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RESEARCH FOR COMPETITIVENESS ACT

JUNE 22, 2006.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. BOEHLERT, from the Committee on Science, submitted the following

R E P O R T

[To accompany H.R. 5356]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, to whom was referred the bill (H.R. 5356) to authorize the National Science Foundation and the Department of Energy Office of Science to provide grants to early career researchers to establish innovative research programs and integrate education and research, and for other purposes, having considered the same, report favorably thereon with amendments and recommend that the bill as amended do pass.

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49–006

AMENDMENT

The amendments are as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Research for Competitiveness Act".

SEC. 2. NATIONAL SCIENCE FOUNDATION EARLY CAREER AWARDS FOR SCIENCE AND ENGINEERING RESEARCHERS.

(a) IN GENERAL.—The Director of the National Science Foundation shall carry out a program to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and organizations described in subsection (c)(2) to conduct research in fields relevant to the mission of the Foundation. The existing Faculty Early Career Development (CAREER) Program may be designated as the mechanism for awarding such grants.

(b) SIZE AND DURATION OF AWARD.—The duration of awards under this section shall be 5 years, and the amount per year shall be at least $80,000.

(c) ELIGIBILITY.—Award recipients shall be individuals who are employed in a tenure-track position as an assistant professor or equivalent title, or who hold an equivalent position, at—

(1) an institution of higher education in the United States; or

(2) an organization in the United States that is a nonprofit, nondegree-granting research organization such as a museum, observatory, or research laboratory.

(d) SELECTION.—Award recipients shall be selected on a competitive, merit-reviewed basis.

(e) SELECTION PROCESS AND CRITERIA FOR AWARDS.—An applicant seeking funding under this section shall submit a proposal to the Director at such time, in such manner, and containing such information as the Director may require. In evaluating the proposals submitted under this section, the Director shall consider, at a minimum—

(1) the intellectual merit of the proposed work;

(2) the innovative or transformative nature of the proposed research;

(3) the extent to which the proposal integrates research and education, including undergraduate education in science and engineering disciplines; and

(4) the potential of the applicant for leadership at the frontiers of knowledge.

(f) AWARDS.—In awarding grants under this section, the Director shall endeavor to ensure that the recipients are from a variety of types of institutions of higher education and nonprofit, nondegree-granting research organizations. In support of this goal, the Director shall broadly disseminate information about when and how to apply for grants under this section, including by conducting outreach to Historically Black Colleges and Universities that are part B institutions as defined in section 322(2) of the Higher Education Act of 1965 (20 U.S.C. 1061(2)) and minority institutions (as defined in section 365(3) of that Act (20 U.S.C. 1067k(3))).

(g) AUTHORIZATION OF APPROPRIATIONS.—For each of the fiscal years 2007 through 2011, the Director shall allocate at least 3.5 percent of funds appropriated to the National Science Foundation for Research and Related Activities to the grants program under this section.

(h) REPORT.—Not later than 6 months after the date of enactment of this Act, the Director shall transmit to the Committee on Science of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate a report describing the distribution of the institutions of the awardees of the Faculty Early Career Development Program since fiscal year 2001 among each of the categories of institutions of higher education defined by the Carnegie Foundation for the Advancement of Teaching and the organizations in subsection (c)(2).

(i) EVALUATION.—Not later than 2 years after the date of enactment of this Act, the Director shall transmit to the Committee on Science of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate a report evaluating the impact of the Faculty Early Career Development Program on the ability of young faculty to compete for National Science Foundation research grants.

SEC. 3. DEPARTMENT OF ENERGY EARLY CAREER AWARDS FOR SCIENCE AND ENGINEERING RESEARCHERS.

(a) IN GENERAL.—The Director of the Office of Science of the Department of Energy shall carry out a program to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and organizations described in subsection (c)(2) to conduct research in fields relevant to the mission of the Department.

(b) SIZE AND DURATION OF AWARD.—The duration of awards under this section shall be up to 5 years, and the amount per year shall be at least $80,000.

(c) ELIGIBILITY.—Award recipients shall be individuals who are employed in a tenure-track position as an assistant professor or equivalent title, or who hold an equivalent position, at—

(1) an institution of higher education in the United States; or

(2) an organization in the United States that is a nonprofit, nondegree-granting research organization such as a museum, observatory, or research laboratory.

(d) SELECTION.—Award recipients shall be selected on a competitive, merit-reviewed basis.

(e) SELECTION PROCESS AND CRITERIA FOR AWARDS.—An applicant seeking funding under this section shall submit a proposal to the Director at such time, in such manner, and containing such information as the Director may require. In evaluating the proposals submitted under this section, the Director shall consider, at a minimum—

(1) the intellectual merit of the proposed work;

(2) the innovative or transformative nature of the proposed research;

(3) the extent to which the proposal integrates research and education, including undergraduate education in science and engineering disciplines; and

(4) the potential of the applicant for leadership at the frontiers of knowledge.

(f) COLLABORATION WITH NATIONAL LABORATORIES.—In awarding grants under this section, the Director shall give priority to proposals in which the proposed work includes collaboration with the Department of Energy National Laboratories.

(g) AWARDS.—In awarding grants under this section, the Director shall endeavor to ensure that the recipients are from a variety of types of institutions of higher education and nonprofit, nondegree-granting research organizations. In support of this goal, the Director shall broadly disseminate information about when and how to apply for grants under this section, including by conducting outreach to Historically Black Colleges and Universities that are part B institutions as defined in section 322(2) of the Higher Education Act of 1965 (20 U.S.C. 1061(2)) and minority institutions (as defined in section 365(3) of that Act (20 U.S.C. 1067k(3))).

(h) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary of Energy to carry out the Director's responsibilities under this section $25,000,000 for each of the fiscal years 2007 through 2011.

(i) REPORT ON RECRUITING AND RETAINING EARLY CAREER SCIENCE AND ENGINEERING RESEARCHERS AT THE NATIONAL LABORATORIES.—Not later than 3 months after the date of enactment of this Act, the Director shall transmit to the Committee on Science of the House of Representatives and to the Committee on Energy and Natural Resources of the Senate a report on efforts to recruit and retain young scientists and engineers at the early stages of their careers at the Department of Energy National Laboratories. The report shall include—

(1) a description of Department of Energy and National Laboratory policies and procedures, including financial incentives, awards, promotions, time set aside for independent research, access to equipment or facilities, and other forms of recognition, designed to attract and retain young scientists and engineers;

(2) an evaluation of the impact of these incentives on the careers of young scientists and engineers at Department of Energy National Laboratories, and also on the quality of the research at the National Laboratories and in Department of Energy programs;

(3) a description of what barriers, if any, exist to efforts to recruit and retain young scientists and engineers, including limited availability of full time equivalent positions, legal and procedural requirements, and pay grading systems; and

(4) the amount of funding devoted to efforts to recruit and retain young researchers and the source of such funds.

SEC. 4. REPORT ON NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY EFFORTS TO RECRUIT AND RETAIN EARLY CAREER SCIENCE AND ENGINEERING RESEARCHERS.

Not later than 3 months after the date of enactment of this Act, the Director of the National Institute of Standards and Technology shall transmit to the Committee on Science of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate a report on efforts to recruit and retain young scientists and engineers at the early stages of their careers at the National Institute of Standards and Technology laboratories and joint institutes. The report shall include—

(1) a description of National Institute of Standards and Technology policies and procedures, including financial incentives, awards, promotions, time set aside for independent research, access to equipment or facilities, and other

forms of recognition, designed to attract and retain young scientists and engineers;

(2) an evaluation of the impact of these incentives on the careers of young scientists and engineers at the National Institute of Standards and Technology, and also on the quality of the research at the National Institute of Standards and Technology's laboratories and in the National Institute of Standards and Technology's programs;

(3) a description of what barriers, if any, exist to efforts to recruit and retain young scientists and engineers, including limited availability of full time equivalent positions, legal and procedural requirements, and pay grading systems; and

(4) the amount of funding devoted to efforts to recruit and retain young researchers and the source of such funds.

SEC. 5. NATIONAL SCIENCE FOUNDATION RESEARCH AWARD MATCH PROGRAM.

(a) IN GENERAL.—The Director of the National Science Foundation shall carry out a program to award grants on a competitive, merit-reviewed basis to scientists and engineers at the early stage of their careers at institutions of higher education and organizations described in subsection (c)(2) to conduct high-risk, high-return research. The program shall support fundamental research with the potential for significant scientific or technical advancement.

(b) SIZE AND DURATION OF AWARD.—

(1) BASE AWARD.—The duration of awards under this section shall be up to 5 years, and the amount per year shall be up to $75,000. The funding awarded under this paragraph shall not be contingent on the receipt of funds under paragraph (2).

(2) MATCHING AWARD.—Each year that a recipient is receiving funding under paragraph (1), the National Science Foundation shall match any funds the recipient receives from United States industry for work in the area described in the recipient's application for the award, up to an additional $37,500.

(c) ELIGIBILITY.—Applicants for awards under this section shall be individuals who are employed in a tenure-track position as an assistant professor or equivalent title, or who hold an equivalent position, at—

(1) an institution of higher education in the United States; or

(2) an organization in the United States that is a nonprofit, nondegree-granting research organization such as a museum, observatory, or research laboratory.

However, a recipient awarded a grant under this section may continue to receive funding under the grant regardless of whether the recipient has been granted tenure after the awarding of the grant.

(d) OUTREACH.—The Director shall broadly disseminate information about when and how to apply for grants under this section, including by conducting outreach to Historically Black Colleges and Universities that are part B institutions as defined in section 322(2) of the Higher Education Act of 1965 (20 U.S.C. 1061(2)) and minority institutions (as defined in section 365(3) of that Act (20 U.S.C. 1067k(3))).

(e) APPLICATION.—Applicants for awards under this section shall submit to the Director—

(1) a curriculum vitae or resume, including a list of publications and a description of any activities demonstrating leadership or educational activities;

(2) a description of research areas of interest;

(3) letters of recommendation; and

(4) any other materials the Director requires.

(f) CRITERIA FOR AWARDS.—In establishing criteria for evaluation of applications for grants under this section, the Director shall include—

(1) the potential of the applicant for leadership at the frontiers of knowledge;

(2) the potential innovative or transformative nature of research in the areas of interest described in the application;

(3) the creativity of the applicant as determined by criteria set by the Director, including creativity demonstrated in past research activities; and

(4) the potential interest to industry of research in the areas of interest described in the application.

(g) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Director of the National Science Foundation to carry out this section—

(1) $3,000,000 for fiscal year 2007;

(2) $6,000,000 for fiscal year 2008;

(3) $9,000,000 for fiscal year 2009;

(4) $12,000,000 for fiscal year 2010; and

(5) $15,000,000 for fiscal year 2011.

SEC. 6. DEPARTMENT OF ENERGY RESEARCH AWARD MATCH PROGRAM.

(a) IN GENERAL.—The Director of the Office of Science of the Department of Energy shall carry out a program to award grants on a competitive, merit-reviewed basis to scientists and engineers at the early stage of their careers at institutions of higher education and organizations described in subsection (d)(2) to conduct high-risk, high-return research in areas related to energy production, storage, and use. The program shall support fundamental research with the potential for significant scientific or technical advancement.

(b) INVOLVEMENT OF DEPARTMENT OF ENERGY ORGANIZATIONS.—In carrying out this program, the Director shall consult with the research, development, demonstration, and commercial application programs of the Office of Nuclear Energy Research and Development, the Office of Fossil Energy, and the Office of Energy Efficiency and Renewables.

(c) SIZE AND DURATION OF AWARD.—

(1) BASE AWARD.—The duration of awards under this section shall be up to 5 years, and the amount per year shall be up to $75,000. The funding awarded under this paragraph shall not be contingent on the receipt of funds under paragraph (2).

(2) MATCHING AWARD.—Each year that a recipient is receiving funding under paragraph (1), the Department of Energy Office of Science shall match any funds the recipient receives from United States industry for work in the area described in the recipient's application for the award, up to an additional $37,500.

(d) ELIGIBILITY.—Applicants for awards under this section shall be individuals who are employed in a tenure-track position as an assistant professor or equivalent title, or who hold an equivalent position, at—

(1) an institution of higher education in the United States; or

(2) an organization in the United States that is a nonprofit, nondegree-granting research organization such as a museum, observatory, or research laboratory.

However, a recipient awarded a grant under this section may continue to receive funding under the grant regardless of whether the recipient has been granted tenure after the awarding of the grant.

(e) OUTREACH.—The Director shall broadly disseminate information about when and how to apply for grants under this section, including by conducting outreach to Historically Black Colleges and Universities that are part B institutions as defined in section 322(2) of the Higher Education Act of 1965 (20 U.S.C. 1061(2)) and minority institutions (as defined in section 365(3) of that Act (20 U.S.C. 1067k(3))).

(f) APPLICATION.—Applicants for awards under this section shall submit to the Director—

(1) a curriculum vitae or resume, including a list of publications and a description of any activities demonstrating leadership or educational activities;

(2) a description of research areas of interest;

(3) letters of recommendation; and

(4) any other materials the Director requires.

(g) CRITERIA FOR AWARDS.—In establishing criteria for evaluation of applications for the grants awarded under subsection (a), the Director shall include—

(1) the potential for leadership at the frontiers of knowledge by the applicant;

(2) the potential innovative or transformative nature of research in the areas of interest described in the application;

(3) the creativity of the applicant as determined by criteria set by the Director, including creativity demonstrated in past research activities; and

(4) the potential interest to industry of research in the areas of interest described in the application.

(h) COLLABORATION WITH NATIONAL LABORATORIES.—In awarding grants under this section, the Director may give priority to applications in which the proposed work includes collaboration with the Department of Energy National Laboratories.

(i) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary of Energy to carry out the Director's responsibilities under this section—

(1) $2,000,000 for fiscal year 2007;

(2) $4,000,000 for fiscal year 2008;

(3) $6,000,000 for fiscal year 2009;

(4) $8,000,000 for fiscal year 2010; and

(5) $10,000,000 for fiscal year 2011.

SEC. 7. MAJOR RESEARCH INSTRUMENTATION.

(a) NATIONAL SCIENCE FOUNDATION PROGRAM.—Awards under the Major Research Instrumentation Program described in section 13 of the National Science

Foundation Authorization Act of 2002 shall range in amount between $100,000 and $20,000,000 and may be used to support the operations and maintenance of instrumentation and equipment acquired under the program.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Science Foundation for this program, $94,200,000 for fiscal year 2007, $100,800,000 for fiscal year 2008, $107,800,000 for fiscal year 2009, $115,300,000 for fiscal year 2010, and $123,400,000 for fiscal year 2011.

SEC. 8. DONATIONS.

Section 11(f) of the National Science Foundation Act of 1950 (42 U.S.C. 1870(f)) is amended by inserting at the end before the semicolon ", except that funds may be donated for specific prize competitions".

