE's Fusion Energy Sciences budget in the "Other" sub-account. In FY2012, enacted funding for the "Other" sub-account was \$11.9 million. These funds supported the SC Early Career Research, Historically Black Colleges and Universities (HBCU), and summer internships for undergraduates programs. The FY2013 request for the "Other" sub-account is \$9.2 million. This amount is \$2.7 million, or 22.7%, less than the FY2012 enacted amount for this account.³⁸

Finally, in FY2012 the Senate Committee on Appropriations urged SC to consider redirecting funds from terminated education programs to the Distinguished Scientist Program authorized by the COMPETES acts. The President's FY2013 request for SC does not appear to include funding for this program.

³⁴ Telephone and e-mail communications between the author and Patricia Temple, Office of Congressional and Intergovernmental Affairs, U.S. Department of Energy, April 11, 2011, identified programs in the FY2012 DOE budget request that correspond with its STEM education responsibilities under America COMPETES 2010. CRS has requested, but not received, a list of DOE programs that correspond with its STEM education responsibilities under America COMPETES 2010 in FY2013.

³⁵ 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. PACE was authorized and reauthorized by the COMPETES acts.

³⁶ H.Rept. 112-118, p. 114.

³⁷ 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.

³⁸ Authorized funding for the Early Career Awards program is \$25.0 million in FY2013.

Other Provisions

The President's FY2013 budget requests funding for other America COMPETES 2010 provisions as well—including \$25.0 million for the new RIP program at the Department of Commerce's (DOC) Economic Development Administration (EDA). Of this amount, the President seeks \$7.0 million for the Science Park Infrastructure Loan Guarantee program, which America COMPETES 2010 authorized as a separate component of the RIP program. The Administration's FY2013 budget request does not appear to include specific funding for the new Federal Loan Guarantees for Innovative Technologies in Manufacturing program at the Department of Commerce or for the activities authorized by the NIST Green Jobs Act of 2010, both of which were authorized by America COMPETES 2010. FY2012 funding for the DOC 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.³⁹

FY2013 Congressional Action

Funding for America COMPETES 2010 programs and agencies is typically included in three appropriations acts.⁴⁰

- *Commerce, Justice, Science, and Related Agencies* (CJS), for NSF, NIST, and other Department of Commerce programs;⁴¹
- *Energy and Water Development* (Energy-Water), for DOE programs;⁴²
- *Labor, Health and Human Services, Education, and Related Agencies* (Labor-HHS-Education), for ED programs.⁴³

As appropriations measures typically 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 America COMPETES 2010. **Table 1** summarizes the FY2013 appropriations status of these selected provisions. This section will be updated as each chamber passes its respective America COMPETES 2010-related appropriations measures.

³⁹ H.Rept. 112-184, p. 216, and P.L. 112-55 (125 Stat. 592).

⁴⁰ For more information on the appropriations process, see CRS Report 97-684, *The Congressional Appropriations Process: An Introduction*, by Jessica Tollestrup.

⁴¹ CRS Report R41721, *Commerce, Justice, Science, and Related Agencies: FY2012 Appropriations*, coordinated by Nathan James, Jennifer D. Williams, and John F. Sargent Jr.

⁴² CRS Report R41908, *Energy and Water Development: FY2012 Appropriations*, coordinated by Carl E. Behrens.

⁴³ CRS Report R42010, *Labor, Health and Human Services, and Education: FY2012 Appropriations*, coordinated by Karen E. Lynch.

**Table I. America COMPETES Reauthorization Act of 2010 (P.L. 111-358):
Selected Programs and FY2013 Appropriations Status**
(in millions of dollars)

