

CRS Report for Congress

The America COMPETES Act and the FY2009 Budget

Updated May 22, 2008

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Prepared for Members and
Committees of Congress

Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE 22 MAY 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE The America COMPETES Act and the FY2009 Budget				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Congressional Research Service, The Library of Congress, 101 Independence Ave, SE, Washington, DC, 20540-7500				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 22	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

The America COMPETES Act and the FY2009 Budget

Summary

The America COMPETES Act (P.L. 110-69) responds to concerns that the United States may not be able to compete economically with other nations in the future due to insufficient investment today in science and technology research and in science, technology, engineering, and mathematics (STEM) education. A similar concern led President Bush to announce the American Competitiveness Initiative (ACI) in January 2006. In March 2008, both the House and Senate included in their budget resolutions support for the America COMPETES Act.

The act authorizes increases in the nation's investment in science and engineering research at the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST) laboratories, and the Department of Energy (DOE) Office of Science. In addition, the act authorizes new STEM education programs at NSF, DOE, and the Department of Education (ED) and enhances the funding of some existing programs at NSF including the Robert Noyce Teacher Scholarship Program. A concern to some policymakers is whether federal appropriations will meet the act's authorized levels.

The act also establishes within DOE the Advanced Research Projects Agency-Energy (ARPA-E) and Discovery Science and Engineering Innovation Institutes. ARPA-E is designed to support transformational energy technology research projects with the goal of enhancing the nation's economic and energy security. An issue for Congress is whether to appropriate funds to ARPA-E. The President's FY2009 budget does not request appropriations for ARPA-E. Instead, it requests funding of six new technology transfer collaborations that integrate basic and applied research.

The Discovery Science and Engineering Innovation Institutes are multidisciplinary research institutes, located at DOE National Laboratories, that would apply fundamental science and engineering discoveries to technological innovations. The President's FY2009 budget would not establish these institutes. The Administration proposes instead to establish Energy Frontier Research Centers (ERFCs) at universities focused on transformative research.

In STEM education, the act authorizes ED and NSF programs to encourage STEM degree majors and professionals to become K-12 STEM teachers. At ED, an issue for Congress is that although the Teachers for a Competitive Tomorrow program is appropriated for FY2008, the Administration proposes to eliminate it for FY2009. At NSF, the FY2009 budget justification provides a FY2008 budget estimate less than Congress appropriated for the Robert Noyce Teacher Scholarship program and requests FY2009 funding at approximately 10% of that authorized in the act.

At DOE, an issue is the degree to which DOE has taken actions to establish the new DOE STEM education initiatives authorized in the act. The DOE FY2009 budget justification notes the America COMPETES Act and mentions many DOE STEM education programs, but it does not identify any specific America COMPETES Act initiatives. As a result, the status of these programs is unclear.

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The America COMPETES Act and the FY2009 Budget

The Administration and Congress agree on the need to invest in science and engineering research, and science, technology, engineering, and mathematics (STEM) education in order for the United States to be more competitive with other nations. Their priorities as to which programs to fund, and how much, however, are different.

When Congress passed the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Act (P.L. 110-69), known as the America COMPETES Act, in August 2007, much of the FY2008 appropriations debate had already taken place. As a consequence, FY2008 appropriations largely failed to address the new priorities enacted in the America COMPETES Act.

The FY2009 budget cycle will be the first time Congress can debate funding for America COMPETES Act programs at the beginning of the appropriations process. The purpose of this report is to compare the President's FY2009 budget request to the FY2009 authorized levels provided by the America COMPETES Act. For more general information on the America COMPETES Act, see CRS Report RL34328, *America COMPETES Act: Programs, Funding, and Selected Issues*, by Deborah D. Stine.

Overview of the America COMPETES Act

The America COMPETES Act was a response to concerns that the United States may not be able to compete economically with other nations in the future. The act mainly addresses concerns about insufficient investment in science and engineering research; STEM education; and STEM workforce development. Similar concerns led President Bush to announce the related American Competitiveness Initiative (ACI) in January 2006.

The America COMPETES Act authorizes an increase in federal science and engineering research funding and support for kindergarten through postdoctoral education. The act also establishes the Advanced Research Projects Agency-Energy (ARPA-E)¹ and Discovery Science and Engineering Innovation Institutes.

¹ For more information on ARPA-E, see CRS Report RL34497, *Advanced Research Projects Agency - Energy (ARPA-E): Background, Status, and Selected Issues for Congress*, by Deborah D. Stine.

The act authorizes funding increases for the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST) laboratories, and the Department of Energy (DOE) Office of Science through FY2010. The Administration's ACI also proposes increases in research funding for the three agencies, but at a lower rate of change.

The America COMPETES Act is an authorization act. New programs established by the act will not be initiated unless funded through subsequent appropriations. Similarly, increases in the authorization level of existing programs may or may not translate into increased funding.

