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REPORT
110–682

NATIONAL NANOTECHNOLOGY INITIATIVE AMENDMENTS ACT OF 2008

JUNE 4, 2008.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. GORDON of Tennessee, from the Committee on Science and Technology, submitted the following

R E P O R T

[To accompany H.R. 5940]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 5940) to authorize activities for support of nanotechnology research and development, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

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69–006

I. AMENDMENT

The amendment is as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Nanotechnology Initiative Amendments Act of 2008".

SEC. 2. NATIONAL NANOTECHNOLOGY PROGRAM AMENDMENTS.

The 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501 et seq.) is amended—

(1) by striking section 2(c)(4) and inserting the following new paragraph:

"(4) develop, within 12 months after the date of enactment of the National Nanotechnology Initiative Amendments Act of 2008, and update every 3 years thereafter, a strategic plan to guide the activities described under subsection (b) that specifies near-term and long-term objectives for the Program, the anticipated time frame for achieving the near-term objectives, and the metrics to be used for assessing progress toward the objectives, and that describes—

"(A) how the Program will move results out of the laboratory and into applications for the benefit of society, including through cooperation and collaborations with nanotechnology research, development, and technology transition initiatives supported by the States;

"(B) how the Program will encourage and support interdisciplinary research and development in nanotechnology; and

"(C) proposed research in areas of national importance in accordance with the requirements of section 5 of the National Nanotechnology Initiative Amendments Act of 2008;";

(2) in section 2—

(A) in subsection (d)—

(i) by redesignating paragraphs (1) through (5) as paragraphs (2) through (6), respectively; and

(ii) by inserting the following new paragraph before paragraph (2), as so redesignated by clause (i) of this subparagraph:

"(1) the Program budget, for the previous fiscal year, for each agency that participates in the Program, including a breakout of spending for the development and acquisition of research facilities and instrumentation, for each program component area, and for all activities pursuant to subsection (b)(10);"; and

(B) by inserting at the end the following new subsection:

"(e) STANDARDS SETTING.—The agencies participating in the Program shall support the activities of committees involved in the development of standards for nanotechnology and may reimburse the travel costs of scientists and engineers who participate in activities of such committees.";

(3) by striking section 3(b) and inserting the following new subsection:

"(b) FUNDING.—(1) The operation of the National Nanotechnology Coordination Office shall be supported by funds from each agency participating in the Program. The portion of such Office's total budget provided by each agency for each fiscal year shall be in the same proportion as the agency's share of the total budget for the Program for the previous fiscal year, as specified in the report required under section 2(d)(1).

"(2) The annual report under section 2(d) shall include—

"(A) a description of the funding required by the National Nanotechnology Coordination Office to perform the functions specified under subsection (a) for the next fiscal year by category of activity, including the funding required to carry out the requirements of section 2(b)(10)(D), subsection (d) of this section, and section 5;

"(B) a description of the funding required by such Office to perform the functions specified under subsection (a) for the current fiscal year by category of activity, including the funding required to carry out the requirements of subsection (d); and

"(C) the amount of funding provided for such Office for the current fiscal year by each agency participating in the Program.";

(4) by inserting at the end of section 3 the following new subsection:

"(d) PUBLIC INFORMATION.—(1) The National Nanotechnology Coordination Office shall develop and maintain a database accessible by the public of projects funded under the Environmental, Health, and Safety, the Education and Societal Dimensions, and the Nanomanufacturing program component areas, or any successor program component areas, including a description of each project, its source of funding by agency, and its funding history. For the Environmental, Health, and Safety pro-

gram component area, or any successor program component area, projects shall be grouped by major objective as defined by the research plan required under section 3(b) of the National Nanotechnology Initiative Amendments Act of 2008. For the Education and Societal Dimensions program component area, or any successor program component area, the projects shall be grouped in subcategories of—

"(A) education in formal settings;

"(B) education in informal settings;

"(C) public outreach; and

"(D) ethical, legal, and other societal issues.

"(2) The National Nanotechnology Coordination Office shall develop, maintain, and publicize information on nanotechnology facilities supported under the Program, and may include information on nanotechnology facilities supported by the States, that are accessible for use by individuals from academic institutions and from industry. The information shall include at a minimum the terms and conditions for the use of each facility, a description of the capabilities of the instruments and equipment available for use at the facility, and a description of the technical support available to assist users of the facility.";

(5) in section 4(a)—

(A) by striking "or designate";

(B) by inserting "as a distinct entity" after "Advisory Panel"; and

(C) by inserting at the end "The Advisory Panel shall form a subpanel with membership having specific qualifications tailored to enable it to carry out the requirements of subsection (c)(7).";

(6) in section 4(b)—

(A) by striking "or designated" and "or designating"; and

(B) by adding at the end the following: "At least one member of the Advisory Panel shall be an individual employed by and representing a minority-serving institution.";

(7) by amending section 5 to read as follows:

"SEC. 5. TRIENNIAL EXTERNAL REVIEW OF THE NATIONAL NANOTECHNOLOGY PROGRAM.