SEC. 9. PROGRAM TO FOSTER CROSS-DISCIPLINARY RESEARCH.

(a) IN GENERAL.—The Director shall establish a program to award grants for long-term, potentially path-breaking, basic research designed to simultaneously advance the physical and nonbiomedical life sciences.

(b) MERIT REVIEW.—Grants shall be awarded under this section on a competitive, merit-reviewed basis. The Director shall ensure that review panels for proposals received under this section include both physical scientists and nonbiomedical life scientists, and, when appropriate, engineers. The Director shall ensure that review panels for proposals received under this section are open to approving high-risk research.

(c) AWARDS.—The Director may award grants under this section to individuals, groups, and centers. The Director shall ensure that some of the grants awarded under section 2 are awarded consistent with this section.

(d) APPLICATION AND SELECTION.—Applications for grants under this section shall be submitted to the Director at such time, in such manner, and containing such information as the Director may require. At a minimum, applications shall contain a brief description of how the proposed research will advance both the physical and nonbiomedical life sciences. In evaluating applications, the Director shall consider, at a minimum, how significantly the research would advance both the physical and nonbiomedical life sciences.

(e) OTHER AGENCIES.—The Director may carry out this program jointly with the Department of Energy Office of Science and other relevant Federal agencies.

(f) REPORT.—The documents prepared by the Director to accompany the annual Presidential budget submission shall specify amounts to be expended on the program in this section.

SEC. 10. RESEARCH ON INNOVATION AND INVENTIVENESS.

In carrying out its research programs on science policy and on the science of learning, the National Science Foundation may support research on the process of innovation and the teaching of inventiveness.

SEC. 11. NASA'S CONTRIBUTION TO INNOVATION.

(a) SENSE OF THE CONGRESS.—It is the sense of the Congress that—

(1) a balanced science program as authorized by section 101(d) of the National Aeronautics and Space Administration Authorization Act of 2005 (Public Law 109–155) contributes significantly to innovation in and the economic competitiveness of the United States; and

(2) a robust National Aeronautics and Space Administration, funded at the levels authorized under sections 202 and 203 of that Act, would offer a balance among science, aeronautics, exploration, and human space flight programs, all of which can attract and employ scientists, engineers, and technicians across a broad range of fields in science, technology, mathematics, and engineering.

(b) PARTICIPATION IN INNOVATION AND COMPETITIVENESS PROGRAMS.—The Administrator of the National Aeronautics and Space Administration shall fully participate in any interagency efforts to promote innovation and economic competitiveness through scientific research and development within the spending levels cited in subsection (a).

SEC. 12. NASA WORKFORCE TRAINING.

(a) ESTABLISHMENT.—The Administrator of the National Aeronautics and Space Administration may establish a NASA Academy, which may be established as a virtual Academy using online learning techniques. The Academy, if established, shall be available to all employees of the National Aeronautics and Space Administration to facilitate increased knowledge of engineering and scientific principles to further the missions of the National Aeronautics and Space Administration.

(b) PURPOSE.—The purpose of the Academy is to provide a unique training program to bridge the gap between the broad-based training provided by universities and the specific training needed to understand the different technologies which form

the basis for work at the National Aeronautics and Space Administration, as well as to update employees with the most current training available in the various skills and disciplines needed at the National Aeronautics and Space Administration.

(c) SUBMISSION OF PLAN.—Not later than 180 days after the date of enactment of this Act, the Administrator of the National Aeronautics and Space Administration shall transmit to the Committee on Science of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a notification of whether the National Aeronautics and Space Administration will establish an Academy as described in subsection (a). If an Academy is to be established, then concurrent with the notification, the Administrator shall transmit a plan for the establishment of the Academy.

SEC. 13. DEFINITIONS.

In this Act—

(1) the term "institution of higher education" has the meaning given such term in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)); and

(2) the term "National Laboratory" has the meaning given the term "nonmilitary energy laboratory" in section 903(3) of the Energy Policy Act of 2005 (42 U.S.C. 16182(3)).

Amend the title so as to read:

A bill to authorize the National Science Foundation and the Department of Energy Office of Science to provide grants to early career researchers to establish innovative research programs and integrate education and research and to conduct high-risk, high-return research, and for other purposes.

II. PURPOSE OF THE BILL

The purpose of the bill is to bolster the research base in the United States by strengthening federal investment in the basic research that provides the background knowledge necessary for future technology developments. The bill authorizes programs at the National Science Foundation (NSF), the Department of Energy (DOE) Office of Science, and the National Aeronautics and Space Administration (NASA).

III. BACKGROUND AND NEED FOR THE LEGISLATION

SCIENCE, TECHNOLOGY, AND GLOBAL COMPETITIVENESS

While the U.S. continues to lead the world in measures of innovation capacity—research and development (R&D) spending, number of scientists and engineers, scientific output, etc.—recent statistics on the level of U.S. support for research relative to other countries indicate that this lead may be slipping. At the same time, other nations—particularly emergent nations such as China and India—have recognized the importance of innovation to economic growth, and are pouring resources into their scientific and technological infrastructure, rapidly building their innovation capacity and increasing their ability to compete with the United States in the global economy.

AMERICAN COMPETITIVENESS INITIATIVE

The American Competitiveness Initiative, announced by the President in the 2006 State of the Union address, calls for doubling the combined (not necessarily the individual) budgets of NSF, the National Institute of Standards and Technology (NIST), and the DOE Office of Science over the next 10 years. The proposed funding increases are targeted to high-priority research areas, including alternative energy technologies, nanotechnology, supercomputing, manufacturing, cybersecurity, the performance of structures during

disasters, and improvements in the U.S. scientific infrastructure, such as research facilities and government laboratories. These investments are expected to support the development of the next generation of transformative technologies.

FEDERAL ROLE IN INNOVATION

A number of recent reports have outlined the issues that the U.S. faces as it tries to maintain a position of leadership and offered recommendations of what the U.S. should do to ensure its economic and national security. The National Academy of Sciences (NAS) report, Rising Above the Gathering Storm, describes how science and engineering are critical to American prosperity, examines how the U.S. is doing relative to other countries in science and technology today, and makes recommendations on how federal programs in support of research and education could be improved to position the U.S. to make the next generation of innovations needed to maintain U.S. competitiveness and security going forward. Other reports on this topic include the National Innovation Initiative from the Council on Competitiveness, which emphasizes the need to strengthen the innovation infrastructure in the U.S. to ensure future prosperity, and the National Defense Education and Innovation Initiative, from the Association of American Universities, which focuses on actions universities and the federal government can take to meet oncoming economic and security challenges.

This Act focuses on research elements of the recommendations made in these reports by strengthening federal support for innovative research and for science and engineering researchers at the early stages of their careers, authorizing funding for research infrastructure, and establishing a program for interdisciplinary research.

Support for young researchers is essential because they face the greatest hurdles in setting up laboratories and obtaining research grants, yet they are the most likely researchers to cross traditional disciplinary boundaries and do path breaking work.

IV. SUMMARY OF HEARINGS

On Thursday, July 21, 2005, the Committee on Science held a hearing to examine the relationship between federal science and engineering research and education investments and U.S. economic competitiveness. The witnesses were Mr. Nicholas Donofrio, Executive Vice President for Innovation and Technology at IBM Corporation; Mr. John Morgridge, Chairman of Cisco Systems, Incorporated, and part-time professor at Stanford University's Graduate School of Business; and Dr. William Brody, President of The Johns Hopkins University and co-chair of the Council on Competitiveness working group that authored the National Innovation Initiative.

The witnesses emphasized that the educational system needs to provide students with a solid background in science and engineering fields so that the U.S. has access to a technologically-literate workforce. The witnesses also stressed that investments in basic university research provide the background knowledge necessary for future technology developments.

On Thursday, October 20, 2005, the Committee on Science held a hearing to receive testimony on the report released by NAS on

October 12 entitled Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future. The report, which was requested by Congress, recommends ways to strengthen research and education in science and technology. The witnesses were Mr. Norman R. Augustine, retired Chairman and CEO of the Lockheed Martin Corporation (Mr. Augustine chaired the committee that wrote the report); Dr. P. Roy Vagelos, retired Chairman and CEO of Merck & Co. (Dr. Vagelos served on the committee that wrote the report), and Dr. William A. Wulf, President of the National Academy of Engineering.

The witnesses emphasized that solving the problems of global economic competition requires significant improvements to America's K–12 and higher education systems and greater support for basic research, including innovative research in cutting-edge fields. The witnesses also stressed that the U.S. ability to innovate has been the source of U.S. prosperity and security, so future policy decisions should be aimed at generating an environment that supports innovation by creating a vibrant research base, educated workforce, and social climate that encourages students to pursue science and technology degrees.

V. Committee Actions

On May 11, 2006, Representative Michael T. McCaul; Representative Sherwood Boehlert, Chairman of the Committee on Science; Representative Lamar S. Smith; Representative Ken Calvert, Chairman of the Space Subcommittee; Representative Vernon J. Ehlers, Chairman of the Environment, Technology, and Standards Subcommittee; Representative Judy Biggert, Chairman of the Energy Subcommittee; Representative Bob Inglis, Chairman of the Research Subcommittee; and Representative John J. H. "Joe" Schwarz introduced H.R. 5356, the Early Career Research Act, a bill to authorize NSF and the DOE Office of Science to provide grants to early career researchers to establish innovative research programs and integrate education and research, and for other purposes.

The Full Committee on Science met on Wednesday, June 7, 2006, to consider the bill.

- Mr. McCaul, Mr. Boehlert, Mr. Gordon, and Ms. Hooley offered an amendment in the nature of a substitute that changed the title of the bill to the Research for Competitiveness Act, inserted the provisions of H.R. 5357 into this bill, added authorization for an existing research infrastructure program at NSF, added language on NSF research at the interface between the physical and nonbiomedical life sciences, and added provisions related to NASA and to research on inventiveness. The amendment was adopted by a voice vote.
- Mr. Miller of North Carolina offered an amendment to add a new section to create a program at NSF to give grants to universities to establish precompetitive technology transfer centers. A unanimous consent request to withdraw the amendment was agreed to.

Mr. Gordon moved that the Committee favorably report the bill, H.R. 5356, to the House with the recommendation that the bill do pass, and that the staff be instructed to make technical and conforming changes to the bill and prepare the legislative report and

that the Chairman take all necessary steps to bring the bill before the House for consideration. With a quorum present, the motion was agreed to by a voice vote.

VI. Summary of Major Provisions of the Bill, as Reported

- Authorizes an existing NSF program that helps fund young faculty in which NSF provides grants of at least $80,000 per year for five years to help researchers establish a lab and pursue risky research in emerging fields and ensures that this NSF program grows proportionally with the overall NSF budget by setting aside 3.5 percent of the agency's research funding for this program.
- Authorizes $25 million at the DOE Office of Science for each of fiscal years 2007 through 2011 for a similar program to support research by new faculty.
- Authorizes grants to early career researchers in which NSF and DOE would provide up to $75,000 per year for up to five years, and make an additional $37,500 available each year provided the researcher raises one-to-one matching funds from private industry for the proposed research.
- Requires DOE to provide to Congress within three months a report on efforts to recruit and retain young scientists and engineers at the early stages of their careers at the DOE National Laboratories. Requires NIST to provide a similar report for early career researchers at NIST.
- Modifies and authorizes appropriations for an existing NSF program, Major Research Instrumentation, which provides grants to purchase and support cross-disciplinary, shared scientific and engineering equipment, such as electron microscopes, telescopes, and supercomputers, at institutions of higher education.
- Amends the National Science Foundation Act of 1950 to allow NSF to accept donations for specific prize competitions.
- Authorizes a program at NSF to fund potentially pathbreaking basic research designed to simultaneously advance the physical and nonbiomedical life sciences.
- Allows NSF to support research on the process of innovation and the teaching of inventiveness.
- States the sense of Congress that a balanced science program at NASA contributes significantly to innovation in the United States and allows NASA to establish a NASA Academy to provide a scientific and engineering training program for NASA employees.

VII. Section-by-Section Analysis (By Title and Section), as Reported

Sec. 1. Short title

"Research for Competitiveness Act."

Sec. 2. National Science Foundation early career awards for science and engineering researchers

Establishes a program at NSF to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions. Allows the existing Faculty

Early Career Development (CAREER) Program to be designated as the mechanism for awarding such grants. Sets the duration of the awards to be five years and the amount per year to be at least $80,000. Eligible applicants are tenure-track faculty at institutions of higher education or the equivalent at research organizations, such as observatories. Requires the award recipients to be selected on a competitive, merit-reviewed basis, based on the intellectual merit of the proposed work; the innovative or transformative nature of the proposed research; the extent to which the proposal integrates research and education, including undergraduate education in science and engineering disciplines; and the potential of the applicant for leadership at the frontiers of knowledge. Requires the Director of NSF to allocate at least 3.5 percent of funds appropriated for Research and Related Activities each year to the grants program under this section.

Requires the Director of NSF to provide to Congress within six months a report describing the distribution of the CAREER Program awardees since fiscal year 2001 among different types of institutions. Requires the Director to provide to Congress within two years a report evaluating the impact of the CAREER Program on the ability of young faculty to compete for NSF research grants.

Sec. 3. Department of Energy early career awards for science and engineering researchers

Establishes at the DOE Office of Science a program to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions. Allows the awards to be for up to five years and the amount per year to be at least $80,000. Eligible applicants are tenure-track faculty at institutions of higher education or the equivalent at research organizations, such as observatories. Requires the award recipients to be selected on a competitive, merit-reviewed basis, based on the intellectual merit of the proposed work; the innovative or transformative nature of the proposed research; the extent to which the proposal integrates research and education, including undergraduate education in science and engineering disciplines; and the potential of the applicant for leadership at the frontiers of knowledge. Requires the Director of the Office of Science to give priority to proposals in which the proposed work includes collaboration with a National Laboratory. Authorizes appropriations for the program of $25,000,000 for each of the fiscal years 2007 through 2011.

Requires the Director of the Office of Science to provide to Congress within three months of enactment a report on efforts to recruit and retain young scientists and engineers at the early stages of their careers at the civilian National Laboratories. The report shall include a description of incentives for recruitment and retention, an evaluation of the effectiveness of the incentives, a description of barriers to recruitment and retention, and the amount and source of funding devoted to recruitment and retention efforts.

Sec. 4. Report on National Institute of Standards and Technology efforts to recruit and retain early career science and engineering researchers

Requires the Director of NIST to provide to Congress within three months of enactment a report on efforts to recruit and retain

young scientists and engineers at the early stages of their careers at NIST. The report shall include a description of incentives for recruitment and retention, an evaluation of the effectiveness of the incentives, a description of barriers to recruitment and retention, and the amount and source of funding devoted to recruitment and retention efforts.