Agency Programs and the America COMPETES Act

The following section discusses some of the America COMPETES Act programs in relation to the President's FY2009 budget submission.²

The FY2009 request information is based on the FY2009 Congressional Budget Request documents from the DOE³ and the NSF.⁴ The ED FY2009 request information is based on the its Budget Summary.⁵ The NIST FY2009 request information is from the *Fiscal Year 2009 Budget of the U.S. Government*.⁶

Table 1 summarizes the America COMPETES Act FY2008 and FY2009 authorization levels, the FY2008 appropriation, and the President's FY2009 request. When funding for an activity is not specified in the FY2009 budget request, the table states "not included." This does not necessarily mean that the Administration does not intend to fund the activity. In some cases, the activity may simply be at a level of organizational detail below that specified in the budget documents.

² For information on the President's FY2009 budget, see CRS Report RL34448, *Federal Research and Development Funding: FY2009*, coordinated by John F. Sargent.

³ The DOE Budget Request is available at [<http://www.cfo.doe.gov/budget/09budget/Start.htm>]. Relevant detailed budget justification addressing science is available in volume 4 at [<http://www.cfo.doe.gov/budget/09budget/Content/Volumes/Volume4.pdf>]. The detailed budget justification addressing the nuclear energy educational programs that are part of the act is available in volume 3, p. 621 at [<http://www.cfo.doe.gov/budget/09budget/Content/Volumes/Volume3a.pdf>].

⁴ The NSF Budget Request is available at [<http://www.nsf.gov/about/budget/fy2009/toc.jsp>].

⁵ The ED Budget Summary is available at [<http://www.ed.gov/about/overview/budget/budget09/summary/index.html>]. The relevant sections are on elementary and secondary education at [<http://www.ed.gov/about/overview/budget/budget09/summary/edlite-section2a.html>], higher education programs at [<http://www.ed.gov/about/overview/budget/budget09/summary/edlite-section2e.html>], and programs proposed for elimination at [<http://www.ed.gov/about/overview/budget/budget09/summary/edlite-section3.html>].

⁶ See the NIST budget information in the Appendix on p. 228 at [<http://www.whitehouse.gov/omb/budget/fy2009/pdf/appendix/com.pdf>]

National Institute of Standards and Technology

The mission of NIST, a laboratory of the Department of Commerce, is to increase the competitiveness of U.S. companies by supporting industrial development of precompetitive, generic technologies, diffusing government-developed technological advances, and providing measurement, calibration, and quality assurance techniques.⁷

The America COMPETES Act authorizes NIST's Scientific and Technical Research and Services (STRS) and Industrial Technology Services (ITS) programs. The ITS includes the existing Hollings Manufacturing Extension Partnership (MEP) and a new Technology Innovation Program (TIP), which replaced a program with similar goals, the repealed Advanced Technology Program (ATP).⁸

The act authorizes \$541.9 million for STRS in FY2009; the President's FY2009 budget proposes \$535.0 million.⁹ The act authorizes \$131.5 million for TIP in FY2009, but the President's FY2009 budget proposes eliminating TIP, so its proposed budget is zero. For MEP, the act authorizes \$122.0 million in FY2009, while the President's FY2009 budget proposes \$4.0 million to end federal support for the program.

Department of Energy

The mission of DOE is to “advance the national, economic, and energy security of the United States; to promote scientific and technological innovation in support of that mission; and to ensure the environmental cleanup of the national nuclear weapons complex.”¹⁰ The DOE is the largest federal government supporter of basic physical sciences research. This research is conducted at its national laboratories as well as through its support of investigator-initiated, merit-reviewed, competitively selected awards, conducted primarily at universities.¹¹

⁷ For more information on NIST, see CRS Report 95-30, *The National Institute of Standards and Technology: An Appropriations Overview*, by Wendy H. Schacht.

⁸ For additional information on ATP and TIP, see CRS Report 95-36, *The Advanced Technology Program*, and CRS Report RS22815, *The Technology Innovation Program*, both by Wendy H. Schacht. The report describes the similarities and differences between the two programs.

⁹ This includes almost \$9 million for the Baldrige National Quality Award Program. According to NIST, “The Baldrige Award is given by the President of the United States to businesses — manufacturing and service, small and large — and to education, health care and nonprofit organizations that apply and are judged to be outstanding in seven areas: leadership; strategic planning; customer and market focus; measurement, analysis, and knowledge management; human resource focus; process management; and results.” For more information, see [http://www.nist.gov/public_affairs/factsheet/baldfacts.htm].

¹⁰ Department of Energy, “About DOE,” at [<http://www.energy.gov/about/index.htm>].

¹¹ Department of Energy, “Science and Technology,” at [<http://www.energy.gov/sciencetech/index.htm>].

The America COMPETES Act authorizes the establishment of the ARPA-E and the Discovery Science and Engineering Innovation Institutes within DOE. Based on the Defense Advanced Research Projects Agency (DARPA) model, ARPA-E is designed to support transformational energy technology research projects with the goal of enhancing the nation's economic and energy security.¹² Discovery Science and Engineering Innovation Institutes would be multidisciplinary research institutes located at DOE national laboratories that would apply fundamental science and engineering discoveries to technological innovations. Up to three institutes may be created each fiscal year. The DOE FY2009 budget request does not propose funding for either ARPA-E or the Discovery Science and Engineering Innovation Institutes.