"(a) IN GENERAL.—The Director of the National Nanotechnology Coordination Office shall enter into an arrangement with the National Research Council of the National Academy of Sciences to conduct a triennial review of the Program. The Director shall ensure that the arrangement with the National Research Council is concluded in order to allow sufficient time for the reporting requirements of subsection (b) to be satisfied. Each triennial review shall include an evaluation of the—

"(1) research priorities and technical content of the Program, including whether the allocation of funding among program component areas, as designated according to section 2(c)(2), is appropriate;

"(2) effectiveness of the Program's management and coordination across agencies and disciplines, including an assessment of the effectiveness of the National Nanotechnology Coordination Office;

"(3) Program's scientific and technological accomplishments and its success in transferring technology to the private sector; and

"(4) adequacy of the Program's activities addressing ethical, legal, environmental, and other appropriate societal concerns, including human health concerns.

"(b) EVALUATION TO BE TRANSMITTED TO CONGRESS.—The National Research Council shall document the results of each triennial review carried out in accordance with subsection (a) in a report that includes any recommendations for ways to improve the Program's management and coordination processes and for changes to the Program's objectives, funding priorities, and technical content. Each report shall be submitted to the Director of the National Nanotechnology Coordination Office, who shall transmit it to the Advisory Panel, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science and Technology of the House of Representatives not later than September 30 of every third year, with the first report due September 30, 2009.

"(c) FUNDING.—Of the amounts provided in accordance with section 3(b)(1), the following amounts shall be available to carry out this section:

"(1) $500,000 for fiscal year 2009.

"(2) $500,000 for fiscal year 2010.

"(3) $500,000 for fiscal year 2011."; and

(8) in section 10—

(A) by amending paragraph (2) to read as follows:

"(2) NANOTECHNOLOGY.—The term 'nanotechnology' means the science and technology that will enable one to understand, measure, manipulate, and manufacture at the nanoscale, aimed at creating materials, devices, and systems with fundamentally new properties or functions."; and

(B) by adding at the end the following new paragraph:

"(7) NANOSCALE.—The term 'nanoscale' means one or more dimensions of between approximately 1 and 100 nanometers.".

SEC. 3. SOCIETAL DIMENSIONS OF NANOTECHNOLOGY.

(a) COORDINATOR FOR SOCIETAL DIMENSIONS OF NANOTECHNOLOGY.—The Director of the Office of Science and Technology Policy shall designate an associate director of the Office of Science and Technology Policy as the Coordinator for Societal Dimensions of Nanotechnology. The Coordinator shall be responsible for oversight of the coordination, planning, and budget prioritization of activities required by section 2(b)(10) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(b)(10)). The Coordinator shall, with the assistance of appropriate senior officials of the agencies funding activities within the Environmental, Health, and Safety and the Education and Societal Dimensions program component areas of the Program, or any successor program component areas, ensure that the requirements of such section 2(b)(10) are satisfied. The responsibilities of the Coordinator shall include—

(1) ensuring that a research plan for the environmental, health, and safety research activities required under subsection (b) is developed, updated, and implemented and that the plan is responsive to the recommendations of the subpanel of the Advisory Panel established under section 4(a) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7503(a)), as amended by this Act;

(2) encouraging and monitoring the efforts of the agencies participating in the Program to allocate the level of resources and management attention necessary to ensure that the ethical, legal, environmental, and other appropriate societal concerns related to nanotechnology, including human health concerns, are addressed under the Program, including the implementation of the research plan described in subsection (b); and

(3) encouraging the agencies required to develop the research plan under subsection (b) to identify, assess, and implement suitable mechanisms for the establishment of public-private partnerships for support of environmental, health, and safety research.

(b) RESEARCH PLAN.—

(1) IN GENERAL.—The Coordinator for Societal Dimensions of Nanotechnology shall convene and chair a panel comprised of representatives from the agencies funding research activities under the Environmental, Health, and Safety program component area of the Program, or any successor program component area, and from such other agencies as the Coordinator considers necessary to develop, periodically update, and coordinate the implementation of a research plan for this program component area. In developing and updating the plan, the panel convened by the Coordinator shall solicit and be responsive to recommendations and advice from—

(A) the subpanel of the Advisory Panel established under section 4(a) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7503(a)), as amended by this Act; and

(B) the agencies responsible for environmental, health, and safety regulations associated with the production, use, and disposal of nanoscale materials and products.

(2) DEVELOPMENT OF STANDARDS.—The plan required under paragraph (1) shall include a description of how the Program will help to ensure the development of—

(A) standards related to nomenclature associated with engineered nanoscale materials;

(B) engineered nanoscale standard reference materials for environmental, health, and safety testing; and

(C) standards related to methods and procedures for detecting, measuring, monitoring, sampling, and testing engineered nanoscale materials for environmental, health, and safety impacts.

(3) COMPONENTS OF PLAN.—The plan required under paragraph (1) shall, with respect to activities described in paragraphs (1) and (2)—

(A) specify near-term research objectives and long-term research objectives;

(B) specify milestones associated with each near-term objective and the estimated time and resources required to reach each milestone;

(C) with respect to subparagraphs (A) and (B), describe the role of each agency carrying out or sponsoring research in order to meet the objectives specified under subparagraph (A) and to achieve the milestones specified under subparagraph (B);

(D) specify the funding allocated to each major objective of the plan and the source of funding by agency for the current fiscal year; and

(E) estimate the funding required for each major objective of the plan and the source of funding by agency for the following 3 fiscal years.