Sec. 5. National Science Foundation Research Award Match Program

Establishes a program at NSF to award grants on a competitive, merit-reviewed basis to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions to conduct high-risk, high-return fundamental research with the potential for significant scientific or technical advancement. Sets the duration of the awards to be up to five years and the amount per year to be up to $75,000, with an additional $37,500 available each year as a one-to-one match for funds the awardee raises from industry for the proposed research. Eligible applicants are tenure-track faculty at institutions of higher education or the equivalent at research organizations, such as observatories. Requires the criteria for awardee selection to include the potential of the applicant for leadership at the frontiers of knowledge; the innovative or transformative nature of research in the areas of interest described in the application; the creativity of the applicant; and the potential interest to industry of research in the areas of interest described in the application. Authorizes appropriations for the program of $3,000,000 for fiscal year 2007; $6,000,000 for fiscal year 2008; $9,000,000 for fiscal year 2009; $12,000,000 for fiscal year 2010; and $15,000,000 for fiscal year 2011.

Sec. 6. Department of Energy Research Award Match Program

Establishes a program at the DOE Office of Science to award grants on a competitive, merit-reviewed basis to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions to conduct high-risk, high-return fundamental research with the potential for significant scientific or technical advancement. Sets the duration of the awards to be up to five years and the amount per year to be up to $75,000, with an additional $37,500 available each year as a one-to-one match for funds the awardee raises from industry for the proposed research. Eligible applicants are tenure-track faculty at institutions of higher education or the equivalent at research organizations, such as observatories. Requires the criteria for awardee selection to include the potential of the applicant for leadership at the frontiers of knowledge; the innovative or transformative nature of research in the areas of interest described in the application; the creativity of the applicant; and the potential interest to industry of research in the areas of interest described in the application. The Director of the Office of Science may give priority to proposals in which the proposed work includes collaboration with the National Laboratories. Authorizes appropriations for the program of $2,000,000 for fiscal year 2007; $4,000,000 for fiscal year 2008; $6,000,000 for fiscal year 2009; $8,000,000 for fiscal year 2010; and $10,000,000 for fiscal year 2011.

Sec. 7. Major Research Instrumentation

Expands the range of awards under the NSF Major Research Instrumentation Program to be between $100,000 and $20,000,000 and allows funding to be used to support the operations and maintenance of instrumentation and equipment acquired under the program. Authorizes appropriations for the program of $94,200,000 for fiscal year 2007; $100,800,000 for fiscal year 2008; $107,800,000 for fiscal year 2009; $115,300,000 for fiscal year 2010; and $123,400,000 for fiscal year 2011.

Sec. 8. Donations

Amends the National Science Foundation Act of 1950 to allow NSF to accept donations for specific prize competitions.

Sec. 9. Program to foster cross-disciplinary research

Establishes a program at NSF to award grants to individuals, groups, and centers for long-term, potentially path-breaking, basic research designed to simultaneously advance the physical and nonbiomedical life sciences. Requires the award recipients to be selected on a competitive, merit-reviewed basis. Requires the review panels to include both physical scientists and nonbiomedical life scientists, and, when appropriate, engineers, and to be open to approving high-risk research. Requires some of the grants awarded under the Early Career Program of Section 2 to be consistent with this section. Authorizes the NSF Director to carry out this program jointly with the DOE Office of Science and other relevant Federal agencies.

Sec. 10. Research on innovation and inventiveness

Allows NSF to support research on the process of innovation and the teaching of inventiveness.

Sec. 11. NASA's contribution to innovation

States the sense of Congress that a balanced science program at NASA contributes significantly to innovation and the economic competitiveness of the United States and that NASA shall, within the spending levels authorized in the NASA Authorization Act of 2005, fully participate in any interagency efforts to promote innovation and economic competitiveness through scientific research and development.

Sec. 12. NASA workforce training

Allows NASA to establish a NASA Academy, which may use online learning techniques, to provide a training program for NASA employees to bridge the gap between the broad-based training provided by universities and the specific scientific and engineering training needed to carry out the NASA missions. Requires the Administrator of NASA to notify Congress within 180 days if the Academy will be established and, if so, to provide a plan for its establishment.

Sec. 13. Definitions

Defines "Institution of Higher Education" and "National Laboratory" for this Act.

VIII. Committee Views

FUNDING FOR EARLY CAREER RESEARCHERS

A number of reports, including Rising Above the Gathering Storm from the NAS, emphasize the importance of funding researchers at the early stages of their careers in science and engineering. The Committee agrees that it is vital to provide support that allows young researchers to establish their laboratories and begin research projects that test accepted notions about existing fields and launch new fields. The Committee expects that NSF will continue its successful CAREER program, and the Act requires that, as overall funding for research expands at NSF, funding for CAREER expand proportionately to ensure that the pipeline of researchers remains strong. The Committee expects that DOE will build on its existing programs for young investigators to carry out the early career program authorized in this Act.

In the Research Award Match Programs authorized at NSF and DOE, the Committee emphasizes that the projects to be supported should be fundamental research. In evaluating the applications, NSF and DOE are expected to place particular emphasis on the potential for creativity of the applicant and his ideas, i.e. on funding the "person" and not just the "project," to empower recipients to propose and attempt high-risk risk, transformative research projects with the potential for significant scientific or technical advancement. This focus on the individual has been successfully emphasized in other grant programs, such as the Howard Hughes Medical Institute's Investigators Program.

Applicants do not need an industrial partner to apply for the grants under the Research Award Match Programs, and the base funding of $75,000 is available to an awardee each year independent of whether he receives funding for industry. In addition, awardees may receive federal matching funds for industry support in any year of the grant, independent of whether they have received it in the past. A goal of the program is to gain industry support for long-range, fundamental research that could have implications for industry down the road. The notion here is to fund the kind of basic research that once would be been funded by the great industrial laboratories.

In both the Early Career Awards Program and the Research Award Match Program authorized at DOE in this Act, the Committee authorizes DOE, in awarding the grants, to take into account whether the proposed work includes collaboration with the DOE National Laboratories. The Committee intends that use of DOE facilities, such as light sources, particle accelerators, nanoscale science research centers, and supercomputers, be considered as collaboration with the laboratories, provided there is substantial time spent at the facility or considerable interactions with DOE staff associated with the use.

The programs authorized in Sections 2, 3, 5, and 6 focus on encouraging and supporting the next generation of researchers at universities and non-profit research organizations. Equally critical is ensuring that Federal and National Laboratories can hire young researchers to replace the growing number of scientists at these laboratories that will be eligible for retirement in the coming years. The reports required in Sections 3 and 4 are designed to provide

the Committee with information on how the NIST and DOE National Laboratories are using their existing authorities to attract and retain early career researchers with training in fields of national importance.

SOCIAL, ECONOMIC, LEGAL, ETHICAL, AND CULTURAL QUESTIONS ASSOCIATED WITH ADVANCES IN INFORMATION TECHNOLOGY

Information technology offers tremendous benefits to society. Yet the advancements in information technology and its growing pervasiveness in our society also raises substantial social, economic, legal, ethical, and cultural questions. Artificial intelligence research, in particular, requires consideration of potential long-term consequences of advances in computer capabilities, including whether such advances would lead to computers (including both hardware and software) that may have the capacity for autonomy or self-awareness. Therefore, the Committee expects that NSF and DOE Office of Science, in carrying out the grant programs authorized in Sections 2, 3, and 9 of this Act, would consider research proposals to explore the development of technological means to maintain the security and securability of computers in order to inhibit self-awareness. The Committee also expects NSF and DOE Office of Science to consider proposals to study the ethical, legal, and societal concerns arising from the potential development of hardware and software that would be capable of mimicking human abilities to learn, reason, and make decisions.

MAJOR RESEARCH INSTRUMENTATION

Often cutting-edge research requires the development and use of complex new instruments or systems of instruments. The Major Research Instrumentation program at NSF supports the development and acquisition of equipment that is too large to be purchased under a single grant and that can and will be shared across labs, departments, or schools within an institution of higher education, or even across institutions. The Committee supports the continuation of this focus and expects NSF and institutions of higher education to work together to ensure that adequate support is provided for the specialized technical operations and maintenance of equipment developed and acquired under this program so that the maximum impact of the instrumentation on research and education is realized. The changes made to the MRI program by the Act to increase the maximum grant award size and to allow grant funds to be used for support of operations and maintenance of instruments acquired under the program are consistent with the recommendations of the NAS report, Advanced Research Instrumentation and Facilities.

In addition to the agency-wide Major Research Instrumentation program, NSF also runs field-specific instrumentation programs in various research directorates, and the Committee acknowledges and supports the appropriateness of these programs and the importance of the projects funded through them.

RESEARCH ON INNOVATION AND INVENTIVENESS

The Committee expects NSF, in supporting research on the process of invention and the teaching of inventiveness, to involve the

Directorate for Engineering, the Directorate for Social, Behavioral and Economic Sciences, and the Directorate for Education and Human Resources. In addition, the Committee expects that such activities might include research aimed at increasing understanding of the creative mind and creative environment, including studying the neural, cognitive and social factors that facilitate or inhibit moments of innovation and discovery and the social and cognitive processes underlying the development of curiosity and problem solving skills; developing measures of inventiveness; studying the cultural, social and geographic contexts of innovation, including examining the influence on inventiveness of flexible learning environments and the role of parents, teachers, and mentors; and examining what organizational forms and practices, including patents and other governmental policies, facilitate innovation, its transformation into products, and the movement of products to markets.

IX. Cost Estimate

A cost estimate and comparison prepared by the Director of the Congressional Budget Office under section 402 of the Congressional Budget Act of 1974 has been timely submitted to the Committee on Science prior to the filing of this report and is included in Section X of this report pursuant to House Rule XIII, clause 3(c)(3).

H.R. 5356 does not contain new budget authority, credit authority, or changes in revenues or tax expenditures. Assuming that the sums authorized under the bill are appropriated, H.R. 5356 does authorize additional discretionary spending, as described in the Congressional Budget Office report on the bill, which is contained in Section X of this report.

X. Congressional Budget Office Cost Estimate

June 20, 2006.

Hon. Sherwood L. Boehlert,
Chairman, Committee on Science,
House of Representatives, Washington, DC.

Dear Mr. Chairman: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 5356, the Research for Competitiveness Act.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contacts are Deborah Reis and Leigh Angres.

Sincerely,

Donald B. Marron,
Acting Director.

Enclosure.

H.R. 5356—Research for Competitiveness Act

Summary: H.R. 5356 would authorize appropriations for the Department of Energy (DOE) and the National Science Foundation (NSF) for research grant programs. CBO estimates that implementing H.R. 5356 would cost $67 million in 2007 and $1.2 billion over the 2007–2011 period, assuming appropriation of the specified and estimated amounts. Because H.R. 5356 would expand the authority of NSF to accept donations from nonfederal entities, enact-

ing the bill could effect revenues and direct spending, but CBO estimates that such effects would be insignificant.

H.R. 5356 contains no intergovernmental or private-sector mandates as defined by the Unfunded Mandates Reform Act (UMRA) and would not directly affect the budgets of state, local, or tribal governments.

Estimated cost to the Federal Government: The estimated budgetary impact of H.R. 5356 is shown in the following table. The costs of this legislation fall within budget function 250 (general science, space, and technology).

Basis of estimate

For this estimate, CBO assumes that H.R. 5356 will be enacted by the end of fiscal year 2006 and that the entire amounts authorized and estimated to be necessary will be appropriated for each year. Estimated outlays are based on historical spending patterns for NSF and DOE programs.

	By fiscal year, in millions of dollars—					
	2006	2007	2008	2009	2010	2011
SPENDING SUBJECT TO APPROPRIATION						
Spending under current law:						
Budget authority[1]	273	0	0	0	0	0
Estimated outlays	264	199	79	25	5	0
Proposed changes:						
NSF grant programs:						
Estimated authorization level	0	282	295	308	322	337
Estimated outlays	0	62	192	257	286	304
DOE grant programs:						
Authorization level	0	27	29	31	33	35
Estimated outlays	0	5	26	29	31	33
Total changes:						
Estimated authorization level	0	309	324	339	355	372
Estimated outlays	0	67	218	286	317	337
Spending under H.R. 5356:						
Estimated authorization level	273	309	324	339	355	372
Estimated outlays	264	266	297	311	322	337

[1] The 2006 level is the amount appropriated for that year for the NSF and DOE programs authorized by H.R. 5356.

Spending subject to appropriation

H.R. 5356 would authorize the appropriation of $309 million in 2007 and about $1.7 billion for the 2007–2011 period for NSF and DOE programs. Assuming appropriation of the necessary amounts, CBO estimates that implementing H.R. 5356 would cost $67 million in fiscal year 2007 and $1.2 billion over the 2007–2011 period. As described below, most of these amounts would be used for federal grant programs.

National Science Foundation Programs. H.R. 5356 would authorize funding for four NSF grant programs. The bill would authorize specific appropriations for two of these: between $3 million and $15 million a year for matching grants to scientists and engineers for high- risk, high-return research and between $94 million and $123 million a year to institutions of higher learning for purchases of major scientific equipment. In addition, the bill would direct NSF to allocate 3.5 percent of amounts appropriated each year for research and related activities for grants to scientists and engineers under its program that supports development of faculty early in their careers. Based on 2006 appropriations, we estimate that this

provision would authorize the appropriation of $154 million in 2007 and $800 million over the 2007–2011 period. Finally, the bill would direct NSF to establish a cross-disciplinary grant program focusing on physical and nonbiomedical life sciences. Based on information provided by NSF regarding similar programs, we estimate that this provision would authorize the appropriation of about $30 million annually. We estimate that implementing the four grant programs would cost $62 million in 2007 and $1.1 billion over the 2007–2011 period.

Department of Energy Programs. H.R. 5356 would specifically authorize the appropriation of $155 million over the 2007–2011 period for DOE grant programs. Of that amount, $125 million would be used to continue DOE's early-career research grants to scientists. The remaining $30 million would be used to create a new matching grant program. Assuming appropriation of these amounts, CBO estimates that implementing these programs would cost $5 million in 2007 and about $125 million over the 2007–2011 period.

Direct spending and revenues

By allowing NSF to accept donations for specific prize competitions, H.R. 5356 could increase revenues from donations and subsequent direct spending of those revenues. Under current law, NSF can use and receive funds only if donated without restriction. Based on information provided by NSF, CBO expects that the effects of this provision on revenues and direct spending would be negligible.

Intergovernmental and private-sector impact: H.R. 5356 contains no intergovernmental or private-sector mandates as defined by UMRA and would not directly affect the budgets of state, local, or tribal governments.

Estimate prepared by: Federal Costs: Deborah Reis and Leigh Angres; impact on state, local, and tribal governments: Emily Holt and Lisa Ramirez-Branum; impact on the private sector: Craig Cammarata.