Dr. John H. Marburger, director of the White House Office of Science and Technology Policy testified:

[T]he Budget does not request funding for the Advanced Research Projects Agency (ARPA-E) or new math and science education programs at the Department of Energy. This is because the Administration believes very strongly that the basic research programs at the DoE Office of Science are a higher leverage investment and in greater need of funding than new DoE programs, especially given the devastating impacts of last year's Omnibus appropriations bill on this agency.¹³

Rather than create ARPA-E or the Discovery Science and Engineering Innovation Institutes, the Secretary of Energy has issued a new policy on technology transfer,¹⁴ and proposes establishing 25-30 multi-investigator Energy Frontier Research Centers (EFRCs)¹⁵ at universities or other nonprofit organizations. As a

¹² For more information on ARPA-E, see CRS Report RL34497, *Advanced Research Projects Agency - Energy (ARPA-E): Background, Status, and Selected Issues for Congress*, by Deborah D. Stine.

¹³ Testimony of Dr. John Marburger, III, Director, White House Office of Science and Technology Policy, House Committee on Science and Technology, *Funding for the America COMPETES Act in the FY2009 Administration Budget Request*, hearing, 110th Congress, 2nd session, February 14, 2008 at [http://democrats.science.house.gov/Media/File/Commdocs/hearings/2008/Full/14feb/Marburger_Testimony.pdf].

¹⁴ See the press release at [<http://www.doe.gov/print/5977.htm>] and the policy statement at [http://www.doe.gov/media/Policy_Statement_on_Technology_Transfer.pdf]. The technology transfer policy states "This Policy Statement builds upon the stimulus provided by the technology transfer provisions contained in the Energy Policy Act of 2005 and other recent legislative actions such as the 'America COMPETES Act' that seek to improve the transfer of energy technologies from the Department's Facilities to products and applications that address public and private needs."

¹⁵ A footnote to Attachment 4 of Dr. Marburger's testimony to the House Committee on Science and Technology Policy states that "[T]otal Budget funding for DoE research center partnerships similar to those in Section 5008 [the Discovery Science and Engineering Innovation Institutes] — Energy Frontier Research Centers, Bioenergy Research Centers, and SciDAC Institutes [Science Discovery Through Advanced Computing] — is \$183 million." Testimony of Dr. John Marburger, III, Director, White House Office of Science and Technology Policy, House Committee on Science and Technology, *Funding for the* (continued...)

result of the technology transfer policy, DOE will now reportedly pool funds from the Office of Science and other programs to fund six new collaborations that integrate basic and applied research. Funding for these collaborations will reportedly be based on congressional language that requires DOE to set aside 0.9% of its applied energy research and development budget for technology transfer.¹⁶ The goal of EFRCs would be to focus on transformative research.¹⁷ The requested FY2009 EFRC budget is approximately \$100.0 million, with initial five-year awards of \$2.0-5.0 million annually per center. In contrast, each Discovery Science and Engineering Innovation Institute is authorized at \$10.0 million annually for a maximum of three years.

The act also authorizes the establishment of several new STEM education programs at the K-12 and post-secondary level within DOE. These activities include K-12 student and teacher programs such as specialty high schools for science and mathematics pilot program, experiential based learning opportunities (e.g., summer internships) for middle and high school students, and summer institutes for teachers. Post-secondary programs include a nuclear science talent expansion program and a hydrocarbon systems science talent expansion program to enhance existing and create new educational programs in nuclear science and hydrocarbon systems. In addition, the act establishes a new position within DOE to direct STEM education programs across the department, and a Science, Engineering, and Mathematics Education Fund, that is to include not less than 0.3% of DOE's research, development, and commercial application funding.

Although the relevant sections in the FY2009 DOE budget submission note the authorization of the America COMPETES Act, they do not make clear what specific educational programs within the act to which the request is responding.¹⁸ For example, the FY2009 request for the Office of Nuclear Energy references the America COMPETES Act and states it will designate 20% of its research funds for university research activities as a way to increase support for U.S. nuclear science

¹⁵ (...continued)

America COMPETES Act in the FY2009 Administration Budget Request, hearing, 110th Congress, 2nd session, February 14, 2008 at [http://democrats.science.house.gov/Media/File/Commdocs/hearings/2008/Full/14feb/Marburger_Testimony.pdf].

¹⁶ This may be a reference to the following provision in the Title X, Section 1001 of the Energy Policy Act (P.L. 109-58): "TECHNOLOGY COMMERCIALIZATION FUND. — The Secretary shall establish an Energy Technology Commercialization Fund, using 0.9 percent of the amount made available to the Department for applied energy research, development, demonstration, and commercial application for each fiscal year, to be used to provide matching funds with private partners to promote promising energy technologies for commercial purposes."

¹⁷ For more details, see the FY2009 DOE Budget submission section entitled "FY 2009 Budget Request to Congress Errata sheet" at [http://www.er.doe.gov/obp/FY_09_Budget/Errata%20Sheet.pdf], and the DOE Energy Frontier Research Centers webpage at [<http://www.sc.doe.gov/bes/EFRC.html>].