(4) TRANSMITTAL TO CONGRESS.—The plan required under paragraph (1) shall be submitted not later than 60 days after the date of enactment of this Act to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives.

(5) UPDATING AND APPENDING TO REPORT.—The plan required under paragraph (1) shall be updated annually and appended to the report required under section 2(d) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(d)).

(c) NANOTECHNOLOGY PARTNERSHIPS.—

(1) ESTABLISHMENT.—As part of the program authorized by section 9 of the National Science Foundation Authorization Act of 2002, the Director of the National Science Foundation shall provide 1 or more grants to establish partnerships as defined by subsection (a)(2) of that section, except that each such partnership shall include 1 or more businesses engaged in the production of nanoscale materials, products, or devices. Partnerships established in accordance with this subsection shall be designated as "Nanotechnology Education Partnerships".

(2) PURPOSE.—Nanotechnology Education Partnerships shall be designed to recruit and help prepare secondary school students to pursue postsecondary level courses of instruction in nanotechnology. At a minimum, grants shall be used to support—

(A) professional development activities to enable secondary school teachers to use curricular materials incorporating nanotechnology and to inform teachers about career possibilities for students in nanotechnology;

(B) enrichment programs for students, including access to nanotechnology facilities and equipment at partner institutions, to increase their understanding of nanoscale science and technology and to inform them about career possibilities in nanotechnology as scientists, engineers, and technicians; and

(C) identification of appropriate nanotechnology educational materials and incorporation of nanotechnology into the curriculum for secondary school students at one or more organizations participating in a Partnership.

(3) SELECTION.—Grants under this subsection shall be awarded in accordance with subsection (b) of such section 9, except that paragraph (3)(B) of that subsection shall not apply.

(d) UNDERGRADUATE EDUCATION PROGRAMS.—

(1) ACTIVITIES SUPPORTED.—As part of the activities included under the Education and Societal Dimensions program component area, or any successor program component area, the Program shall support efforts to introduce nanoscale science, engineering, and technology into undergraduate science and engineering education through a variety of interdisciplinary approaches. Activities supported may include—

(A) development of courses of instruction or modules to existing courses;

(B) faculty professional development; and

(C) acquisition of equipment and instrumentation suitable for undergraduate education and research in nanotechnology.

(2) COURSE, CURRICULUM, AND LABORATORY IMPROVEMENT AUTHORIZATION.—There are authorized to be appropriated to the Director of the National Science Foundation to carry out activities described in paragraph (1) through the Course, Curriculum, and Laboratory Improvement program—

(A) from amounts authorized under section 7002(b)(2)(B) of the America COMPETES Act, $5,000,000 for fiscal year 2009; and

(B) from amounts authorized under section 7002(c)(2)(B) of the America COMPETES Act, $5,000,000 for fiscal year 2010.

(3) ADVANCED TECHNOLOGY EDUCATION AUTHORIZATION.—There are authorized to be appropriated to the Director of the National Science Foundation to carry out activities described in paragraph (1) through the Advanced Technology Education program—

(A) from amounts authorized under section 7002(b)(2)(B) of the America COMPETES Act, $5,000,000 for fiscal year 2009; and

(B) from amounts authorized under section 7002(c)(2)(B) of the America COMPETES Act, $5,000,000 for fiscal year 2010.

(e) INTERAGENCY WORKING GROUP.—The National Science and Technology Council shall establish under the Nanoscale Science, Engineering, and Technology Sub-

committee an Education Working Group to coordinate, prioritize, and plan the educational activities supported under the Program.

(f) SOCIETAL DIMENSIONS IN NANOTECHNOLOGY EDUCATION ACTIVITIES.—Activities supported under the Education and Societal Dimensions program component area, or any successor program component area, that involve informal, precollege, or undergraduate nanotechnology education shall include education regarding the environmental, health and safety, and other societal aspects of nanotechnology.

(g) REMOTE ACCESS TO NANOTECHNOLOGY FACILITIES.—(1) Agencies supporting nanotechnology research facilities as part of the Program shall require the entities that operate such facilities to allow access via the Internet, and support the costs associated with the provision of such access, by secondary school students and teachers, to instruments and equipment within such facilities for educational purposes. The agencies may waive this requirement for cases when particular facilities would be inappropriate for educational purposes or the costs for providing such access would be prohibitive.

(2) The agencies identified in paragraph (1) shall require the entities that operate such nanotechnology research facilities to establish and publish procedures, guidelines, and conditions for the submission and approval of applications for the use of the facilities for the purpose identified in paragraph (1) and shall authorize personnel who operate the facilities to provide necessary technical support to students and teachers.

SEC. 4. TECHNOLOGY TRANSFER.