Estimate approved by: Peter H. Fontaine, Deputy Assistant Director for Budget Analysis.

XI. Compliance With Public Law 104–4 (Unfunded Mandates)

H.R. 5356 contains no unfunded mandates.

XII. Committee Oversight Findings and Recommendations

The Committee on Science's oversight findings and recommendations are reflected in the body of this report.

XIII. Statement on General Performance Goals and Objectives

Pursuant to clause (3)(c) of House rule XIII, the goals of H.R. 5356 are to establish programs to provide grants to researchers just starting their careers to conduct high- risk, high-return research; authorize the acquisition of shared scientific equipment by institutions of higher education; authorize a program at NSF to fund basic research designed to simultaneously advance the physical and nonbiomedical life sciences; authorize research at NSF on

innovation; and authorize NASA to establish a NASA Academy to provide a scientific and engineering training program for NASA employees.

XIV. Constitutional Authority Statement

Article I, section 8 of the Constitution of the United States grants Congress the authority to enact H.R. 5356.

XV. Federal Advisory Committee Statement

H.R. 5356 does not establish nor authorize the establishment of any advisory committee.

XVI. Congressional Accountability Act

The Committee finds that H.R. 5356 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVII. Statement on Preemption of State, Local, or Tribal Law

This bill is not intended to preempt any state, local, or tribal law.

XVIII. Changes in Existing Law Made by the Bill, as Reported

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (new matter is printed in italics and existing law in which no change is proposed is shown in roman):

SECTION 11 OF THE NATIONAL SCIENCE FOUNDATION ACT OF 1950

GENERAL AUTHORITY OF FOUNDATION

SEC. 11. The Foundation shall have the authority, within the limits of available appropriations, to do all things necessary to carry out the provisions of this Act, including, but without being limited thereto, the authority—

(a) * * *

* * * * * * *

(f) to receive and use funds donated by others, if such funds are donated without restriction other than that they be used in furtherance of one or more of the general purposes of the Foundation*, except that funds may be donated for specific prize competitions*;

* * * * * * *

XIX. Committee Recommendations

On June 7, 2006, a quorum being present, the Committee on Science favorably reported H.R. 5356, The Research for Competitiveness Act, as amended, by a voice vote and recommended its enactment.

XX. Proceedings of the Full Committee Markup

WEDNESDAY, JUNE 7, 2006

House of Representatives,
Committee on Science,
Washington, DC.

The Committee met, pursuant to call, at 2:39 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Sherwood L. Boehlert [Chairman of the Committee] presiding.

Chairman BOEHLERT. I want to welcome everyone here for this markup on three important and bipartisan bills. The Committee on Science will come to order, as I started to say.

Pursuant to notice, the Committee on Science meets to consider H.R. 5136, the *National Integrated Drought Information System Act of 2006;* H.R. 5358, the *Science and Mathematics Education for Competitiveness Act;* and H.R. 5356, the *Research for Competitiveness Act.*

I ask unanimous consent for the authority to recess the Committee at any point during consideration of these matters, and without objection, it is so ordered.

We will now proceed with the markup beginning with opening statements. I will go first, followed by my distinguished colleague and partner in this venture, Mr. Gordon.

I am going to make all my general comments on today's bills now, and not speak on the bills later on. Since we have to squeeze in a lot of business this afternoon between Floor votes, and according to the report from the Floor, we can expect a series of votes some time in the 4:00 to 4:15 timeframe.

As usual with this committee, these bills reflect a lot of bipartisan work to solve real problems in practical ways.

Our first bill today will be a measure to improve drought forecasting and monitoring, introduced by Mr. Hall. I appreciate Mr. Hall bringing this matter to our attention.

Drought may seem like something that is easy to detect, but hard to do anything about; but that turns out to be wrong on both counts. It is tricky to figure out when a drought is developing, but if one knows, one can take many steps to alter water usage to mitigate drought's often severe economic consequences. So we need to pay more attention to this costly phenomenon, and Mr. Hall's bill, building on existing federal efforts, will enable us to improve drought forecasting and monitoring, which will save billions, with a "B," billions of dollars. So, I expect this bill to move smoothly today, and on the House Floor. We will have one manager's amendment today, to reduce the authorization levels, to make that progress to the Floor a little easier.

The other two bills we will take up today are the Committee's long-awaited innovation package.

Our goal here is to take action on the recommendations of the National Academy of Sciences, the Council on Competitiveness, AEA, the Business Roundtable, the National Association of Manufacturers, and others, who have been calling for the U.S. to shore

up its competitiveness by focusing more attention and more dollars on research and education.

These calls were really music to our ears, because we have been issuing the same entreaties ourselves on this committee for a number of years, and especially in the last couple of years, as the challenge to future U.S. competitiveness has never become clearer.

But we didn't want to answer those calls with a laundry list of new programs of dubious value, that would be unlikely to ever get funded. It might give us a lot of satisfaction and some fancy press releases, but that is not what this committee is about. We are about results. Indeed, we looked around to see what is working right now, or what has worked in the recent past, and then, we extended or expanded or built on those successful programs, and the result is a focused, bipartisan measure that should be able to move swiftly through the House.

This measure is an intelligent middle ground between those who want to create scores of new, untested, expensive programs, and those who argue that all that is necessary is to increase overall funding for basic research, and leave everything else to chance. If we are to remain competitive, then we have to bolster key programs at the National Science Foundation, especially focused on K–12 and undergraduate education, and it is the prerogative of the Congress to do that.

I want to thank Dr. Schwarz and Mr. McCaul, two active freshmen on this committee with a deep understanding of these issues, for introducing these bills.

And I want to thank Mr. Gordon and the Members on both sides of the aisle, who worked with us on developing the final versions of these bills that are in the amendments in the nature of a substitute, including Dr. Ehlers and Ms. Biggert and Mr. Calvert, Ms. Jackson Lee and Mr. Green, and Mr. Honda. You get the idea of how we operate. Fingerprints of Members on both sides of the aisle are all over these bills, and that is the way it should be.

The Schwarz bill focuses on education programs at the National Science Foundation, which runs programs that are critical to improving math and science education at all levels. The bill includes enhancing and extending the Noyce Scholarship program, one of my pet projects, to attract and better train science and math teachers. We also give renewed emphasis to the Math and Science Partnership program, now renamed the School and University Partnership Program.

And we underscore NSF's role in the sometimes neglected, but critical area of undergraduate education. We also give clear authority to the Department of Energy for education programs, and we require an inventory and an evaluation of those programs.

In Mr. McCaul's bill, we bolster research by ensuring that both NSF and DOE, we will set aside funding for young researchers, who are likely to perform the most creative and pathbreaking work. And we revive and idea from the 1980s, to try to get industry interested in these young academic researchers and in their long-term, basic research.

I would add that both of these bills, and the underlying 2002 NSF Act, direct that the programs in these bills, among other things, help bring more individuals from under-represented groups

into science, math, and engineering, and that is a goal that many Members of this committee have been very active in pursuing.

So, we are taking action today, as we promised when we heard from the leaders of the National Academies Gathering Storm panel last year. We are setting a realistic agenda to increase U.S. investment in research and education in carefully targeted ways.

I look forward to moving this legislation today, and to continuing efforts to see it signed into law this year. And I will continue to work with the appropriators to see that they provide the funding called for in the American Competitiveness Initiative and in these bills.

Now, it is my privilege to turn to my partner in this venture, the distinguished gentleman from Tennessee, Mr. Gordon.

[The prepared statement of Chairman Boehlert follows:]

PREPARED STATEMENT OF CHAIRMAN SHERWOOD L. BOEHLERT

I want to welcome everyone here for this markup on three important and bipartisan bills. I'm going to make all my general comments on today's bills now and not speak on the bills later, since we have to squeeze in a lot of business this afternoon between Floor votes.

As usual with this committee, these bills reflect a lot of bipartisan work to solve real problems in practical ways.

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Our goal here is to take action on the recommendations of the National Academy of Sciences, the Council on Competitiveness, AEA, the Business Roundtable, the National Association of Manufacturers and others who have been calling for the U.S. to shore up its competitiveness by focusing more attention and more dollars on research and education.

These calls were really music to our ears because we've been issuing the same entreaties ourselves for years, and especially in the last couple of years as the challenge to future U.S. competitiveness has become ever clearer.

But we didn't want to answer these calls with a laundry list of new programs of dubious value that would be unlikely to ever get funded. Instead, we looked around to see what is working right now or what has worked in the recent past, and then we extended or expanded or built on those successful programs. And the result is a focused, bipartisan measure that should be able to move swiftly through the House.

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And I want to thank Mr. Gordon and the Members on both sides of the aisle who worked with us on developing the final versions of these bills that are in the amendments in the nature of a substitute, including Mr. Ehlers, Ms. Biggert, Mr. Calvert, Ms. Jackson Lee, Mr. Green and Mr. Honda.

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I would add that both these bills, and the underlying 2002 NSF Act, direct that the programs in these bills, among other things, help bring more individuals from under-represented into science, math and engineering.

So we're taking action today as we promised when we heard from the leaders of the National Academy's Gathering Storm panel last year. We are setting a realistic agenda to increase U.S. investment in research and education in carefully targeted ways.

I look forward to moving this legislation today, and to continuing efforts to see it signed into law this year. And I will continue to work with the appropriators to see that they provide the funding called for in the American Competitiveness Initiative and in these bills.

Chairman BOEHLERT. We will now consider H.R. 5356, the *Research for Competitiveness Act.* I recognize Mr. Gordon for his remarks.

Mr. GORDON. Mr. Chairman, I think we are moving along well.

Let me just say once again, I think this is a good bill. I think it would have been better if we had added the ARPA–E recommendations from the "Rising Above the Gathering Storm" bill that myself and most Members here have co-sponsored.

Just to, once again, remind people, so that it stays on your radar, so hopefully, we will have a chance to deal with this later. But the Department of Defense had a little agency called DARPA, and we are familiar with that. It is in the advanced research area. They developed the Internet. They developed stealth technology, and a number of other important technologies. What we would like to see, and again, following on the recommendations of the report, is that within the Department of Energy, we set up a similar type of advanced research agency, that we look around, you know, the country, and we determine the eight or ten—for them to determine the eight or ten best technologies, where we could have some breakthrough with energy and alternative energies, that we bring the National Labs, the private sector, the universities together, really hunker down, focus on these, like they have done in DARPA, and see if we can't have some breakthroughs.

And again, I will not make it as an amendment, but I raise it as an issue, so that we can hopefully talk about this more at a later date.

[The prepared statement of Mr. Gordon follows:]

PREPARED STATEMENT OF REPRESENTATIVE BART GORDON

Today, the Committee will consider legislative proposals for improving the future competitiveness of the Nation.

The manager's amendments to H.R. 5356 and H.R. 5358, which I have co-sponsored, meld provisions from the majority's bills and my bipartisan bills, H.R. 4434 and H.R. 4596.

I want to thank the Chairman and other Members of the Majority for working with me to improve both the scope and funding levels authorized in the manager's

amendments so that they are more in-line with the recommendations of the recent report from the National Academy of Sciences, *Rising Above the Gathering Storm.*

The resulting legislation focuses specifically on improving science and math education and on strengthening basic research.

The markup vehicles now implement a number of the key recommendations of the *Gathering Storm* report, recommendations which represent a consensus for action from a distinguished panel representing business, academic, and education leaders.

Last year, I introduced three bills based on the *Rising Storm* panel's recommendations that were in the Science Committee's jurisdiction, and I had hoped to see early action by Congress in implementing them.

With the general uncertainty about our country's future economic prospects, we need to act promptly. At a recent ETS Subcommittee hearing with NIST's three Nobel Prize winners, all three agreed that we need to increase our investment in basic research and to improve K–12 science and math education.

The *Gathering Storm* report states that "laying the foundation for a scientifically literate workforce begins with developing outstanding K–12 teachers in science and mathematics."

I believe the report got it exactly right and has identified teachers as the first priority.

Therefore, I am pleased that the markup vehicle for H.R. 5358 will implement the top priority of the Academies' report, which is to put in place effective teacher training programs for new and in-service science and math teachers.

The proposed modifications to the Noyce scholarship program will transform it into much more than a scholarship program. It will spur reform to change the way colleges and universities educate new science and math teachers. Teachers who emerge from the program will combine deep knowledge of their subject with expertise in the most effective practices for teaching science or math.

The new teachers will also receive mentoring and support during the critical early years of their teaching careers, when teacher attrition is known to be high.

Finally, the program is authorized at a level that would enable it to meet the goal of producing 10,000 highly qualified science and math teachers each year within the President's goal of doubling the NSF budget.

In short, the manager's amendment now implements the highest priority of the *Rising Storm* report. In addition, the NSF's major K–12 education program involving partnerships between universities and school systems is strengthened by the manager's amendment. Emphasis is placed on professional development opportunities for practicing teachers, including support for Master's degree programs and teacher institutes.

While I am largely satisfied with these bills, I am disappointed that the Science Committee is being a follower and not a leader on the critical issue of innovation. We are following the action of Senate committees to move legislation, and the bills before us today were only recently introduced.

In addition, we are taking a timid approach by not addressing all of the *Gathering Storm* report's recommendations within the Committee's jurisdiction.

We are not taking up ARPA–E legislation to help meet the Nation's critical energy needs, and we are not authorizing the NSF and DOE Office of Science funding increases called for in both the President's American Competitiveness Initiative and in the National Academy's report. As the authorizing committee for these agencies, we are ducking our responsibilities if we do not act.

So while the bills before us today are a good start, they do not represent a comprehensive approach. I hope the Committee will soon act to provide the missing pieces.

Mr. Chairman, I yield back my time.

[The prepared statement of Mr. Ehlers follows:]

PREPARED STATEMENT OF REPRESENTATIVE VERNON J. EHLERS

There are many ways we can foster innovation and competition at the national level, but the most critical is the support of education in science, technology, engineering and mathematics fields. I am pleased that today's bills artfully address this area by focusing on programs that maximize innovation and educational opportunities. By addressing teacher training, graduate interdisciplinary studies, and research in areas that bridge scientific fields, these bills combine to provide a comprehensive alliance putting us on the right track to remain competitive in today's global economy. NSF education programs play a strong role in promoting our economic competitiveness and national security and I am glad that my colleagues on the Committee recognize that this treasure trove of knowledge the Foundation represents should not be overlooked. The bills also demonstrate a strong commitment

toward fundamental research, and place an emphasis on the promise of young research professors.

I look forward to working with my colleagues and the scientific community to advance this important legislation. I believe that both bills align with the mission of bolstering American Competitiveness, and will support them strongly when they are considered by the whole House.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF REPRESENTATIVE EDDIE BERNICE JOHNSON

Thank you, Mr. Chairman and Ranking Member.