¹⁸ Relevant DOE detailed budget justification addressing science is available on pp. 453-472 of volume 4 at [<http://www.cfo.doe.gov/budget/09budget/Content/Volumes/Volume4.pdf>] and the nuclear energy educational programs on pp. 621-626 of volume 3 at [<http://www.cfo.doe.gov/budget/09budget/Content/Volumes/Volume3a.pdf>].

and engineering education, but it does not cite the act's nuclear science talent expansion program.

In the section entitled “Workforce Development for Teachers and Scientists” in the Office of Science budget justification, DOE notes the America COMPETES Act and mentions many DOE STEM educational programs, but it does not identify any of them as either new America COMPETES Act initiatives or specify if some of the existing programs have been modified to accommodate the act. In addition, the DOE Office of Science does not mention the Early Career Awards for Science, Engineering, and Mathematics Researchers program.

In congressional testimony, however, the Administration has identified two DOE STEM education programs and the early career researcher program from the act as included in the FY2009 budget request. The DOE Summer Institutes authorization in the act is \$20 million in FY2009. According to the testimony, funding for these institutes is requested for \$6 million in FY2009, through DOE's existing Academies Creating Teacher Scientists (ACTS) Program.¹⁹ The Protecting America's Competitive Edge (PACE) Graduate Fellowship Program is requested for \$19 million in FY2009, above the act authorization level of \$12 million in FY2009.²⁰ The Early Career Awards for Science, Engineering, and Mathematics Researchers program is authorized for \$25.0 million in FY2009; the testimony requests FY2009 funding of \$10 million.

Some of the COMPETES Act programs have additional requirements that may be beyond those that may be part of existing programs. For example, the America COMPETES Act's DOE summer institutes programs has prioritization criteria focused on teachers from a wide range of school districts, high-need school districts, and underrepresented groups; coordination and consultation requirements with DOE and NSF; and evaluation and accountability plan requirements, which may or may not be an element of the existing DOE ACTS program.

The FY2009 budget request does not mention either establishing a DOE STEM Education fund or appointing a DOE STEM education program director.

Department of Education

The ED's mission is to “promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal

¹⁹ Attachment 4 in Testimony of Dr. John Marburger, III, Director, White House Office of Science and Technology Policy, House Committee on Science and Technology, *Funding for the America COMPETES Act in the FY2009 Administration Budget Request*, hearing, 110th Congress, 2nd session, February 14, 2008 at [http://democrats.science.house.gov/Media/File/Commdocs/hearings/2008/Full/14feb/Marburger_Testimony.pdf].

²⁰ Ibid.

access.”²¹ Among its activities, ED establishes policies on and distributes and monitors federal financial aid for education.²²

The America COMPETES Act authorizes the establishment of several new STEM education programs, including Teachers for a Competitive Tomorrow, the Advanced Placement and International Baccalaureate Program, Math Now, and the Advancing America Through Foreign Language Partnership Program.

Congress appropriated FY2008 funding for the Teachers for a Competitive Tomorrow program, which supports the development and implementation of higher education programs including a STEM baccalaureate degree with concurrent teacher certification, a part-time master’s degrees in STEM or critical foreign languages for current teachers, and programs for professional scientists and engineers to pursue master’s degrees that enable teacher certification. The FY2009 ED budget summary proposes to eliminate this program, indicating that these “activities can be funded under other Federal programs.”²³

The FY2009 ED budget summary indicates that the America COMPETES Act’s Advanced Placement and International Baccalaureate Program would provide a new vision for the existing ED Advanced Placement Incentive Program (API) authorized under Title I, Part G, of the Elementary and Secondary Education Act (ESEA). This new direction includes increasing access to classes and tests for low-income students, preparation of teachers in high-need schools, and non-federal organizations contributing funds to the program. The America COMPETES Act authorizes \$75.0 million for the Advanced Placement and International Baccalaureate Program in FY2009. The President’s FY2009 budget requests \$70.0 million. Approximately \$22.0 million would support previously existing API activities, while approximately \$47.0 million would support America COMPETES Act activities.

The Math Now program is part of the President’s ACI. The ED FY2009 budget summary proposes funding it at its full authorization level, \$95 million.

The Advancing America Through Foreign Language Partnership Program funds partnerships between higher education institutions and school districts to enhance postsecondary level language learning. For this program, the act authorizes \$28.0 million in FY2008 and such sums as may be necessary for FY2009. The President’s FY2009 budget requests \$24.0 million to support 24 new awards in languages such as Arabic, Chinese, Indic, Iranian, and Turkic. This program supports the President’s National Security Language Initiative.

²¹ U.S. Department of Education, “About ED,” at [<http://www.ed.gov/about/landing.jhtml?src=gu>].

²² For more information on STEM Education activities, see CRS Report 98-871, *Science, Engineering, and Mathematics Education: Status and Issues*, by Christine M. Matthews, and CRS Report RL33434, *Science, Technology, Engineering, and Mathematics (STEM) Education: Background, Federal Policy, and Legislative Action*, by Jeffrey J. Kuenzi.