(a) PROTOTYPING.—

(1) ACCESS TO FACILITIES.—In accordance with section 2(b)(7) of 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(b)(7)), the agencies supporting nanotechnology research facilities as part of the Program shall provide access to such facilities to companies for the purpose of assisting the companies in the development of prototypes of nanoscale products, devices, or processes (or products, devices, or processes enabled by nanotechnology) for determining proof of concept. The agencies shall publicize the availability of these facilities and encourage their use by companies as provided for in this section.

(2) PROCEDURES.—The agencies identified in paragraph (1)—

(A) shall establish and publish procedures, guidelines, and conditions for the submission and approval of applications for use of nanotechnology facilities;

(B) shall publish descriptions of the capabilities of facilities available for use under this subsection, including the availability of technical support; and

(C) may waive recovery, require full recovery, or require partial recovery of the costs associated with use of the facilities for projects under this subsection.

(3) SELECTION AND CRITERIA.—In cases when less than full cost recovery is required pursuant to paragraph (2)(C), projects provided access to nanotechnology facilities in accordance with this subsection shall be selected through a competitive, merit-based process, and the criteria for the selection of such projects shall include at a minimum—

(A) the readiness of the project for technology demonstration;

(B) evidence of a commitment by the applicant for further development of the project to full commercialization if the proof of concept is established by the prototype; and

(C) evidence of the potential for further funding from private sector sources following the successful demonstration of proof of concept.

The agencies may give special consideration in selecting projects to applications that are relevant to important national needs or requirements.

(b) USE OF EXISTING TECHNOLOGY TRANSFER PROGRAMS.—

(1) PARTICIPATING AGENCIES.—Each agency participating in the Program shall—

(A) encourage the submission of applications for support of nanotechnology related projects to the Small Business Innovation Research Program and the Small Business Technology Transfer Program administered by such agencies; and

(B) through the National Nanotechnology Coordination Office and within 6 months after the date of enactment of this Act, submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives—

(i) the plan described in section 2(c)(7) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(c)(7)); and

(ii) a report specifying, if the agency administers a Small Business Innovation Research Program and a Small Business Technology Transfer Program—

(I) the number of proposals received for nanotechnology related projects during the current fiscal year and the previous 2 fiscal years;

(II) the number of such proposals funded in each year;

(III) the total number of nanotechnology related projects funded and the amount of funding provided for fiscal year 2003 through fiscal year 2007; and

(IV) a description of the projects identified in accordance with subclause (III) which received private sector funding beyond the period of phase II support.

(2) NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.—The Director of the National Institute of Standards and Technology in carrying out the requirements of section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n) shall—

(A) in regard to subsection (d) of that section, encourage the submission of proposals for support of nanotechnology related projects; and

(B) in regard to subsection (g) of that section, include a description of how the requirement of subparagraph (A) of this paragraph is being met, the number of proposals for nanotechnology related projects received, the number of such proposals funded, the total number of such projects funded since the beginning of the Technology Innovation Program, and the outcomes of such funded projects in terms of the metrics developed in accordance with such subsection (g).

(3) TIP ADVISORY BOARD.—The TIP Advisory Board established under section 28(k) of the National Institute of Standards and Technology Act (15 U.S.C. 278n(k)), in carrying out its responsibilities under subsection (k)(3), shall provide the Director of the National Institute of Standards and Technology with—

(A) advice on how to accomplish the requirement of paragraph (2)(A) of this subsection; and

(B) an assessment of the adequacy of the allocation of resources for nanotechnology related projects supported under the Technology Innovation Program.

(c) INDUSTRY LIAISON GROUPS.—An objective of the Program shall be to establish industry liaison groups for all industry sectors that would benefit from applications of nanotechnology. The Nanomanufacturing, Industry Liaison, and Innovation Working Group of the National Science and Technology Council shall actively pursue establishing such liaison groups.

(d) COORDINATION WITH STATE INITIATIVES.—Section 2(b)(5) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(b)(5)) is amended to read as follows:

"(5) ensuring United States global leadership in the development and application of nanotechnology, including through coordination and leveraging Federal investments with nanotechnology research, development, and technology transition initiatives supported by the States;".

SEC. 5. RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

(a) IN GENERAL.—The Program shall include support for nanotechnology research and development activities directed toward application areas that have the potential for significant contributions to national economic competitiveness and for other significant societal benefits. The activities supported shall be designed to advance the development of research discoveries by demonstrating technical solutions to important problems in such areas as nano-electronics, energy efficiency, health care, and water remediation and purification. The Advisory Panel shall make recommendations to the Program for candidate research and development areas for support under this section.

(b) CHARACTERISTICS.—

(1) IN GENERAL.—Research and development activities under this section shall—

(A) include projects selected on the basis of applications for support through a competitive, merit-based process;

(B) involve collaborations among researchers in academic institutions and industry, and may involve nonprofit research institutions and Federal laboratories, as appropriate;

(C) when possible, leverage Federal investments through collaboration with related State initiatives; and

(D) include a plan for fostering the transfer of research discoveries and the results of technology demonstration activities to industry for commercial development.

(2) PROCEDURES.—Determination of the requirements for applications under this subsection, review and selection of applications for support, and subsequent funding of projects shall be carried out by a collaboration of no fewer than 2 agencies participating in the Program. In selecting applications for support, the agencies shall give special consideration to projects that include cost sharing from non-Federal sources.