I am happy that the Republican leadership has finally put together a package of legislation in response to the President's call for increased national competitiveness in science, technology, engineering and math.

This initiative underscores the recommendations of several important reports, including the report called *Rising Above the Gathering Storm,* released last year by the National Academy of Sciences.

A nation lacking science and math competitiveness is a nation lacking a future of prosperity. Advances in medicine, engineering and technology have touched every aspect of our lives.

The bills up for consideration today focus on particular weaknesses in our national scientific enterprise.

The enhancement of early career awards for investigators in the physical sciences will be important in maintaining our national pipeline of talent.

Support of high-risk, high-reward research projects pertinent to industry are designed to spur innovation.

Cross-disciplinary research is an important sector, and it is good to encourage collaboration between life sciences and the physical sciences.

As always, the NASA workforce is deserving of the Committee's support, especially when it comes to programs to strengthen that workforce.

Moreover, Mr. Chairman, the provisions in H.R. 5358 are likewise good ideas to enhance math and science education at all levels.

Programs such as the Robert Noyce Teacher Scholarship provide strong support to math and science teachers, particularly as they enter the final years of their training. Research has shown that these years are critical for retention of teachers, and so it is good to provide support at this critical point in their education.

Advanced degree programs for teachers such as those specified in the School and University Partnerships for Science and Math Education provision, are also important to keep educators on the cutting edge of their course material.

H.R. 5358 contains many creative provisions to support math and science teachers from the beginning of their training throughout their careers.

I believe this support is critical to enhancing students' views of math and science. Students need to see mentors who have passion for the subject material.

One particular concern of mine is regarding our nation's people of color. Minorities, with the exception of students at Historically Black Colleges and Universities, are not pursuing careers in science, technology, engineering and math at the same rate of their peers.

My hope was to see a much greater emphasis on programs supporting ethnic minorities. Although I commend the efforts of the National Science Foundation, Department of Energy and other organizations that support research in the physical sciences, the problem is clearly far from being resolved.

This issue, of minority participation in math and science careers, is one I would like to see this committee address much more intently in the future.

As former Chair of the Research Subcommittee, I support this committee's efforts to enhance programs in the name of national competitiveness.

Thank you, Mr. Chairman. I yield back.

[The prepared statement of Mr. Honda follows:]

PREPARED STATEMENT OF REPRESENTATIVE MICHAEL M. HONDA

Mr. Chairman, thank you for recognizing me, and I'll be brief.

I just wanted to take this opportunity to thank you and your staff for working with me to include language about what I've been calling "teaching innovation" in the manager's amendment.

The language would allow NSF to use funding for the development and dissemination of curriculum materials that will help foster inventiveness and innovation, and to research the process of innovation and the teaching of inventiveness.

I think that as we strive to train new scientists, engineers, and teachers to maintain global competitiveness in science and technology, we must realize that we cannot just train them in the same old way we have used in the past.

We need to introduce them to new fields, teach them to be interdisciplinary, and ensure that they are taught the creativity and thinking skills of highly inventive and innovative people.

Data on patent awards shows that in especially innovative high-tech companies, the cutting edge work has really been driven by a few highly innovative scientists and engineers. We need to figure out how these people "do it" and teach others those skills. That's what my language does.

I'm not the only one who thinks this—leading experts made similar recommendations in the MIT–Lemelson Program report "Invention," and many high-tech CEOs have told me the same thing and have endorsed my stand-alone bill from which this language is adapted, the INVENT Act, H.R. 5477.

So again, I thank the Chairman for working with me to include this in the manager's amendment, and I yield back the balance of my time.

Chairman BOEHLERT. Thank you so much.

I ask unanimous consent that the bill is considered as read and open to amendment at any point, and that the Members proceed with the amendments in the order on the roster. Without objection, it is so ordered.

The first amendment on the roster is an amendment offered in the nature of a substitute, offered by the gentleman from Texas, Mr. McCaul. I ask unanimous consent that the amendment in the nature of a substitute be treated as original text for purposes of amendment under the five minute rule, and without objection, that is so ordered.

The Clerk will report the amendment.

The CLERK. Amendment to H.R. 5356, offered by Mr. McCaul of Texas.

Chairman BOEHLERT. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

And I recognize Mr. McCaul for five minutes to explain this substitute amendment.

Mr. MCCAUL. Thank you, Mr. Chairman, and I want to thank the Ranking Member, Mr. Gordon. Not to be outdone by the Ranking Member, I have actually triplets in pre-K, and five children overall, so I think the term active freshman by the Chairman is appropriate in this case.

This amendment is about the future. It is the product of many hearings, including a field hearing, which Congressman Lamar Smith chaired, and I participated in Austin, Texas, at the IT World Congress.

As many of you know, the technologies which enabled e-commerce to become a reality in the 1990s are based on research initially conducted at universities like the University of Texas, which is in my hometown.

Many of these programs were funded by federal agencies, such as the National Science Foundation and DARPA, United States investments in research and development during the past fifty years provided these breakthroughs, which transformed American society, and helped the U.S. to build the world's dominant economy. When you use a web browser, send an e-mail, or even use the Internet, you can thank those thinkers and innovators at American universities who have helped develop these great technologies that made our world smaller.

Today, the technology developed in university labs translates into multi-billion dollar industries. For instance, in 2005, compa-

nies in my home State of Texas exported $31 billion in computers and electronic products. So, you can see why it is important to nurture the minds and the innovators who are working on the most cutting edge ideas, and those who are preparing to be America's next high-tech workforce. The bills which our committee is marking up today intend to do just that.

I am pleased to introduce today a substitute that improves on this important legislation, and I would like to thank my colleagues on both sides of the aisle for their support and comments, especially Chairman Boehlert, Ranking Member Gordon, Ms. Jackson Lee for helping us to include language on diversity, and Mr. Honda, and all the hardworking staff, and especially Elizabeth Grossman of the majority staff for her hard work on this important legislation.

The substitute, which combines the two original bills into one, the *Research for Competitiveness Act,* carries forward the language on providing grants for scientists and engineers in the early stage of their academic careers, to establish innovative lines of research. In this capacity, we are investing in minds, and hoping to create America's next high-tech workforce. It also recognizes the economic potential of scientific research by supporting scientists who conduct high risk, high return research, by creating a grant program that includes investments from both the Federal Government, and from private industry. This partnership will provide much needed synergy between some of the greatest minds at our universities and the private sector, to create incentives in areas with the most potential for significant technical advancement, and this is an area, Mr. Chairman, that we have talked about consistently throughout this Congress, and I am so proud to see this advance forward in legislation here today.

This substitute also emphasizes the importance of basic research, which forms the building blocks for the most important scientific discoveries. To aid that research, the substitute also provides specific authorizations and guidance for the major research instrumentation program at NSF. This helps universities acquire the shared scientific equipment that is essential to scientists working in the fields from nanotechnology to astronomy.

The amendment also authorizes an NSF program to foster research at the boundary between the physical and biological sciences. Recognizing the need to support scientists working in the exciting areas at the intersections between traditional disciplines.

Finally, this amendment will add language recognizing the NASA workforce's contributions to innovation through the NASA science programs.

America's competitors in the global IT marketplace are pouring billions into their science and technology infrastructure, rapidly building their innovation capacity, and dramatically increasing their ability to compete with the United States on the world stage. As our foreign competitors increase their investment in innovation, we too must do the same. That investment does not just mean dollars and cents. It also means building and maintaining a strong and well educated high-tech workforce.

Improving math and science education for our kids, and providing incentives for our college students to pursue degrees and careers in a technical field, are equally important to any financial in-

vestment America could make in its quest for technological innovation.

In closing, we have a great opportunity here today to help drive American innovation, and to build upon our high-tech workforce. I urge my colleagues on this committee to vote yes on the substitute amendment, and report the bill to the Floor for consideration.

Thank you, Mr. Chairman.

[The prepared statement of Mr. McCaul follows:]

PREPARED STATEMENT OF REPRESENTATIVE MICHAEL MCCAUL

Thank you Mr. Chairman,

As you know, many of the technologies which enabled e-commerce to become a reality in the 1990s are based on research initially conducted at universities like the University of Texas, which is in my hometown of Austin. Many of those programs were funded by federal agencies, such as the National Science Foundation and DARPA. United States investments in research and development during the past 50 years provided these breakthroughs which transformed American society and helped the U.S. to build the world's dominant economy.

When you use a web browser, send an e-mail or even use the Internet, you can thank those thinkers and innovators at American universities who have helped develop these great technologies that made our world smaller. Today, the technology developed in university labs translates into multi-billion dollar industries.

For instance, in 2005, companies in my home State of Texas exported $31 billion in computers and electronic products—and that is just Texas.

So you can see why it's so important to nurture the minds and the innovators who are working on the most cutting edge ideas, and those who are preparing to be America's next high-tech workforce—the bills which our committee is marking up today intend to do just that.

I am pleased to introduce today a substitute that improves on this important legislation. This amendment is the product of May's hearings, including a field hearing chaired by Congressman Lamar Smith in Austin, Texas at the IT World Congress.

I would like to thank my colleagues on both sides of the aisle for their support and comments, especially Chairman Boehlert, Ranking Member Gordon, Ms. Jackson Lee for helping us to include language on diversity, and Mr. Honda and all their hardworking staff—especially Elizabeth Grossman of the Majority staff. The substitute, which combines the two original bills into one, the *Research for Competitiveness Act,* carries forward the language on providing grants for scientists and engineers in the early stage of their academic careers to establish innovative lines of research. In this capacity, we are investing in minds and hoping to create America's next high-tech workforce.

It also recognizes the economic potential of scientific research by supporting scientists who conduct high-risk, high-return research, by creating a grant program that includes investments from both the Federal Government and from private industry. This partnership will provide much needed synergy between some of the greatest minds at our universities and the private sector to create incentives in areas with the most potential for significant technical advancement.

This substitute also emphasizes the importance of basic research, which forms the building blocks for the most important scientific discoveries. To aid that research, the substitute also provides specific authorizations and guidance for the Major Research Instrumentation program at NSF, which helps universities acquire the shared scientific equipment that is essential to scientists working in fields from nanotechnology to astronomy. The amendment also authorizes an NSF program to foster research at the boundary between the physical and biological sciences, recognizing the need to support scientists working in the exciting areas at the intersections between traditional disciplines. Finally, this amendment will add language recognizing the NASA workforce's contribution to innovation through the NASA science programs.

America's competitors in the global IT marketplace are pouring billions into their science and technology infrastructure, rapidly building their innovation capacity and dramatically increasing their ability to compete with U.S. companies on the world stage.

As our foreign competitors increase their investment in innovation, we too must do the same. That investment does not just mean dollars and cents, it also means building and maintaining a strong and well educated high-tech workforce.

Improving math and science education for our kids and providing incentives for our college students to pursue degrees and careers in a technical field are equally

important to any financial investment America could make in its quest for technological innovation. In closing, we have a great opportunity here today to help drive American innovation and to build upon our high-tech workforce, and I urge my colleagues on the Science Committee to vote YES on the Substitute Amendment, and report the bill for Floor consideration.

Thank you.

Chairman BOEHLERT. I want to thank Mr. McCaul for his leadership on this issue, and for your eloquent explanation, not only of the provisions of the bill, the reasons why it is so desperately needed. So, thank you for your leadership.

Is there anyone else who wish to be heard? Mr. Sherman.

Mr. SHERMAN. Mr. Chairman, I move to strike the last word.

Chairman BOEHLERT. The gentleman is recognized.

Mr. SHERMAN. I commend both the author of the bill and the author of the manager's amendment. This is a good bill.

I, in some other context, would offer an amendment, but in this case, I don't need to, because I am working with the Chairman on report language that will fully address my concerns, and I promise that it won't be a page long. We will get it down to a paragraph.

One area—the bill isn't overly specific as to the substance of the research to be done, but one area that I think we do need more research in was the subject of hearings before this committee. When I asked for a consensus of the panel, and they came to a rough consensus that we are about 25 years away from supercomputers that exceed human intelligence. And so, I hope to work with the Chairman to include report language that one of the areas that we ought to get these young researchers involved in is the area of when you design a supercomputer, and you are seeking that maximum level of intelligence, what do you put into that research, into that supercomputer, that avoids, or at least seeks to avoid, self awareness. Or if you can't do that, how do you at least achieve, or how do you at least design the computer to avoid ambition. And I hope that would be among the many things that these fine young researchers research, and I thank the Chairman for his willingness to work on report language.

Chairman BOEHLERT. I thank the gentleman very much. I don't mean to add to your concerns, but when you talk about supercomputers exceeding the intelligence of man in 25 years or so, my grandson's got a Game Boy that exceeds my intelligence level, but I thank you for that intervention, and of course, we will continue to work with you, as we develop report language.

I would hope that visitors not particularly familiar with the Hill would learn something from this hearing. I like to think that this committee has it right. I mean, we work well together. We don't spend a lot of time trying to score partisan points on either side, as we approach a very serious matter called Election 2006.

What we really try to do is emphasize the importance of the subject matter at hand, and try to figure out how we can sort out any differences, and come to some reasonable conclusions, and you know what? Nothing ever comes out where everybody is completely happy, but I think this committee reports products that everyone can be proud of. So, thank you for your intervention, and I thank all my colleagues for what they have to offer.

Any other discussion on this particular amendment? All right, the second amendment on the roster is offered by the gentleman from North Carolina, Mr. Miller. Are you ready to proceed?

Mr. MILLER. I am, Mr. Chairman.

Chairman BOEHLERT. The Clerk will report the amendment.

The CLERK. Amendment to H.R. 5356, offered by Mr. Miller of North Carolina.

Chairman BOEHLERT. I ask unanimous consent to dispense with the reading. Without objection, it is so ordered.

The gentleman is recognized for five minutes to explain the amendment.

Mr. MILLER. Thank you, Mr. Chairman.

This bill is undoubtedly an important bill, H.R. 5356. It does follow the recommendations of the Augustine report, which we have referred to repeatedly during this hearing, during this markup, rather, during this meeting, and undoubtedly, we need to encourage young scientists to conduct higher risk, high return research early in their careers, so that we can tap into their enthusiasm, their intellect, their originality, and provide the research that will be necessary to make sure that our nation remains at the forefront of every new technology, and that we remain the most innovative economy on Earth.

But Mr. Chairman, I am very concerned that we are missing an important step. We still have a Valley of Death, once ideas have made it through basic research, but before they can reach the marketplace. I have spoken with you, Mr. Chairman. I have spoken in Committee meetings. I have spoken privately with many Members of the Committee, including the Chairman, including Dr. Ehlers and others, about this problem, and the importance of trying to help get ideas to that stage of being commercially viable.

It often is not really that much money that stands in the way, anywhere from $2,000 to $40,000. But particularly for smaller colleges and universities, that small amount of money is an insuperable problem, an insuperable hurdle in trying to get an idea from research to the marketplace to commercial viability, to where there can be a liquidity event, in the language of one witness in a hearing on this topic earlier this year or last.