²³ ED FY2009 Budget Summary, section on programs proposed for elimination at [<http://www.ed.gov/about/overview/budget/budget09/summary/edlite-section3.html>].

No funding is mentioned in the ED budget summary for the following America COMPETES Act authorized programs: the Summer Term Education Program, the P-16 Alignment of Secondary School Graduate Requirements with the Demands of 21st Century Postsecondary Endeavors and Support for P-16 Education Data Systems, or the Mathematics and Science Partnership Bonus Grants. As noted previously, this may or may not mean that the programs will be funded, as some are below the organizational level specified in the budget documents.

National Science Foundation

The NSF supports science and engineering in general and funds basic research across many disciplines by supporting investigator-initiated, merit-reviewed, competitively selected awards, state-of-the-art tools, and instrumentation and facilities, primarily at U.S. colleges and universities.²⁴

The America COMPETES Act authorizes \$5,742.0 million for NSF's research and related activities (R&RA) account. The President's FY2009 budget requests funding of \$5,594.0 million. In some cases, such as the Major Research Instrumentation (MRI) and Faculty Early Career Development (CAREER) programs, the requested levels are close to those authorized in the act. Other R&RA programs have been funded below the authorized levels, including the Experimental Programs to Stimulate Competitive Research (EPSCoR), which the President's budget requests funding at \$113.5 million rather than the authorized level of \$133.2 million, and the Integrative Graduate Education and Research Traineeship (IGERT), for which the request is \$38.8 million rather than authorized level of \$52.5 million.

In the Education and Human Resources (EHR) directorate, the America COMPETES Act authorization is \$995.0 million, while the President's FY2009 budget requests \$790.0 million. Programs with requested funding well below that authorized include the Robert Noyce Teacher Scholarship program²⁵ (at \$11.6 million compared with an authorization of \$115.0 million) and the Mathematics and Science Education Partnership²⁶ (at \$51.0 million compared with an authorization of \$111.0 million). In contrast, the Graduate Research Fellowship (GRF) program is proposed for \$116.7 million, more than the authorization of \$107.2 million.

The two new NSF programs authorized in the America COMPETES Act have no funding requested for them. These are the Professional Science Master's Degree

²⁴ For more information on NSF, see CRS Report 95-307, *U.S. National Science Foundation: An Overview*, by Christine M. Matthews.

²⁵ The Robert Noyce Teacher Scholarship program encourages science, technology, engineering, and mathematics majors and professionals to become K-12 mathematics and science teachers by providing funds to institutions of higher education to support scholarships, stipends, and programs for students who commit to teaching in high-need K-12 school districts.

²⁶ The Math and Science Partnership program provides grants to teams composed of institutions of higher education, local K-12 school systems, and their supporting partners to develop and implement pioneering ways of advancing mathematics and science education for students.

Program and the Laboratory Science Pilot Program. NSF has a working group that is looking at options, suggestions, and recommendations for implementation of the NSF-related provisions in the act.²⁷ Thus, a lack of funding for these new programs in the FY2009 budget should not be presumed to indicate a lack of interest in them as a final decision regarding these programs has not yet been made.

²⁷ Email from Teresa Davies, Director, Legislative Affairs, NSF, to Deborah Stine on February 13, 2008.

Table 1. Comparison of the America COMPETES Act Authorizations, FY2008 Appropriations, and FY2009 Requests
(\$ millions)

Programs	FY2008 Authorization (America COMPETES Act, P.L. 110-69)	FY2008 Appropriation (Consolidated Appropriations Act, 2008, P.L. 110-161)	FY2009 Authorization (America COMPETES Act, P.L. 110-69)	FY2009 Request (President's Budget)
<i>Department of Commerce</i>				
National Institute of Standards and Technology (Sec. 3001)				
— Scientific & Technical Research and Services (STRS) (Sec. 3001)	\$502.1	\$440.5 ^a	\$541.9	\$535.0 ^a
— Construction & Maintenance (Sec. 3001)	150.9	160.5	86.4	99.0
— Technology Innovation Program (TIP) (Sec. 3001/3012)	100.0	65.2 ^b	131.5	0.0
— Manufacturing Extension Partnership (MEP) (Sec. 3001/3003)	110.0	89.6	122.0	4.0
<i>Department of Energy</i>				
DOE Science, Engineering and Mathematics Programs (Sec. 5003)				
— Pilot Program of Grants to Specialty Schools for Science and Mathematics (Sec. 5003) [NEW]	14.0	Not Included	22.5	Not Included