(3) INTERDISCIPLINARY RESEARCH CENTERS.—Research and development activities under this section may be supported through interdisciplinary nanotechnology research centers, as authorized by section 2(b)(4) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(b)(4)), that are organized to investigate basic research questions and carry out technology demonstration activities in areas such as those identified in subsection (a).

(c) REPORT.—Reports required under section 2(d) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(d)) shall include a description of research and development areas supported in accordance with this section, including the same budget information as is required for program component areas under paragraphs (1) and (2) of such section 2(d).

SEC. 6. NANOMANUFACTURING RESEARCH.

(a) RESEARCH AREAS.—The Nanomanufacturing program component area, or any successor program component area, shall include research on—

(1) development of instrumentation and tools required for the rapid characterization of nanoscale materials and for monitoring of nanoscale manufacturing processes; and

(2) approaches and techniques for scaling the synthesis of new nanoscale materials to achieve industrial-level production rates.

(b) GREEN NANOTECHNOLOGY.—Interdiciplinary research centers supported under the Program in accordance with section 2(b)(4) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(b)(4)) that are focused on nanomanufacturing research and centers established under the authority of section 5(b)(3) of this Act shall include as part of the activities of such centers—

(1) research on methods and approaches to develop environmentally benign nanoscale products and nanoscale manufacturing processes, taking into consideration relevant findings and results of research supported under the Environmental, Health, and Safety program component area, or any successor program component area;

(2) fostering the transfer of the results of such research to industry; and

(3) providing for the education of scientists and engineers through interdisciplinary studies in the principles and techniques for the design and development of environmentally benign nanoscale products and processes.

(c) REVIEW OF NANOMANUFACTURING RESEARCH AND RESEARCH FACILITIES.—

(1) PUBLIC MEETING.—Not later than 12 months after the date of enactment of this Act, the National Nanotechnology Coordination Office shall sponsor a public meeting, including representation from a wide range of industries engaged in nanoscale manufacturing, to—

(A) obtain the views of participants at the meeting on—

(i) the relevance and value of the research being carried out under the Nanomanufacturing program component area of the Program, or any successor program component area; and

(ii) whether the capabilities of nanotechnology research facilities supported under the Program are adequate—

(I) to meet current and near-term requirements for the fabrication and characterization of nanoscale devices and systems; and

(II) to provide access to and use of instrumentation and equipment at the facilities, by means of networking technology, to individuals who are at locations remote from the facilities; and

(B) receive any recommendations on ways to strengthen the research portfolio supported under the Nanomanufacturing program component area, or any successor program component area, and on improving the capabilities of nanotechnology research facilities supported under the Program.

Companies participating in industry liaison groups shall be invited to participate in the meeting. The Coordination Office shall prepare a report documenting the findings and recommendations resulting from the meeting.

(2) ADVISORY PANEL REVIEW.—The Advisory Panel shall review the Nanomanufacturing program component area of the Program, or any successor program component area, and the capabilities of nanotechnology research facilities supported under the Program to assess—

(A) whether the funding for the Nanomanufacturing program component area, or any successor program component area, is adequate and receiving appropriate priority within the overall resources available for the Program;

(B) the relevance of the research being supported to the identified needs and requirements of industry;

(C) whether the capabilities of nanotechnology research facilities supported under the Program are adequate—

(i) to meet current and near-term requirements for the fabrication and characterization of nanoscale devices and systems; and

(ii) to provide access to and use of instrumentation and equipment at the facilities, by means of networking technology, to individuals who are at locations remote from the facilities; and

(D) the level of funding that would be needed to support—

(i) the acquisition of instrumentation, equipment, and networking technology sufficient to provide the capabilities at nanotechnology research facilities described in subparagraph (C); and

(ii) the operation and maintenance of such facilities.

In carrying out its assessment, the Advisory Panel shall take into consideration the findings and recommendations from the report required under paragraph (1).

(3) REPORT.—Not later than 18 months after the date of enactment of this Act, the Advisory Panel shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives a report on its assessment required under paragraph (2), along with any recommendations and a copy of the report prepared in accordance with paragraph (1).

SEC. 7. DEFINITIONS.

In this Act, terms that are defined in section 10 of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7509) have the meaning given those terms in that section.

II. PURPOSE OF THE BILL

The purpose of this bill is to improve the content and various aspects of the planning and coordination of the National Nanotechnology Initiative (NNI). This includes provisions to strengthen the planning and implementation of the environment, health, and safety research component of the NNI; to increase emphasis on nanomanufacturing research, technology transfer, and commercialization of research results flowing from the program; to create a new NNI component of focused, large-scale research and development projects in areas of national importance; and to enhance support for K–16 nanotechnology-related education programs.