And until those colleges and universities can establish a self-sustaining pipeline to get ideas from research to viability, they simply cannot do it. This amendment would establish a very modest grant program to help colleges and universities establish a pre-competitive technology transfer center, simply to establish proof of concept, to patent and license, to cover patent and licensing expenses, to conduct feasibility studies. And the colleges and universities would have to be weaned from this funding fairly quickly. They would have to get programs up and running. They would have to establish a pipeline. They would have to learn to be self-sufficient. They would have four years, four years and no more.

Mr. Chairman, I have spoken to you about this problem, about the need. You have agreed with the need, I understand, that you agree with my concern. You share my concern, and you think this might be a good idea, but you are not entirely convinced that it is a good idea as an amendment to this bill.

Mr. Chairman, if you are willing to work with me, to discuss with me other ways to get at this problem, to make sure that agencies within the jurisdiction of this committee may help solve the problem of getting, of technology transfer at that pre-competitive stage, I will certainly consider withdrawing the amendment.

Chairman BOEHLERT. I can assure the gentleman that I will continue the dialogue that we enjoy, and if the past is prologue, your persuasiveness is such that you are getting me, slowly but surely.

Mr. MILLER. Mr. Chairman, there are some other issues we might discuss as well. But on this issue, I will accept the assurances of the Chairman, which I have learned are offered in good faith and can be relied upon, and I ask unanimous consent to withdraw this amendment.

Chairman BOEHLERT. Without objection, so ordered.

Are there any other amendments to the amendment in the nature of a substitute? If no, the vote occurs on the amendment in the nature of a substitute. All in favor, say aye. Aye. The opposed, no. The nos don't have it. The ayes have it, and the amendment is agreed to.

Are there any other amendments? Hearing none, the vote is on the bill H.R. 5356, the *Research for Competitiveness Act,* as amended. All those in favor will say aye. Aye. Opposed, no. In the opinion of the Chair, the ayes have it.

I now recognize Mr. Gordon to offer a motion.

Mr. GORDON. Mr. Chairman, I move that the Committee favorably report H.R. 5356, as amended, to the House, with the recommendation that the bill, as amended, do pass.

Furthermore, I move that the staff be instructed to prepare the legislative report, and make necessary technical and conforming changes, and that the Chairman take all necessary steps to bring the bill before the House for consideration.

Chairman BOEHLERT. The question is on the motion to report the bill, as amended, favorably. Those in favor of the motions will say aye. Aye. Opposed, no. The ayes have it. The bill is favorably reported.

Without objection, the motion to reconsider is laid upon the table. I move that Members have two subsequent calendar days in which to submit supplemental, minority, or additional views on the measure.

I move, pursuant to Clause 1 of Rule 22 of the Rules of the House of Representatives, that the Committee authorizes the Chairman to offer such motions as may be necessary in the House to adopt and pass H.R. 5356, the *Research for Competitiveness Act,* as amended. Without objection, so ordered.

I want to thank all the Members for their attendance, not just today, but for their active participation in the important deliberations of this committee.

This concludes our markup.

[Whereupon, at 3:53 p.m., the Committee was adjourned.]

Appendix:

H.R. 5356, Section-by-Section Summary, Amendment Roster

I

109TH CONGRESS
2D SESSION

H. R. 5356

To authorize the National Science Foundation and the Department of Energy Office of Science to provide grants to early career researchers to establish innovative research programs and integrate education and research, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

MAY 11, 2006

Mr. MCCAUL of Texas (for himself, Mr. BOEHLERT, Mr. SMITH of Texas, Mr. CALVERT, Mr. EHLERS, Mrs. BIGGERT, Mr. INGLIS of South Carolina, and Mr. SCHWARZ of Michigan) introduced the following bill; which was referred to the Committee on Science

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A BILL

To authorize the National Science Foundation and the Department of Energy Office of Science to provide grants to early career researchers to establish innovative research programs and integrate education and research, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Early Career Research Act".

SEC. 2. NATIONAL SCIENCE FOUNDATION EARLY CAREER AWARDS FOR SCIENCE AND ENGINEERING RESEARCHERS.

(a) IN GENERAL.—The Director of the National Science Foundation shall carry out a program to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions to conduct research in fields relevant to the mission of the Foundation. The existing Faculty Early Career Development (CAREER) Program may be designated as the mechanism for awarding such grants.

(b) SIZE AND DURATION OF AWARD.—The duration of awards under this section shall be 5 years, and the amount per year shall be at least $80,000.

(c) ELIGIBILITY.—Award recipients shall be individuals who are employed in a tenure-track position as an assistant professor or equivalent title, or who hold an equivalent position, at—

(1) an institution of higher education in the United States; or

(2) an organization in the United States that is a nonprofit, nondegree-granting research organization such as a museum, observatory, or research laboratory.

(d) SELECTION.—Award recipients shall be selected on a merit-reviewed and competitive basis.

(e) SELECTION PROCESS AND CRITERIA FOR AWARDS.—An applicant seeking funding under this section shall submit a proposal to the Director at such time, in such manner, and containing such information as the Director may require. In evaluating the proposals submitted under this section, the Director shall consider, at a minimum—

(1) the intellectual merit of the proposed work;

(2) the innovative or transformative nature of the proposed research;

(3) the extent to which the proposal integrates research and education, including undergraduate education in science and engineering disciplines; and

(4) the potential of the applicant for leadership at the frontiers of knowledge.

(f) AUTHORIZATION OF APPROPRIATIONS.—For each of the fiscal years 2007 through 2011, the Director shall allocate at least 3.5 percent of funds appropriated to the National Science Foundation for Research and Related Activities to the grants program under this section.

(g) REPORT.—Not later than 6 months after the date of enactment of this Act, the Director shall provide to the Committee on Science of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate a report describing the distribution

of the institutions of the awardees of the Faculty Early Career Development Program since fiscal year 2001 among each of the categories of institutions of higher education defined by the Carnegie Foundation for the Advancement of Teaching and the organizations in subsection (c)(2).

(h) EVALUATION.—Not later than 2 years after the date of enactment of this Act, the Director shall provide to the Committee on Science of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate a report evaluating the impact of the Faculty Early Career Development Program on the ability of young faculty to compete for National Science Foundation research grants.

SEC. 3. DEPARTMENT OF ENERGY EARLY CAREER AWARDS FOR SCIENCE AND ENGINEERING RESEARCHERS.

(a) IN GENERAL.—The Under Secretary for Science of the Department of Energy shall carry out a program to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions to conduct research in fields relevant to the mission of the Department.

(b) SIZE AND DURATION OF AWARD.—The duration of awards under this section shall be up to 5 years, and the amount per year shall be at least $80,000.

(c) ELIGIBILITY.—Award recipients shall be individuals who are employed in a tenure-track position as an assistant professor or equivalent title, or who hold an equivalent position, at—

(1) an institution of higher education in the United States; or

(2) an organization in the United States that is a nonprofit, nondegree-granting research organization such as a museum, observatory, or research laboratory.

(d) SELECTION.—Award recipients shall be selected on a merit-reviewed and competitive basis.

(e) SELECTION PROCESS AND CRITERIA FOR AWARDS.—An applicant seeking funding under this section shall submit a proposal to the Under Secretary at such time, in such manner, and containing such information as the Under Secretary may require. In evaluating the proposals submitted under this section, the Under Secretary shall consider, at a minimum—

(1) the intellectual merit of the proposed work;

(2) the innovative or transformative nature of the proposed research;

1 (3) the extent to which the proposal integrates
2 research and education, including undergraduate
3 education in science and engineering disciplines; and
4 (4) the potential of the applicant for leadership
5 at the frontiers of knowledge.
6 (f) COLLABORATION WITH NATIONAL LABORA-
7 TORIES.—In awarding grants under this section, the
8 Under Secretary shall give priority to proposals in which
9 the proposed work includes collaboration with the Depart-
10 ment of Energy National Laboratories.
11 (g) AUTHORIZATION OF APPROPRIATIONS.—There
12 are authorized to be appropriated to the Secretary of En-
13 ergy to carry out the Under Secretary's responsibilities
14 under this section $25,000,000 for each of the fiscal years
15 2007 through 2011.
16 (h) REPORT ON RECRUITING AND RETAINING EARLY
17 CAREER SCIENCE AND ENGINEERING RESEARCHERS AT
18 THE NATIONAL LABORATORIES.—Not later than 3
19 months after the date of enactment of this Act, the Sec-
20 retary of Energy shall provide a report to the Committee
21 on Science of the House of Representatives and to the
22 Committee on Energy and Natural Resources of the Sen-
23 ate on efforts to recruit and retain young scientists and
24 engineers at the early stages of their careers at the De-

partment of Energy National Laboratories. The report shall include—

(1) a description of Department of Energy and National Laboratory policies and procedures, including financial incentives, awards, promotions, time set aside for independent research, access to equipment or facilities, and other forms of recognition, designed to attract and retain young scientists and engineers;

(2) an evaluation of the impact of these incentives on the careers of young scientists and engineers at Department of Energy National Laboratories, and also on the quality of the research at the National Laboratories and in Department of Energy programs;

(3) a description of what barriers, if any, exist to efforts to recruit and retain young scientists and engineers, including limited availability of full time equivalent positions, legal and procedural requirements, and pay grading systems; and

(4) the amount of funding devoted to efforts to recruit and retain young researchers and the source of such funds.

SEC. 4. REPORT ON NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY EFFORTS TO RECRUIT AND RETAIN EARLY CAREER SCIENCE AND ENGINEERING RESEARCHERS.

Not later than 3 months after the date of enactment of this Act, the Director of the National Institute of Standards and Technology shall provide a report to the Committee on Science of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate on efforts to recruit and retain young scientists and engineers at the early stages of their careers at the National Institute of Standards and Technology laboratories and joint institutes. The report shall include—

(1) a description of National Institute of Standards and Technology policies and procedures, including financial incentives, awards, promotions, time set aside for independent research, access to equipment or facilities, and other forms of recognition, designed to attract and retain young scientists and engineers;

(2) an evaluation of the impact of these incentives on the careers of young scientists and engineers at the National Institute of Standards and Technology, and also on the quality of the research at the National Institute of Standards and Tech-

nology's laboratories and in the National Institute of Standards and Technology's programs;

(3) a description of what barriers, if any, exist to efforts to recruit and retain young scientists and engineers, including limited availability of full time equivalent positions, legal and procedural requirements, and pay grading systems; and

(4) the amount of funding devoted to efforts to recruit and retain young researchers and the source of such funds.

SEC. 5. DEFINITION.

In this Act, the term ''institution of higher education'' has the meaning given such term in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)).

○

SECTION-BY-SECTION SUMMARY OF H.R. 5356,
RESEARCH FOR COMPETITIVENESS ACT

SEC. 1. SHORT TITLE

"Research for Competitiveness Act."

SEC. 2. NATIONAL SCIENCE FOUNDATION EARLY CAREER AWARDS FOR SCIENCE AND ENGINEERING RESEARCHERS

Establishes a program at the National Science Foundation (NSF) to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions. Allows the existing Faculty Early Career Development (CAREER) Program to be designated as the mechanism for awarding such grants. Sets the duration of the awards to be five years and the amount per year to be at least $80,000. Eligible applicants are tenure-track faculty at institutions of higher education or the equivalent at research organizations, such as observatories. Requires the award recipients to be selected on a competitive, merit-reviewed basis, based on the intellectual merit of the proposed work; the innovative or transformative nature of the proposed research; the extent to which the proposal integrates research and education, including undergraduate education in science and engineering disciplines; and the potential of the applicant for leadership at the frontiers of knowledge. Requires the Director to allocate at least 3.5 percent of funds appropriated for Research and Related Activities each year to the grants program under this section.

Requires the Director of NSF to provide to Congress within six months a report describing the distribution of the CAREER Program awardees since fiscal year 2001 among different types of institutions. Requires the Director to provide to Congress within two years a report evaluating the impact of the CAREER Program on the ability of young faculty to compete for NSF research grants.

SEC. 3. DEPARTMENT OF ENERGY EARLY CAREER AWARDS FOR SCIENCE AND ENGINEERING RESEARCHERS

Establishes at the Department of Energy Office of Science a program to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions. Allows the awards to be for up to five years and the amount per year to be at least $80,000. Eligible applicants are tenure-track faculty at institutions of higher education or the equivalent at research organizations, such as observatories. Requires the award recipients to be selected on a competitive, merit-reviewed basis, based on the intellectual merit of the proposed work; the innovative or transformative nature of the proposed research; the extent to which the proposal integrates research and education, including undergraduate education in science and engineering disciplines; and the potential of the applicant for leadership at the frontiers of knowledge. Requires the Director to give priority to proposals in which the proposed work includes collaboration with a National Laboratory. Authorizes appropriations for the program of $25,000,000 for each of the fiscal years 2007 through 2011.

Requires the Director of the Office of Science to provide to Congress within three months of enactment a report on efforts to recruit and retain young scientists and engineers at the early stages of their careers at the civilian National Laboratories. The report shall include a description of incentives for recruitment and retention, an evaluation of the effectiveness of the incentives, a description of barriers to recruitment and retention, and the amount and source of funding devoted to recruitment and retention efforts.

SEC. 4. REPORT ON NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY EFFORTS TO RECRUIT AND RETAIN EARLY CAREER SCIENCE AND ENGINEERING RESEARCHERS

Requires the Director of the National Institute of Standards and Technology to provide to Congress within three months of enactment a report on efforts to recruit and retain young scientists and engineers at the early stages of their careers at the National Institute of Standards and Technology. The report shall include a description of incentives for recruitment and retention, an evaluation of the effectiveness of the incentives, a description of barriers to recruitment and retention, and the amount and source of funding devoted to recruitment and retention efforts.

SEC. 5. NATIONAL SCIENCE FOUNDATION RESEARCH AWARD MATCH PROGRAM (originated in H.R. 5357)

Establishes a program at NSF to award grants on a competitive, merit-reviewed basis to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions to conduct high-risk, high-return fundamental research with the potential for significant scientific or technical advancement. Sets the duration of the awards to be up to five years and the amount per year to be up to $75,000, with an additional $37,500 available each year as a one-to-one match for funds the awardee raises from industry for the proposed research. Eligible applicants are tenure-track faculty at institutions of higher education or the equivalent at research organizations, such as observatories. Requires the criteria for awardee selection to include the potential of the applicant for leadership at the frontiers of knowledge; the innovative or transformative nature of research in the areas of interest described in the application; the creativity of the applicant; and the potential interest to industry of research in the areas of interest described in the application. Authorizes appropriations for the program of $3,000,000 for fiscal year 2007; $6,000,000 for fiscal year 2008; $9,000,000 for fiscal year 2009; $12,000,000 for fiscal year 2010; and $15,000,000 for fiscal year 2011.