Programs	FY2008 Authorization (America COMPETES Act, P.L. 110-69)	FY2008 Appropriation (Consolidated Appropriations Act, 2008, P.L. 110-161)	FY2009 Authorization (America COMPETES Act, P.L. 110-69)	FY2009 Request (President's Budget)
— Experiential Based Learning Opportunities (Sec. 5003) [NEW]	7.5	Not Included	7.5	Not Included
— Summer Institutes (Sec. 5003) [NEW]	15.0	Not Included	20.0	Not Included
Nuclear Science Talent Expansion Program (Sec. 5004)				
— Nuclear Science Program Expansion Grants for Institutions of Higher Education (Sec. 5004) [NEW]	3.5	Not Included	6.5	Not Included
— Nuclear Science Competitiveness Grants for Institutions of Higher Education (Sec. 5004) [NEW]	3.0	Not Included	5.5	Not Included
Hydrocarbon Systems Science Talent Expansion Program (Sec. 5005)				
— Hydrocarbon Systems Science Program Expansion Grants for Institutions of Higher Education (Sec. 5005) [NEW]	3.5	Not Included	6.5	Not Included
— Hydrocarbon Systems Science Competitiveness Grants for Institutions of Higher Education (Sec. 5005) [NEW]	3.0	Not Included	5.5	Not Included

Programs	FY2008 Authorization (America COMPETES Act, P.L. 110-69)	FY2008 Appropriation (Consolidated Appropriations Act, 2008, P.L. 110-161)	FY2009 Authorization (America COMPETES Act, P.L. 110-69)	FY2009 Request (President's Budget)
Early Career Awards for Science, Engineering, and Mathematics Researchers (Sec. 5006) [NEW]	25.0	Not Included	25.0	Not Included
Office of Science (Sec. 5007) (as amends the Energy Policy Act of 2005 for FY2010)	4,586.0 ^c	3,973.1	5,200.0 ^c	4,721.9
Discovery Science and Engineering Innovation Institutes (Sec. 5008) [NEW]	10.0-30.0 ^d	Not Included	10.0-30.0 ^d	Not Included
Protecting America's Competitive Edge (PACE) Graduate Fellowship Program (Sec. 5009) [NEW]	7.5	Not Included	12.0	Not Included
Distinguished Scientist Program (Sec. 5011) [NEW]	15.0	Not Included	20.0	Not Included
Advanced Research Projects Agency — Energy [ARPA-E] (Sec. 5012) [NEW]	300.0	Not Included	Such sums as are necessary	Not Included

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Programs	FY2008 Authorization (America COMPETES Act, P.L. 110-69)	FY2008 Appropriation (Consolidated Appropriations Act, 2008, P.L. 110-161)	FY2009 Authorization (America COMPETES Act, P.L. 110-69)	FY2009 Request (President's Budget)
<i>Department of Education</i>				
Teachers for a Competitive Tomorrow: Baccalaureate Degrees in Science, Technology, Engineering, Mathematics, or Critical Foreign Languages, with Concurrent Teacher Certification (Sec. 6113, 6115, 6116) [NEW]	151.2	* 1.0	151.2	0.0
Teachers for a Competitive Tomorrow: Master's Degrees in Science, Technology, Engineering, and Mathematics, or Critical Foreign Language Education (Sec. 6114-6116) [NEW]	125.0	* 1.0	125.0	0.0
Advanced Placement and International Baccalaureate Programs (Sec. 6121-6123)	75.0	Not Included	Such sums as may be necessary	70.0 ^e
Promising Practices in Science, Technology, Engineering, and Mathematics Teaching (Sec. 6131) [NEW]	1.2	Not Included	0.0 ^f	Not Included
Math Now (Sec. 6201) [NEW]	95.0	* 0.0	Such sums as may be necessary	95.0
Summer Term Education Programs (Sec. 6202) [NEW]	Such sums as may be necessary	Not Included	Such sums as may be necessary	Not Included

Programs	FY2008 Authorization (America COMPETES Act, P.L. 110-69)	FY2008 Appropriation (Consolidated Appropriations Act, 2008, P.L. 110-161)	FY2009 Authorization (America COMPETES Act, P.L. 110-69)	FY2009 Request (President's Budget)
Advancing America Through Foreign Language Partnership Program (Sec. 6301-6304) [NEW]	28.0	Not Included	Such sums as may be necessary	24.0
P-16 Alignment of Secondary School Graduate Requirements with the Demands of 21st Century Postsecondary Endeavors and Support for P-16 Education Data Systems (Sec. 6401) [NEW]	120.0	Not Included	Such sums as may be necessary	Not Included
Mathematics and Science Partnership Bonus Grants (Sec. 6501) [NEW]	Such sums as may be necessary	Not Included	Such sums as may be necessary	Not Included
National Science Foundation (Sec. 7002)	6,600.0	6,065.0	7,326.0	6,854.1
Research and Related Activities	5,156.0	4,821.5	5,742.3	5,594.0
— Major Research Instrumentation (MRI) (Sec. 7002/Sec. 7036)	115.0	Not Included	123.1	115.0
— Faculty Early Career Development (CAREER) (Sec.7002)	165.4	Not Included	183.6	181.9
— Research Experiences for Undergraduates (REU) (Sec.7002)	61.6	Not Included	68.4	61.6