III. BACKGROUND AND NEED FOR THE LEGISLATION

NATIONAL NANOTECHNOLOGY INITIATIVE AUTHORIZATION AND STRUCTURE

The Science and Technology Committee was instrumental in the development and enactment of the 21st Century Nanotechnology Research and Development Act of 2003 (P.L. 108–153), which authorizes the interagency National Nanotechnology Initiative (NNI). The 2003 statute put in place formal interagency planning, budgeting, and coordinating mechanisms for NNI. The National Science and Technology Council, through the Nanoscale Science, Engineering, and Technology (NSET) Subcommittee, plans and coordinates the NNI, and the National Nanotechnology Coordination Office

(NNCO) provides technical and administrative support to the NSET. There are currently twenty-six federal agencies that participate in the NNI, with 13 of those agencies reporting a nanotechnology research and development budget. The total estimated NNI budget for fiscal year 2008 is $1.49 billion.

P.L. 108–153 also provides for formal reviews of the content and management of the program by the National Academy of Sciences and by the NNI Advisory Panel, a statutorily created advisory committee of non-government experts. These reviews have found that the coordination and planning processes among the participating agencies in the NNI are largely effective. The NNI supports productive, cooperative research efforts across a spectrum of disciplines, and it is establishing a network of national facilities for support of nanoscale research and development.

However, the formal reviews by external experts noted above, as well as the findings of the Committee's oversight hearings on the NNI, have identified aspects of the interagency program that could be strengthened and improved. These areas are environmental, health and safety research; technology transfer and the fostering of commercialization of research results; and educational activities.

ENVIRONMENTAL, HEALTH, & SAFETY RESEARCH

Nanotechnology is advancing rapidly, and according to the Woodrow Wilson International Center for Scholars, at least 600 products that contain nanoscale materials have entered commerce, including aerosols and cosmetics. It is important for the successful development of nanotechnology that potential downsides of the technology be addressed from the beginning in a straightforward and open way because negative public perceptions about the safety of a technology can have serious consequences for its acceptance and use.

The current level of scientific understanding is inadequate to pin down what types of engineered nanomaterials may be dangerous, although early studies show some are potentially harmful. At present the state of understanding is insufficient regarding which characteristics of these materials are most significant to determine their effects on living organisms and the environment. Also, the sensors and instruments for effectively monitoring the presence of such materials in air or water are not yet available.

Although the NNI agencies have from the outset of the initiative included activities for increasing understanding of the environmental and safety aspects of nanotechnology, these agencies have not yet put in place a well designed, adequately funded, and effectively executed research program. In October 2003, the NSET organized an interagency Nanotechnology Environmental and Health Implications (NEHI) Working Group to coordinate environmental and safety research carried out under the NNI. The NEHI Working Group has released three environmental, health, and safety (EHS) research planning documents, each successively more comprehensive. The most recent document, the Strategy for Nanotechnology-Related Environmental, Health, and Safety Research, was released in February 2008. This document provided a more in-depth assessment of current research needs and priorities; however, it failed to include a schedule and timelines for meeting objectives and the proposed funding levels, by topic and by agency.

NANOMANUFACTURING AND COMMERCIALIZATION

One of the core activities under the NNI specified by the 2003 statute is, as stated in section 2(b)(7), "accelerating the deployment and application of nanotechnology research and development in the private sector, including startup companies." The motivation for this provision was to help ensure that the United States successfully capitalizes on the commercial developments that will flow from the substantial investment in research on the frontiers of science and technology.

The NNI agencies have so far invested approximately $7 billion over seven years, mostly for support of basic research that is providing new tools for the manipulation of matter at the nanoscale and is increasing our understanding of the behavior of engineered nanoscale materials and devices. However, the investment in areas most closely related to commercialization of research results is receiving a fairly small proportion of these resources. The fiscal year 2008 estimated budget for nanomanufacturing research (a component of the NNI that is closely tied to bridging the gap between research and the development of commercial applications) is $50.2 million, which is 3.3% of the total budget.

P.L. 108–153 also specifically encourages the transfer of nanotechnology research results for the public benefit through support of nanotechnology related projects under the Small Business Innovation Research (SBIR) and Small Business Technology Transfer Research (STTR) programs. The total SBIR and STTR program spending in all technology areas in fiscal year 2006 was nearly $2.2 billion, and of that budget, only $79.7 million (3.7%) was identified as supporting nanotechnology related projects. The current allocation of funding raises the concern that the NNI does not provide sufficient resources for activities to foster the transfer of new discoveries to commercial products and processes.

NANOTECHNOLOGY EDUCATION

The impact of nanotechnology on Americans' quality of life and economic prosperity could be enormous, and thus it is critical for the United States to stay at the forefront of scientific research and development in this field. This dictates the necessity of supporting educational activities that will cultivate students who are enthusiastic and able to pursue careers in all aspects of nanotechnology. The Nation needs a full pipeline of talented engineers, scientists and technicians, and a scientifically literate public, able to exploit and understand this new science.

The NNI has from its beginnings supported education activities designed to teach K–16 students, science teachers, faculty members, and the general public about nanotechnology and to prepare undergraduate students for careers in nanotechnology fields or to pursue advanced degrees in the field. For example, the National Science Foundation (NSF) allocates NNI funds for education initiatives that include the National Center for Learning and Teaching in Nanoscale Science and Engineering and the Nanoscale Informal Science Education (NISE) Network, which is introducing nanotechnology to the public and drawing students to careers in nanotechnology fields.