Programs	FY2012 Enacted/ Estimated^a	FY2013 Authorization (P.L. 111-358)	FY2013 Request	House	Senate	FY2013 Final
Department of Education						
Teachers for a Competitive Tomorrow – Baccalaureate (Sec. 1003)	n/db	\$2.0	n/d			
Teachers for a Competitive Tomorrow – Master's (Sec. 1003)	n/db	\$2.0	n/d			
Advanced Placement and International Baccalaureate Programs (Sec. 1003)	n/dc	\$75.0	n/ad			
Alignment of Education Programs (Sec. 1003)	n/d	\$120.0	n/de			
Department of Energy						
Summer Institutes (Sec. 901)	n/df	\$25.0	n/df			
Nuclear Science Program Expansion Grants for Institutions of Higher Education (Sec. 902)	n/d	\$10.4	n/d			
Nuclear Science Competitiveness Grants for Institutions of Higher Education (Sec. 902)	n/d	\$8.8	n/d			
Hydrocarbon Systems Science Talent Program Expansion Grants (Sec. 902)	n/d	\$10.1	n/d			
Early Career Awards (Sec. 902)	n/dg	\$25.0	n/dh			
Protecting America's Competitive Edge (PACE) Graduate Fellowship Program (Sec. 902)	n/di	\$21.9	n/d			
Distinguished Scientist Program (Sec. 902)	n/di	\$33.0	n/d			

Programs	FY2012 Enacted/ Estimated ^a	FY2013 Authorization (P.L. 111-358)	FY2013 Request	House	Senate	FY2013 Final
Basic Research (Office of Science, Sec. 903)	\$4,873.6 ^k	\$6,000.7	\$4,992.1			
Advanced Research Projects Agency— Energy (Sec. 904)	\$275.0	\$312.0	\$350.0			
Department of Commerce						
Federal Loan Guarantees for Innovative Technologies in Manufacturing (New, Sec. 602)	\$5.0	\$20.0	n/d			
Regional Innovation Program (New, Sec. 603)	n/d	\$100.0	\$25.0 ^l			
Loan Guarantees for Science Park Infrastructure (New, Sec. 603)	\$5.0	\$7.0	\$7.0 ^l			
National Institute of Standards and Technology						
Total	\$750.8	\$1,039.7	\$857.0			
Scientific & Technical Research & Services	\$567.0	\$676.7	\$648.0			
Construction of Research Facilities	\$55.4	\$121.3	\$60.0			
Industrial Technology Services	\$128.4	\$241.7	\$149.0			
<i>Manufacturing Extension Partnership</i>	\$128.4	\$165.1	\$128.0			
<i>Baldrige Performance Excellence Program</i>	\$0.0	\$10.6	\$0.0			
NIST Green Jobs Act of 2010 (New, Sec. 703)	n/d	\$7.0	n/d			
National Science Foundation						
Total	\$7,033.1	\$8,300.0	\$7,373.1			
Research & Related Activities	\$5,689.0	\$6,637.8	\$5,983.3			
Education & Human Resources	\$829.0	\$1,041.8	\$875.6			
Major Research Equipment and Facilities Construction	\$197.1	\$236.8	\$196.2			

Programs	FY2012 Enacted/ Estimated ^a	FY2013 Authorization (P.L. 111-358)	FY2013 Request	House	Senate	FY2013 Final
Agency Operations & Award Management	\$299.4	\$363.7	\$299.4			
National Science Board	\$4.4	\$4.9	\$4.4			
Office of the Inspector General	\$14.2	\$15.0	\$14.2			
STEM-Training Grant Program (New, Sec. 556)	n/d	\$10.0	n/d			

Sources: 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>; America COMPETES Reauthorization Act of 2010 (P.L. 111-358).

Notes: n/d = not defined; CRS was unable to identify a specific, defined appropriation or budget request for the authorization. Programs designated as “new” were authorized by America COMPETES 2010. Totals may not add due to rounding.

- a. “Enacted” funding levels come from annual appropriations acts while “estimated” funding levels come from agency budget documents. Enacted funding levels may not include rescissions, transfers, or other budget changes. Estimated funding levels may or may not reflect such changes, but do provide budgetary data for accounts that are not typically specified in annual appropriations acts. For example, Congress typically appropriates to the NSF at the major account level (e.g., R&RA). As a result, most NSF sub-accounts have no enacted funding level. NSF estimates program funding levels and publishes these estimates in its annual budget request to Congress.
- b. Congress has not provided funding for this program since FY2010.
- c. ED 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.
- d. 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 is \$81.0 million, which includes \$24.1 million for AP test fees. FY2012 funding for AP programs (as authorized by ESEA, not COMPETES) in P.L. 112-74 was \$27.0 million.
- e. ED does not 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 system elements, for which ED relies on P.L. 110-69, Section 6401.
- f. According to DOE, this program corresponds with the DOE ACTS program. DOE ACTS was eliminated in FY2012. The President’s FY2013 DOE budget request does not include funding for this program.
- g. DOE indicates that the SC Early Career Research Program corresponds with the Early Career Awards program authorized by the COMPETES acts. This item is funded in the DOE’s Fusion Energy Sciences budget in the “Other” sub-account. In FY2012, funding for the “Other” sub-account was \$11.9 million. These funds supported the SC Early Career Research, Historically Black Colleges and Universities (HBCU), and summer internships for undergraduates programs.
- h. The FY2013 request for the Fusion Energy Sciences “Other” sub-account is \$9.2 million. This amount is \$2.7 million, or 22.7%, less than the FY2012 enacted amount for this account.