Programs	FY2008 Authorization (America COMPETES Act, P.L. 110-69)	FY2008 Appropriation (Consolidated Appropriations Act, 2008, P.L. 110-161)	FY2009 Authorization (America COMPETES Act, P.L. 110-69)	FY2009 Request (President's Budget)
— Experimental Programs to Stimulate Competitive Research (EPSCoR) (Sec.7002)	120.0	* 115.0	133.2	113.5
— Integrative Graduate Education and Research Traineeship/R&RA (IGERT) (Sec.7002) ^g	47.3	Not Included	52.5	38.8
— Graduate Research Fellowship/R&RA (GRF) (Sec.7002) ^h	9.0	Not Included	10.0	8.1
— Professional Science Master's Degree Program (Sec. 7002/7034) [NEW]	10.0	Not Included	12.0	Not Included
Education and Human Resources	896.0	725.6	995.0	790.4
— Mathematics and Science Education Partnership (MSP) (Sec.7002/7028)	100.0	Not Included	111.0	51.0
— Robert Noyce Teacher Scholarship Program (Sec.7002/7030)	89.8	* 15.0	115.0	11.6
— Science, Mathematics, Engineering, and Technology Talent Expansion (Sec.7002/7025)	40.0	Not Included	50.0	29.7
— Advanced Technological Education (ATE) (Sec.7002)	52.0	Not Included	57.7	51.6

Programs	FY2008 Authorization (America COMPETES Act, P.L. 110-69)	FY2008 Appropriation (Consolidated Appropriations Act, 2008, P.L. 110-161)	FY2009 Authorization (America COMPETES Act, P.L. 110-69)	FY2009 Request (President's Budget)
— Integrative Graduate Education and Research Traineeship/EHR (IGERT) (Sec.7002) ^g	27.1	Not Included	30.1	25.0
— Graduate Research Fellowship/EHR (GRF) (Sec.7002) ^h	96.6	Not Included	107.2	116.7
Major Research Equipment and Facilities Construction (Sec.7002)	245.0	220.7	262.0	147.5
Agency Operations and Award Management (Sec.7002)	285.6	281.8	309.8	305.1
National Science Board (Sec.7002)	4.1	4.0	4.2	4.0
Inspector General (Sec.7002)	12.4	11.4	12.8	13.1
Laboratory Science Pilot Program (Sec. 7026) [NEW]	5.0	Not Included	Such sums as may be necessary	Not Included

Sources: America COMPETES Act (P.L. 110-69); Consolidated Appropriations Act, 2008 (P.L. 110-161) and joint explanatory statement; *Congressional Record*, December 17, 2007. The FY2009 request information is based on FY2009 Congressional Budget Request documents from the Department of Energy and the National Science Foundation. The Department of Education FY2009 information is based on its Budget Summary. The NIST FY2009 request information is from the *Fiscal Year 2009 Budget of the U.S. Government*.

Notes: Section numbers refer to the America COMPETES Act (P.L. 110-69). [NEW] = a program that was not authorized prior to the America COMPETES Act. Not Included = programs not specifically identified in the President's budget request or an agency's budget estimate. * = number was in report language. All other appropriations are numbers from bill language.

- a. The President's budget request for STRS includes not only research activities, but also almost \$8 million in the FY2008 President's budget request and \$9 million in the FY2009 President's budget request for the Baldrige National Quality Award Program. According to NIST, "The Baldrige Award is given by the President of the United States to businesses — manufacturing and service, small and large — and to education, health care and nonprofit organizations that apply and are judged to be outstanding in seven areas: leadership; strategic planning; customer and market focus; measurement, analysis, and knowledge management; human resource focus; process management; and results." For more information, see [http://www.nist.gov/public_affairs/factsheet/baldfaq.htm].
- b. The following statement is made regarding TIP in the Consolidated Appropriations Act joint explanatory statement: "Of the amounts provided to ITS [Industrial Technology Services], \$65,200,000 is for the Technology Innovation Program as authorized by Public Law 110-69 [the America COMPETES Act]. TIP is structured to fund high-risk, high reward research focused on broad national needs such as advanced automotive batteries, aquaculture, novel lightweight materials, and other emerging technologies. The funding provided for TIP will address mortgage obligations relating to projects created under the Advanced Technology Program (ATP). The amended bill also includes language to allow the TIP immediate access to an additional \$5,000,000 from deobligations and prior-year recoveries from ATP."
- c. The America COMPETES Act amends the Energy Policy Act of 2005 (P.L. 109-58), Section 971(b), for FY2010. The authorization numbers provided here for FY2008 and FY2009 are from the Energy Policy Act (P.L. 109-58).
- d. The Secretary of Energy can decide to establish up to three institutes for each fiscal year. Each institute could receive \$10 million per year for three fiscal years.
- e. In the Department of Education FY2009 budget request, the Department states that the America COMPETES Act program, the Advanced Placement and International Baccalaureate Program, would provide a new "vision" for the existing Advanced Placement Incentive Program (API) authorized under Title I, Part G, of the Elementary and Secondary Education Act (ESEA). The request states that, "Of the requested amount [\$70 million], roughly \$12 million would be required to fund State applications for the Test Fees Program and approximately \$11 million would fund API continuation grants under the ESEA program, leaving an estimated \$47 million for new grants under the COMPETES Act authority. Funds available for new awards will support projects expanding AP offerings and participation in mathematics, science, and critical languages."
- f. The America COMPETES Act only authorizes funding for this activity, a study at the National Academy of Sciences, for FY2008.
- g. Two directorates of the National Science Foundation manage the Integrative Graduate Education and Research Traineeship (IGERT) program — the Education and Human Resources Directorate (EHR) and the Research and Related Activities (R&RA) directorate. The America COMPETES Act and the NSF budget request both identify the allocations for each directorate.
- h. Two directorates of the National Science Foundation manage the Graduate Research Fellowship (GRF) program — the Education and Human Resources Directorate (EHR) and the Research and Related Activities (R&RA) directorate. The America COMPETES Act and the NSF budget request both identify the allocations for each directorate.