Nevertheless, the overall NNI investment in K–16, and informal, educational activities is small and principally provided by NSF. Because of the vital role nanotechnology will play in the future of science and technology, the NNI agencies should consider ways to improve the planning and coordination of the nanotechnology education component of the NNI and to expand the level of engagement by the agencies in sponsoring nanotechnology educational activities.

IV. Summary of Hearings

On October 2, 2007, the Subcommittee on Research and Science Education held a hearing to review the educational activities being supported under the NNI. The Subcommittee heard testimony from Dr. David Ucko, Deputy Division Director of the Education and Human Resources Division on Research and Learning, National Science Foundation; Dr. Navida Ganguly, Head of the Science Department at Oak Ridge High School, Oak Ridge, Tennessee; Dr. Hamish Fraser, Ohio Regents Eminent Scholar and Professor, Department of Materials Science Engineering, the Ohio State University; Dr. Ray Vandiver, Vice President of New Project Development, Oregon Museum of Science and Industry; Mr. Sean Murdock, Executive Director, NanoBusiness Alliance; and Dr. Gerald Wheeler, Executive Director, National Science Teachers Association. The witnesses agreed that nanotechnology education is an important component of a strategy to capitalize on the promise of this advancing field. Several witnesses discussed the importance of early nanotechnology education, including informal education, for generating awareness, information and excitement about nanotechnology among young students and the general public. Witnesses were unanimous in expressing support for increasing formal education in nanotechnology beginning at the undergraduate level, including at 2-year colleges because of their important role in supplying much of the 21st Century skilled workforce. The representative from the National Science Foundation provided an overview of the many activities in formal and informal nanotechnology education at all levels now being supported by the agency's NNI program.

On October 31, 2007, the Committee on Science and Technology held a hearing on research on environmental and safety impacts of nanotechnology, on the current status of planning and implementation of such research under the NNI, and on whether changes are needed to the current mechanisms for planning and implementation. Witnesses included Dr. Clayton Teague, Director of the National Nanotechnology Coordination Office (NNCO); Mr. Floyd Kvamme, Co-Chair of the President's Council of Advisors on Science and Technology (PCAST); Dr. Vicki L. Colvin, Executive Director, International Council on Nanotechnology and Professor of Chemistry and Chemical Engineering, Rice University; Dr. Andrew Maynard, Chief Science Advisor, Project on Emerging Nanotechnologies, Woodrow Wilson International Center for Scholars; Dr. Richard Denison, Senior Scientist, Environmental Defense; and Mr. Paul D. Ziegler, Chairman of the Nanotechnology Panel, American Chemistry Council, and Global Director of PPG Industries, Inc. The hearing highlighted the unanimous position by all witnesses regarding the importance of environmental, health and safety (EHS) research for the development of nanotechnology and

the necessity of a well designed and adequately funded EHS research component of the NNI. However, there was concern that the interagency planning for and implementation of the EHS research component of NNI was not moving with the urgency it deserved. While the organizations responsible for development and implementation of the plan asserted that the current process is effective and that the participating agencies believe the process is working well, the non-governmental organizations supported recommendations for changes in the planning process as well as increases in the priority of EHS in the overall NNI basic research funding.

On March 11, 2008, the Subcommittee on Research and Science Education held a hearing to review the transfer of NNI research outcomes for commercial and public benefit. Witnesses included Mr. Skip Rung, President and Executive Director, Oregon Nanoscience and Microtechnologies Institute (ONAMI); Dr. Julie Chen, Co-Director, Nanomanufacturing Center of Excellence, University of Massachusetts Lowell; Dr. Jeffrey Welser, Director, Nanoelectronics Research Initiative (NRI), on behalf of the Semiconductor Industry Association; Mr. William Moffitt, CEO, Nanosphere, Inc., on behalf of the NanoBusiness Alliance; and Dr. Mark Melliar-Smith, CEO, Molecular Imprints, Inc. The witnesses stressed the importance of basic research in nanomanufacturing and adequate funding for geographically diverse user facilities. The witnesses were clear that basic research funding should be broad to allow for new discoveries and pioneering research; however, they indicated that it would be wise to focus some funding and planning toward commercialization. They suggested that this might be accomplished through demonstration projects or by defining areas of global competitiveness. Many of the witnesses testified that the SBIR program and the Technology Innovation Program (TIP) of the National Institute of Standards and Technology (NIST) are very important for the development of innovative technologies and felt that the programs should emphasize funding for nanotechnology projects. It was also emphasized that green nanotechnology concepts and approaches are integrated with the basic research activities at the nanomanufacturing research centers.