SEC. 6. DEPARTMENT OF ENERGY RESEARCH AWARD MATCH PROGRAM (originated in H.R. 5357)

Establishes a program at the Department of Energy Office of Science to award grants on a competitive, merit-reviewed basis to scientists and engineers at the early stage of their careers at institutions of higher education and research institutions to conduct high-risk, high-return fundamental research with the potential for significant scientific or technical advancement. Sets the duration of the awards to be up to five years and the amount per year to be up to $75,000, with an additional $37,500 available each year as a one-to-one match for funds the awardee raises from industry for the proposed research. Eligible applicants are tenure-track faculty at institutions of higher education or the equivalent at research organizations, such as observatories. Requires the criteria for awardee selection to include the potential of the applicant for leadership at the frontiers of knowledge; the innovative or transformative nature of research in the areas of interest described in the application; the creativity of the applicant; and the potential interest to industry of research in the areas of interest described in the application. The Director may give priority to proposals in which the proposed work includes collaboration with the National Laboratories. Authorizes appropriations for the program of $2,000,000 for fiscal year 2007; $4,000,000 for fiscal year 2008; $6,000,000 for fiscal year 2009; $8,000,000 for fiscal year 2010; and $10,000,000 for fiscal year 2011.

SEC. 7. MAJOR RESEARCH INSTRUMENTATION

Expands the range of awards under the NSF Major Research Instrumentation Program to be between $100,000 and $20,000,000 and allows funding to be used to support the operations and maintenance of instrumentation and equipment acquired under the program. Authorizes appropriations for the program of $94,200,000 for fiscal year 2007; $100,800,000 for fiscal year 2008; $107,800,000 for fiscal year 2009; $115,300,000 for fiscal year 2010; and $123,400,000 for fiscal year 2011.

SEC. 8. DONATIONS

Amends the *National Science Foundation Act of 1950* to allow the Foundation to accept donations for specific prize competitions.

SEC. 9. PROGRAM TO FOSTER CROSS-DISCIPLINARY RESEARCH

Establishes a program at NSF to award grants to individuals, groups, and centers for long-term, potentially path-breaking, basic research designed to simultaneously advance the physical and non-biomedical life sciences. Requires the award recipients to be selected on a competitive, merit-reviewed basis. Requires the review panels to include both physical scientists and non-biomedical life scientists, and, when appropriate, engineers, and to be open to approving high-risk research. Requires some of the grants awarded under the Early Career Program of Section 2 to be consistent with this section. Authorizes the NSF Director to carry out this program jointly with the Department of Energy Office of Science and other relevant federal agencies.

SEC. 10. RESEARCH ON INNOVATION AND INVENTIVENESS

Allows NSF to support research on the process of innovation and the teaching of inventiveness.

SEC. 11. NASA'S CONTRIBUTION TO INNOVATION

States the sense of Congress that a balanced science program at the National Aeronautics and Space Administration (NASA) contributes significantly to innovation

and the economic competitiveness of the United States and that NASA shall, within the spending levels authorized in the *NASA Authorization Act of 2005,* fully participate in any interagency efforts to promote innovation and economic competitiveness through scientific research and development.

SEC. 12. NASA WORKFORCE TRAINING

Allows NASA to establish a NASA Academy, which may use online learning techniques, to provide a training program for NASA employees to bridge the gap between the broad-based training provided by universities and the specific scientific and engineering training needed to carry out the NASA missions. Requires the Administrator of NASA to notify Congress within 180 days if the Academy will be established and, if so, to provide a plan for its establishment.

SEC. 13. DEFINITIONS

Defines "Institution of Higher Education" and "National Laboratory" for this Act.

COMMITTEE ON SCIENCE
FULL COMMITTEE MARKUP

June 7, 2006

AMENDMENT ROSTER

HR 5356, Research for Competitiveness Act
–Motion to adopt the bill, as amended: agreed to by a voice vote.
–Motion to report the bill, as amended: agreed to by a voice vote.

No.	Sponsor	Description	Result
1.	Mr. McCaul, Mr. Boehlert, Mr. Gordon, & Ms. Hooley	Amendment in the Nature of a Substitute to merge early career and research match bills; provide guidance and authorization for the National Science Foundation's (NSF) Major Research Instrumentation program; and create a program to foster cross-disciplinary research.	–Adopted by a voice vote.
2.	Mr. Miller	Amendment to add a new section to the bill to create a new program at NSF to give grants to universities to establish precompetitive technology transfer centers.	–Unanimous consent to withdraw the amendment: agreed to by a voice vote.

AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 5356

OFFERED BY MR. MCCAUL OF TEXAS, MR. BOEHLERT OF NEW YORK, MR. GORDON OF TENNESSEE, AND MS. HOOLEY OF OREGON

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Research for Competitiveness Act".

SEC. 2. NATIONAL SCIENCE FOUNDATION EARLY CAREER AWARDS FOR SCIENCE AND ENGINEERING RESEARCHERS.

(a) IN GENERAL.—The Director of the National Science Foundation shall carry out a program to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and organizations described in subsection (c)(2) to conduct research in fields relevant to the mission of the Foundation. The existing Faculty Early Career Development (CAREER) Program may be designated as the mechanism for awarding such grants.

(b) SIZE AND DURATION OF AWARD.—The duration of awards under this section shall be 5 years, and the amount per year shall be at least $80,000.

(c) ELIGIBILITY.—Award recipients shall be individuals who are employed in a tenure-track position as an assistant professor or equivalent title, or who hold an equivalent position, at—

(1) an institution of higher education in the United States; or

(2) an organization in the United States that is a nonprofit, nondegree-granting research organization such as a museum, observatory, or research laboratory.

(d) SELECTION.—Award recipients shall be selected on a competitive, merit-reviewed basis.

(e) SELECTION PROCESS AND CRITERIA FOR AWARDS.—An applicant seeking funding under this section shall submit a proposal to the Director at such time, in such manner, and containing such information as the Director may require. In evaluating the proposals submitted under this section, the Director shall consider, at a minimum—

(1) the intellectual merit of the proposed work;

(2) the innovative or transformative nature of the proposed research;

1 (3) the extent to which the proposal integrates
2 research and education, including undergraduate
3 education in science and engineering disciplines; and
4 (4) the potential of the applicant for leadership
5 at the frontiers of knowledge.
6 (f) AWARDS.—In awarding grants under this section,
7 the Director shall endeavor to ensure that the recipients
8 are from a variety of types of institutions of higher edu-
9 cation and nonprofit, nondegree-granting research organi-
10 zations. In support of this goal, the Director shall broadly
11 disseminate information about when and how to apply for
12 grants under this section, including by conducting out-
13 reach to Historically Black Colleges and Universities that
14 are part B institutions as defined in section 322(2) of the
15 Higher Education Act of 1965 (20 U.S.C. 1061(2)) and
16 minority institutions (as defined in section 365(3) of that
17 Act (20 U.S.C. 1067k(3))).
18 (g) AUTHORIZATION OF APPROPRIATIONS.—For each
19 of the fiscal years 2007 through 2011, the Director shall
20 allocate at least 3.5 percent of funds appropriated to the
21 National Science Foundation for Research and Related
22 Activities to the grants program under this section.
23 (h) REPORT.—Not later than 6 months after the date
24 of enactment of this Act, the Director shall transmit to
25 the Committee on Science of the House of Representatives

and to the Committee on Commerce, Science, and Transportation of the Senate a report describing the distribution of the institutions of the awardees of the Faculty Early Career Development Program since fiscal year 2001 among each of the categories of institutions of higher education defined by the Carnegie Foundation for the Advancement of Teaching and the organizations in subsection (c)(2).

(i) EVALUATION.—Not later than 2 years after the date of enactment of this Act, the Director shall transmit to the Committee on Science of the House of Representatives and to the Committee on Commerce, Science, and Transportation of the Senate a report evaluating the impact of the Faculty Early Career Development Program on the ability of young faculty to compete for National Science Foundation research grants.

SEC. 3. DEPARTMENT OF ENERGY EARLY CAREER AWARDS FOR SCIENCE AND ENGINEERING RESEARCHERS.

(a) IN GENERAL.—The Director of the Office of Science of the Department of Energy shall carry out a program to award grants to scientists and engineers at the early stage of their careers at institutions of higher education and organizations described in subsection (c)(2)

1 to conduct research in fields relevant to the mission of the
2 Department.
3 (b) SIZE AND DURATION OF AWARD.—The duration
4 of awards under this section shall be up to 5 years, and
5 the amount per year shall be at least $80,000.
6 (c) ELIGIBILITY.—Award recipients shall be individ-
7 uals who are employed in a tenure-track position as an
8 assistant professor or equivalent title, or who hold an
9 equivalent position, at—
10 (1) an institution of higher education in the
11 United States; or
12 (2) an organization in the United States that is
13 a nonprofit, nondegree-granting research organiza-
14 tion such as a museum, observatory, or research lab-
15 oratory.
16 (d) SELECTION.—Award recipients shall be selected
17 on a competitive, merit-reviewed basis.
18 (e) SELECTION PROCESS AND CRITERIA FOR
19 AWARDS.—An applicant seeking funding under this sec-
20 tion shall submit a proposal to the Director at such time,
21 in such manner, and containing such information as the
22 Director may require. In evaluating the proposals sub-
23 mitted under this section, the Director shall consider, at
24 a minimum—
25 (1) the intellectual merit of the proposed work;

(2) the innovative or transformative nature of the proposed research;

(3) the extent to which the proposal integrates research and education, including undergraduate education in science and engineering disciplines; and

(4) the potential of the applicant for leadership at the frontiers of knowledge.

(f) COLLABORATION WITH NATIONAL LABORATORIES.—In awarding grants under this section, the Director shall give priority to proposals in which the proposed work includes collaboration with the Department of Energy National Laboratories.

(g) AWARDS.—In awarding grants under this section, the Director shall endeavor to ensure that the recipients are from a variety of types of institutions of higher education and nonprofit, nondegree-granting research organizations. In support of this goal, the Director shall broadly disseminate information about when and how to apply for grants under this section, including by conducting outreach to Historically Black Colleges and Universities that are part B institutions as defined in section 322(2) of the Higher Education Act of 1965 (20 U.S.C. 1061(2)) and minority institutions (as defined in section 365(3) of that Act (20 U.S.C. 1067k(3))).

(h) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary of Energy to carry out the Director's responsibilities under this section $25,000,000 for each of the fiscal years 2007 through 2011.

(i) REPORT ON RECRUITING AND RETAINING EARLY CAREER SCIENCE AND ENGINEERING RESEARCHERS AT THE NATIONAL LABORATORIES.—Not later than 3 months after the date of enactment of this Act, the Director shall transmit to the Committee on Science of the House of Representatives and to the Committee on Energy and Natural Resources of the Senate a report on efforts to recruit and retain young scientists and engineers at the early stages of their careers at the Department of Energy National Laboratories. The report shall include—

(1) a description of Department of Energy and National Laboratory policies and procedures, including financial incentives, awards, promotions, time set aside for independent research, access to equipment or facilities, and other forms of recognition, designed to attract and retain young scientists and engineers;

(2) an evaluation of the impact of these incentives on the careers of young scientists and engineers at Department of Energy National Laboratories, and also on the quality of the research at the

1 National Laboratories and in Department of Energy
2 programs;
3 (3) a description of what barriers, if any, exist
4 to efforts to recruit and retain young scientists and
5 engineers, including limited availability of full time
6 equivalent positions, legal and procedural require-
7 ments, and pay grading systems; and
8 (4) the amount of funding devoted to efforts to
9 recruit and retain young researchers and the source
10 of such funds.

11 **SEC. 4. REPORT ON NATIONAL INSTITUTE OF STANDARDS**
12 **AND TECHNOLOGY EFFORTS TO RECRUIT**
13 **AND RETAIN EARLY CAREER SCIENCE AND**
14 **ENGINEERING RESEARCHERS.**

15 Not later than 3 months after the date of enactment
16 of this Act, the Director of the National Institute of
17 Standards and Technology shall transmit to the Com-
18 mittee on Science of the House of Representatives and to
19 the Committee on Commerce, Science, and Transportation
20 of the Senate a report on efforts to recruit and retain
21 young scientists and engineers at the early stages of their
22 careers at the National Institute of Standards and Tech-
23 nology laboratories and joint institutes. The report shall
24 include—

1 (1) a description of National Institute of Stand-
2 ards and Technology policies and procedures, includ-
3 ing financial incentives, awards, promotions, time set
4 aside for independent research, access to equipment
5 or facilities, and other forms of recognition, designed
6 to attract and retain young scientists and engineers;
7 (2) an evaluation of the impact of these incen-
8 tives on the careers of young scientists and engi-
9 neers at the National Institute of Standards and
10 Technology, and also on the quality of the research
11 at the National Institute of Standards and Tech-
12 nology's laboratories and in the National Institute of
13 Standards and Technology's programs;
14 (3) a description of what barriers, if any, exist
15 to efforts to recruit and retain young scientists and
16 engineers, including limited availability of full time
17 equivalent positions, legal and procedural require-
18 ments, and pay grading systems; and
19 (4) the amount of funding devoted to efforts to
20 recruit and retain young researchers and the source
21 of such funds.

22 **SEC. 5. NATIONAL SCIENCE FOUNDATION RESEARCH**
23 **AWARD MATCH PROGRAM.**

24 (a) IN GENERAL.—The Director of the National
25 Science Foundation shall carry out a program to award

1 grants on a competitive, merit-reviewed basis to scientists
2 and engineers at the early stage of their careers at institu-
3 tions of higher education and organizations described in
4 subsection (c)(2) to conduct high-risk, high-return re-
5 search. The program shall support fundamental research
6 with the potential for significant scientific or technical ad-
7 vancement.

8 (b) SIZE AND DURATION OF AWARD.—

9 (1) BASE AWARD.—The duration of awards
10 under this section shall be up to 5 years, and the
11 amount per year shall be up to $75,000. The fund-
12 ing awarded under this paragraph shall not be con-
13 tingent on the receipt of funds under paragraph (2).

14 (2) MATCHING AWARD.—Each year that a re-
15 cipient is receiving funding under paragraph (1), the
16 National Science Foundation shall match any funds
17 the recipient receives from United States industry
18 for work in the area described in the recipient's ap-
19 plication for the award, up to an additional $37,500.