- i. According to 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 Graduate Fellowship (SCGF) program in the Office of Science, Workforce Development for Teachers and Scientists. FY2012 funding for CSGF was \$6.0 million. The FY2013 request for CSGF is for the same amount. H.Rept. 112-331 provided \$5.0 million for the SCGF program in FY2012. FY2012 SCGF funds were specifically designated for the FY2010 cohort.
- j. S.Rept. 112-75 urged DOE to redirect Office of Science, Workforce Development for Teachers and Scientists' funding from programs proposed for termination in FY2012 to the Distinguished Scientist program.
- k. This amount reflects a \$15.4 million rescission in FY2012 in accordance with the contractor pay freeze.
- l. Although America COMPETES authorizes a separate \$7.0 science park loan guarantee program, the FY2013 DOC budget request includes funding for science parks in the total \$25.0 million request for the RIP program.

Policy Context

The COMPETES acts are designed to improve the competitive position of the United States by fostering scientific and technological innovation. The primary policy devices that the acts employ—to this end—are rapid increases in authorized funding for physical sciences and engineering research (e.g., the so-called “doubling path” policy for targeted accounts) and STEM education program authorizations. The specific debate about FY2013 funding for America COMPETES 2010 provisions occurs within the broader conversation about these policy choices. This section briefly summarizes this policy context.⁴⁴

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 the answer to this question is that the federal government should encourage innovation by supporting physical sciences and engineering research and by increasing the domestic supply of STEM workers. Supporters of this 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 means 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 accompany these global changes. In particular, COMPETES act proponents raise concerns about funding for research in the physical sciences and engineering and the domestic supply of scientists, engineers, and technicians.⁴⁵

⁴⁴ 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 Heather B. Gonzalez.

⁴⁵ 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>.

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.⁴⁶ Another fundamental assumption that some analysts have called into question is whether increased investment in publically funded research will increase U.S. competitiveness given that such research is typically publically available.⁴⁷ Other analysts prefer to use regulatory changes and tax policy to achieve competitiveness objectives, arguing that direct federal investment in research in the physical sciences and engineering and in STEM education distorts markets.⁴⁸ 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.⁴⁹

In addition to the broad conversation about the policy approach embodied by the COMPETES acts, there are more specific debates about the acts' particular methods and means that may become part of the FY2013 funding conversation. These debates center on the federal role in the national research and development (R&D) enterprise and on the federal STEM education portfolio. For example, some policymakers prefer to limit the federal role in the national R&D enterprise to basic research, while other policymakers favor an approach that includes both basic research and support for development at stages that are closer to commercialization. The congressional debate about the federal role in the national R&D enterprise may shape both the character and amount of research funding Congress appropriates to COMPETES act agencies. In the realm of STEM education, a number of policy conversations may become part of the FY2013 funding debate. Among these is the question of a strategy for federal STEM education programs. America COMPETES 2010 directed the National Science and Technology Council to prepare a strategic plan for federal STEM education programs. The Administration indicates that it expects to release the strategic plan in early 2012. To the extent that this strategic plan embraces or sets aside existing programs in the federal STEM education portfolio—or recommends the creation of new programs—a policy debate about the direction of federal STEM education investments in FY2013 may follow its release.

⁴⁶ 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://democrats.science.house.gov/publications/Testimony.aspx?TID=9735>.

⁴⁷ 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 John F. Sargent Jr.

⁴⁸ 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/full110/mar17/Crews.pdf>.

⁴⁹ 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.

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