Congressional Activities

Congress' initial response to the President's budget request is to develop a budget resolution that sets the budget spending amounts for each functional category of the budget.²⁸ It does not allocate funds among specific programs or accounts. The programs authorized in the America COMPETES Act fall into several budget functions such as 250 (General Science, Space and Technology),²⁹ 270 (Energy), 370 (Commerce and Housing Credit), and 500 (Education, Employment, Training and Social Services).³⁰

On March 13, 2008, the House passed its version of the FY2009 budget resolution (H.Con.Res. 312). On March 14, 2008, the Senate passed its version of the FY2009 budget resolution (S.Con.Res. 70). Major program assumptions underlying the functional amounts are often discussed in the reports accompanying the resolution. These program assumptions and budget functions, however, are not binding. The final step in the FY2009 budget resolution process is for Congress to reconcile the Senate and House budget resolutions in a conference report.³¹

Section 601 of the FY2009 House budget resolution (H.Con.Res. 312) includes a sense of the House on the innovation agenda and America COMPETES Act. It states that the resolution supports the efforts authorized in the America COMPETES Act by providing in Function 250 and Function 270 increased funding above that requested by the President for FY2009. In addition, the House budget resolution provides more funding than the President's budget requests for scientific research and education included in Function 370, Function 500, Function 550 (Health), and Function 300 (Environment and Natural Resources). The resolution also states that the increased funding in the resolution will support initiatives within the America COMPETES Act for STEM education initiatives, doubling NSF funding, physical sciences basic research, collaborative research partnerships, and research directed toward achieving energy independence through the development of clean and sustainable alternative energy technologies.

The Senate approved an amendment (S.Amdt. 4173) to the reported version of the FY2009 Senate budget resolution (S.Con.Res. 70) "to provide additional resources in FY2009 for investments in innovation and education in order to improve the competitiveness of the United States." In a committee print, the Senate Budget Committee states, "The Committee-reported resolution rejects elimination of MEP

²⁸ CRS Report 97-684, *The Congressional Appropriations Process: An Introduction*, by Sandy Streeter.

²⁹ Note that the DOE Office of Science is in budget function 250, not budget function 270.

³⁰ For more information on budget functions, see CRS Report 98-280, *Functional Categories of the Federal Budget*, by Bill Heniff Jr.

³¹ CRS Report 98-721, *Introduction to the Federal Budget Process*, by Robert Keith. This process is set forth in the Congressional Budget Act, Titles I-IX of the Congressional Budget and Impoundment Control Act of 1974 (P.L. 93-344; July 12, 1974; 88 Stat. 297-339), as amended and codified at 2 U.S.C. 621-692.

funding and restores the funding to this vital program to the level authorized in the America COMPETES Act.”³²

Funding decisions on an agency and program basis are made during the appropriations process. The House and Senate are to resolve differences in the budget resolution. The Conference Report on S.Con.Res. 70, The Concurrent Budget Resolution for 2009, includes in Section 522, a sense of the Congress on the Innovation Agenda and the America COMPETES Act. The resolution “supports the efforts authorized in the America COMPETES Act, providing substantially increased funding above the President’s requested level for 2009, and increased amounts after 2009.” The budget resolution also includes agreeing to an allocation to the House Committee on Appropriations and the Senate Committee on Appropriations. Once these allocations are received, the next step in the FY2009 budget process is for the House and Senate Appropriations Committees to subdivide the amounts they receive from the budget committee among the appropriations committees’ 12 subcommittees.³³

The Appropriations Committees jurisdiction for the federal agencies that have programs authorized by the America COMPETES Act programs are divided among at least three Appropriations subcommittees:

- Commerce, Justice, Science, and Related Agencies: NSF, NIST, NASA, and OSTP;
- Energy and Water Development: DOE;
- Labor, Health and Human Services, Education, and Related Agencies: ED.

The CRS *FY2009 Status Table of Appropriations* is updated on a regular basis as Congress takes action throughout the appropriations process.³⁴

³² U.S. Senate, Committee on the Budget, *Concurrent Resolution on the Budget, FY 2009, Committee Print to Accompany, S.Con.Res. 70 Together with Additional Views and Minority Views*, S. Prt. 110 — 039, March 2008.

³³ For additional information on the appropriations process, see CRS Report 97-684, *The Congressional Appropriations Process: An Introduction*, by Sandy Streeter.

³⁴ This table is available at [<http://www.crs.gov/products/appropriations/appover.shtml>].