20 (c) ELIGIBILITY.—Applicants for awards under this
21 section shall be individuals who are employed in a tenure-
22 track position as an assistant professor or equivalent title,
23 or who hold an equivalent position, at—

24 (1) an institution of higher education in the
25 United States; or

1 (2) an organization in the United States that is
2 a nonprofit, nondegree-granting research organiza-
3 tion such as a museum, observatory, or research lab-
4 oratory.
5 However, a recipient awarded a grant under this section
6 may continue to receive funding under the grant regard-
7 less of whether the recipient has been granted tenure after
8 the awarding of the grant.
9 (d) OUTREACH.—The Director shall broadly dissemi-
10 nate information about when and how to apply for grants
11 under this section, including by conducting outreach to
12 Historically Black Colleges and Universities that are part
13 B institutions as defined in section 322(2) of the Higher
14 Education Act of 1965 (20 U.S.C. 1061(2)) and minority
15 institutions (as defined in section 365(3) of that Act (20
16 U.S.C. 1067k(3))).
17 (e) APPLICATION.—Applicants for awards under this
18 section shall submit to the Director—
19 (1) a curriculum vitae or resume, including a
20 list of publications and a description of any activities
21 demonstrating leadership or educational activities;
22 (2) a description of research areas of interest;
23 (3) letters of recommendation; and
24 (4) any other materials the Director requires.

1 (f) CRITERIA FOR AWARDS.—In establishing criteria
2 for evaluation of applications for grants under this section,
3 the Director shall include—
4 (1) the potential of the applicant for leadership
5 at the frontiers of knowledge;
6 (2) the potential innovative or transformative
7 nature of research in the areas of interest described
8 in the application;
9 (3) the creativity of the applicant as determined
10 by criteria set by the Director, including creativity
11 demonstrated in past research activities; and
12 (4) the potential interest to industry of research
13 in the areas of interest described in the application.
14 (g) AUTHORIZATION OF APPROPRIATIONS.—There
15 are authorized to be appropriated to the Director of the
16 National Science Foundation to carry out this section—
17 (1) $3,000,000 for fiscal year 2007;
18 (2) $6,000,000 for fiscal year 2008;
19 (3) $9,000,000 for fiscal year 2009;
20 (4) $12,000,000 for fiscal year 2010; and
21 (5) $15,000,000 for fiscal year 2011.
22 **SEC. 6. DEPARTMENT OF ENERGY RESEARCH AWARD**
23 **MATCH PROGRAM.**
24 (a) IN GENERAL.—The Director of the Office of
25 Science of the Department of Energy shall carry out a

1 program to award grants on a competitive, merit-reviewed
2 basis to scientists and engineers at the early stage of their
3 careers at institutions of higher education and organiza-
4 tions described in subsection (d)(2) to conduct high-risk,
5 high-return research in areas related to energy production,
6 storage, and use. The program shall support fundamental
7 research with the potential for significant scientific or
8 technical advancement.

9 (b) INVOLVEMENT OF DEPARTMENT OF ENERGY OR-
10 GANIZATIONS.—In carrying out this program, the Director
11 shall consult with the research, development, demonstra-
12 tion, and commercial application programs of the Office
13 of Nuclear Energy Research and Development, the Office
14 of Fossil Energy, and the Office of Energy Efficiency and
15 Renewables.

16 (c) SIZE AND DURATION OF AWARD.—

17 (1) BASE AWARD.—The duration of awards
18 under this section shall be up to 5 years, and the
19 amount per year shall be up to $75,000. The fund-
20 ing awarded under this paragraph shall not be con-
21 tingent on the receipt of funds under paragraph (2).

22 (2) MATCHING AWARD.—Each year that a re-
23 cipient is receiving funding under paragraph (1), the
24 Department of Energy Office of Science shall match
25 any funds the recipient receives from United States

1 industry for work in the area described in the recipi-
2 ent's application for the award, up to an additional
3 $37,500.
4 (d) ELIGIBILITY.—Applicants for awards under this
5 section shall be individuals who are employed in a tenure-
6 track position as an assistant professor or equivalent title,
7 or who hold an equivalent position, at—
8 (1) an institution of higher education in the
9 United States; or
10 (2) an organization in the United States that is
11 a nonprofit, nondegree-granting research organiza-
12 tion such as a museum, observatory, or research lab-
13 oratory.
14 However, a recipient awarded a grant under this section
15 may continue to receive funding under the grant regard-
16 less of whether the recipient has been granted tenure after
17 the awarding of the grant.
18 (e) OUTREACH.—The Director shall broadly dissemi-
19 nate information about when and how to apply for grants
20 under this section, including by conducting outreach to
21 Historically Black Colleges and Universities that are part
22 B institutions as defined in section 322(2) of the Higher
23 Education Act of 1965 (20 U.S.C. 1061(2)) and minority
24 institutions (as defined in section 365(3) of that Act (20
25 U.S.C. 1067k(3))).

1 (f) APPLICATION.—Applicants for awards under this
2 section shall submit to the Director—
3 (1) a curriculum vitae or resume, including a
4 list of publications and a description of any activities
5 demonstrating leadership or educational activities;
6 (2) a description of research areas of interest;
7 (3) letters of recommendation; and
8 (4) any other materials the Director requires.
9 (g) CRITERIA FOR AWARDS.—In establishing criteria
10 for evaluation of applications for the grants awarded
11 under subsection (a), the Director shall include—
12 (1) the potential for leadership at the frontiers
13 of knowledge by the applicant;
14 (2) the potential innovative or transformative
15 nature of research in the areas of interest described
16 in the application;
17 (3) the creativity of the applicant as determined
18 by criteria set by the Director, including creativity
19 demonstrated in past research activities; and
20 (4) the potential interest to industry of research
21 in the areas of interest described in the application.
22 (h) COLLABORATION WITH NATIONAL LABORA-
23 TORIES.—In awarding grants under this section, the Di-
24 rector may give priority to applications in which the pro-

1 posed work includes collaboration with the Department of
2 Energy National Laboratories.
3 (i) AUTHORIZATION OF APPROPRIATIONS.—There
4 are authorized to be appropriated to the Secretary of En-
5 ergy to carry out the Director's responsibilities under this
6 section—
7 (1) $2,000,000 for fiscal year 2007;
8 (2) $4,000,000 for fiscal year 2008;
9 (3) $6,000,000 for fiscal year 2009;
10 (4) $8,000,000 for fiscal year 2010; and
11 (5) $10,000,000 for fiscal year 2011.
12 **SEC. 7. MAJOR RESEARCH INSTRUMENTATION.**
13 (a) NATIONAL SCIENCE FOUNDATION PROGRAM.—
14 Awards under the Major Research Instrumentation Pro-
15 gram described in section 13 of the National Science
16 Foundation Authorization Act of 2002 shall range in
17 amount between $100,000 and $20,000,000 and may be
18 used to support the operations and maintenance of instru-
19 mentation and equipment acquired under the program.
20 (b) AUTHORIZATION OF APPROPRIATIONS.—There
21 are authorized to be appropriated to the National Science
22 Foundation for this program, $94,200,000 for fiscal year
23 2007, $100,800,000 for fiscal year 2008, $107,800,000
24 for fiscal year 2009, $115,300,000 for fiscal year 2010,
25 and $123,400,000 for fiscal year 2011.

SEC. 8. DONATIONS.

Section 11(f) of the National Science Foundation Act of 1950 (42 U.S.C. 1870(f)) is amended by inserting at the end before the semicolon ", except that funds may be donated for specific prize competitions".

SEC. 9. PROGRAM TO FOSTER CROSS-DISCIPLINARY RESEARCH.

(a) IN GENERAL.—The Director shall establish a program to award grants for long-term, potentially path-breaking, basic research designed to simultaneously advance the physical and nonbiomedical life sciences.

(b) MERIT REVIEW.—Grants shall be awarded under this section on a competitive, merit-reviewed basis. The Director shall ensure that review panels for proposals received under this section include both physical scientists and nonbiomedical life scientists, and, when appropriate, engineers. The Director shall ensure that review panels for proposals received under this section are open to approving high-risk research.

(c) AWARDS.—The Director may award grants under this section to individuals, groups, and centers. The Director shall ensure that some of the grants awarded under section 2 are awarded consistent with this section.

(d) APPLICATION AND SELECTION.—Applications for grants under this section shall be submitted to the Director at such time, in such manner, and containing such

1 information as the Director may require. At a minimum,
2 applications shall contain a brief description of how the
3 proposed research will advance both the physical and non-
4 biomedical life sciences. In evaluating applications, the Di-
5 rector shall consider, at a minimum, how significantly the
6 research would advance both the physical and nonbio-
7 medical life sciences.

8 (e) OTHER AGENCIES.—The Director may carry out
9 this program jointly with the Department of Energy Office
10 of Science and other relevant Federal agencies.

11 (f) REPORT.—The documents prepared by the Direc-
12 tor to accompany the annual Presidential budget submis-
13 sion shall specify amounts to be expended on the program
14 in this section.

15 **SEC. 10. RESEARCH ON INNOVATION AND INVENTIVENESS.**

16 In carrying out its research programs on science pol-
17 icy and on the science of learning, the National Science
18 Foundation may support research on the process of inno-
19 vation and the teaching of inventiveness.

20 **SEC. 11. NASA'S CONTRIBUTION TO INNOVATION.**

21 (a) SENSE OF THE CONGRESS.—It is the sense of the
22 Congress that—

23 (1) a balanced science program as authorized
24 by section 101(d) of the National Aeronautics and
25 Space Administration Authorization Act of 2005

1 (Public Law 109–155) contributes significantly to
2 innovation in and the economic competitiveness of
3 the United States; and
4 (2) a robust National Aeronautics and Space
5 Administration, funded at the levels authorized
6 under sections 202 and 203 of that Act, would offer
7 a balance among science, aeronautics, exploration,
8 and human space flight programs, all of which can
9 attract and employ scientists, engineers, and techni-
10 cians across a broad range of fields in science, tech-
11 nology, mathematics, and engineering.
12 (b) PARTICIPATION IN INNOVATION AND COMPETI-
13 TIVENESS PROGRAMS.—The Administrator of the Na-
14 tional Aeronautics and Space Administration shall fully
15 participate in any interagency efforts to promote innova-
16 tion and economic competitiveness through scientific re-
17 search and development within the spending levels cited
18 in subsection (a).
19 **SEC. 12. NASA WORKFORCE TRAINING.**
20 (a) ESTABLISHMENT.—The Administrator of the Na-
21 tional Aeronautics and Space Administration may estab-
22 lish a NASA Academy, which may be established as a vir-
23 tual Academy using online learning techniques. The Acad-
24 emy, if established, shall be available to all employees of
25 the National Aeronautics and Space Administration to fa-

1 cilitate increased knowledge of engineering and scientific
2 principles to further the missions of the National Aero-
3 nautics and Space Administration.

4 (b) PURPOSE.—The purpose of the Academy is to
5 provide a unique training program to bridge the gap be-
6 tween the broad-based training provided by universities
7 and the specific training needed to understand the dif-
8 ferent technologies which form the basis for work at the
9 National Aeronautics and Space Administration, as well
10 as to update employees with the most current training
11 available in the various skills and disciplines needed at the
12 National Aeronautics and Space Administration.

13 (c) SUBMISSION OF PLAN.—Not later than 180 days
14 after the date of enactment of this Act, the Administrator
15 of the National Aeronautics and Space Administration
16 shall transmit to the Committee on Science of the House
17 of Representatives and the Committee on Commerce,
18 Science, and Transportation of the Senate a notification
19 of whether the National Aeronautics and Space Adminis-
20 tration will establish an Academy as described in sub-
21 section (a). If an Academy is to be established, then con-
22 current with the notification, the Administrator shall
23 transmit a plan for the establishment of the Academy.

24 **SEC. 13. DEFINITIONS.**

25 In this Act—

1 (1) the term "institution of higher education"
2 has the meaning given such term in section 101(a)
3 of the Higher Education Act of 1965 (20 U.S.C.
4 1001(a)); and
5 (2) the term "National Laboratory" has the
6 meaning given the term "nonmilitary energy labora-
7 tory" in section 903(3) of the Energy Policy Act of
8 2005 (42 U.S.C. 16182(3)).

Amend the title to read as follows: "A Bill to authorize the National Science Foundation and the Department of Energy Office of Science to provide grants to early career researchers to establish innovative research programs and integrate education and research and to conduct high-risk, high-return research, and for other purposes.".

AMENDMENT TO H.R. 5356

OFFERED BY MR. MILLER OF NORTH CAROLINA

Page 20, line 24, redesignate section 13 as section 14.

Page 20, after line 23, insert the following new section:

1 **SEC. 13. PRECOMPETITIVE INNOVATION INVESTMENT.**

2 The Stevenson-Wydler Technology Innovation Act of
3 1980 (15 U.S.C. 3701 et seq.) is amended by adding at
4 the end the following new section:

5 **"SEC. 24. PRECOMPETITIVE INNOVATION INVESTMENT.**

6 "(a) DEFINITIONS.—In this section:

7 "(1) INSTITUTION OF HIGHER EDUCATION.—
8 The term 'institution of higher education' has the
9 meaning given that term in section 101(a) of the
10 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

11 "(2) PRECOMPETITIVE.—The term
12 'precompetitive' means the period after completion
13 of basic research but before completion of proof of
14 concept.

15 "(b) GRANT PROGRAM.—The National Science Foun-
16 dation shall establish a program of grants to institutions

of higher education to enable them to bridge the gap between laboratory discovery and commercially viable research.

"(c) USE OF GRANT AMOUNTS.—Amounts provided in a grant under this section may be used for the establishment of precompetitive technology transfer centers, which can be used to advance inventions made at the institution of higher education that have market potential to the point where they can attract other private or public funding, through—

"(1) enlisting the assistance of commercialization specialists to assist the institution of higher education in areas such as the formation of a small business, licensing, or other method of commercialization;

"(2) establishing proof-of-concept;

"(3) technology feasibility studies;

"(4) concept analysis;

"(5) market assessment or study;

"(6) development and testing of a basic prototype;

"(7) patenting and licensing expenses; or

"(8) development of a business plan.

"(d) APPLICATION REQUIREMENT.—An applicant for a grant under this section shall establish to the satisfac-

1 tion of the National Science Foundation its ability to carry
2 out the activities described in subsection (c) for which the
3 grant will be used.

4 "(e) SELECTION PREFERENCES.—The National
5 Science Foundation shall give preference in the selection
6 of grantees under this section to—

7 "(1) institutions of higher education that work
8 with outside agencies such as State and local govern-
9 ment, businesses, and economic development organi-
10 zations;

11 "(2) institutions of higher education that match
12 Federal funds used in grants made under the pro-
13 gram; and

14 "(3) institutions of higher education that work
15 with other institutions of higher education, including
16 institutions too small to have their own technology
17 licensing office.

18 "(f) EQUAL ACCESS TO GRANTS.—The National
19 Science Foundation shall strive to ensure equal access to
20 grants under this section for Historically Black Colleges
21 and Universities, and Minority Serving Institutions.

22 "(g) LIMIT ON NUMBER OF GRANTS.—No institution
23 of higher education shall receive a grant under this section
24 for more than 4 years.".