On April 16, 2008, the Committee on Science and Technology held a hearing to review draft legislation that proposed changes to various aspects of the planning and implementation mechanisms for and to the content of the NNI. Witnesses included Mr. Floyd E. Kvamme, Co-Chair, President's Council of Advisors on Science and Technology; Mr. Sean Murdock, Executive Director, NanoBusiness Alliance; Dr. Joseph Krajcik, Associate Dean for Research and Professor of Education, University of Michigan; Dr. Andrew Maynard, Chief Science Advisor, Project on Emerging Nanotechnologies, Woodrow Wilson International Center for Scholars; Dr. Raymond David, Manager of Toxicology, BASF Corporation, on behalf of the American Chemistry Council; and Dr. Robert R. Doering, Senior Fellow and Research Strategy Manager, Texas Instruments, on behalf of the Semiconductor Industry Association. Witnesses testified that EHS issues are fundamental to advancing nanotechnology, agreed that the NNI should focus considerable resources in this research area, and supported the legislation's requirement to expand the EHS strategy to include more detailed planning. But they were not in agreement on the need for a con-

gressionally mandated minimum level of funding. Likewise, there was agreement on the importance of NNI support for efforts to foster commercialization of research results, and in particular, there was support for the provisions in the draft bill to encourage industry use of nanotechnology research facilities and for the emphasis on including more nanotechnology related projects in the funding portfolios of the SBIR and STTR programs, as well as the TIP. The provisions in the bill that encourage state and industry partnerships were lauded, particularly the education partnerships which require participation by industry.

V. Committee Actions

On May 1, 2008, Representative Bart Gordon, Chairman of the Committee on Science and Technology, for himself, Mr. Hall, Ranking Member of the Committee on Science and Technology, Mr. Baird, Mr. Ehlers, Ms. Johnson (TX), Mr. Sensenbrenner, Mr. Udall (CO), Mr. Smith (TX), Mr. Wu, Mr. Bartlett, Mr. Miller (NC), Mr. Lucas, Mr. Lipinski, Mrs. Biggert, Ms. Giffords, Mr. Akin, Ms. Hooley, Mr. Neugebauer, Mr. Rothman, Mr. Inglis, Mr. Wilson (OH), Mr. McCaul, Mr. Mario Diaz-Balart (FL), Mr. Gingrey, and Mr. Bilbray introduced H.R. 5940, the National Nanotechnology Initiative Amendments Act, a bill to authorize activities for support of nanotechnology research and development, and for other purposes.

The Committee on Science and Technology met on Wednesday, May 7, 2008, to consider the bill.

- An amendment was offered by Ms. Johnson requiring that at least one member of the NNI Advisory Panel be an individual employed by and representing a minority-serving institution. The amendment was adopted by a voice vote.
- An amendment was offered by Ms. Johnson requiring that informal, pre-college or undergraduate nanotechnology education activities under the NNI Education and Societal Dimensions program component area include education on environmental, health and safety, and other societal aspects of nanotechnology. The amendment was adopted by a voice vote.
- An amendment was offered by Mr. Baird requiring NNI supported nanotechnology research facilities to allow Internet access to instruments and equipment by secondary school teachers and students for educational purposes and to provide technical support for such use. The amendment was adopted by a voice vote.
- An amendment was offered by Mr. Baird requiring that the review of NNI supported nanotechnology facilities under section 6(c), both as part of the public meeting and the NNI Advisory Panel's assessment, include consideration of whether researchers at remote locations have adequate access to equipment and instruments at the facilities by means of networking technology and a cost estimate for supporting such remote access. The amendment was adopted by a voice vote.

Mr. Hall moved that the Committee favorably report the bill, H.R. 5940, as amended, to the House with the recommendation that the bill, as amended, do pass, and that the staff be instructed to make technical and conforming changes to the bill, as amended, and prepare the legislative report and that the Chairman take all

necessary steps to bring the bill before the House for consideration. The motion was agreed to by a voice vote.

VI. Summary of Major Provisions of the Bill

• Requires the development of a strategic plan for the NNI which specifies the near-term and long-term objectives and the timeframe and metrics for achieving those objectives. The plan must also include a description of how the NNI will support technology transfer and interdisciplinary research and of proposed research in areas of national importance required under section 5(a).

• Requires the Director of the Office of Science and Technology Policy (OSTP) to designate an associate director as the Coordinator for Societal Dimensions with the responsibility for the oversight, planning, and budget for the EHS and ethical, legal and societal impact (ELSI) components of the NNI. The coordinator is required to convene a panel of representatives from agencies that fund research in EHS to develop a research plan for this component area that explicitly includes near-term and long-term objectives with milestones, the role of each agency in meeting those objectives, and the funding required by agency and by objective.

• Establishes Nanotechnology Education Partnerships as part of the NSF Math and Science Partnership program, requiring participation by nanotechnology industry partners, and authorizes activities to support nanotechnology undergraduate education.

• Authorizes and encourages access by industry to NNI nanotechnology facilities. Requires the agencies to publicize the availability of these facilities and provide descriptions of the capabilities of the facilities and the procedures and rules for their use, including criteria for access for cases in which full cost recovery is not required.

• Requires the NNI to support large-scale, multi-agency funded research and development initiatives in application areas of national importance. Tasks the NNI Advisory Panel to recommend candidate topic areas and requires that these areas leverage federal investments through collaborations with state supported initiatives, when possible.

• Specifies that research in the nanomanufacturing component of NNI include research on development of tools for rapid characterization of nanoscale materials and on scaling up synthesis of materials to industrial production rates. Requires research on developing environmentally benign nanoscale products, fostering the transfer of the results of that research to industry, and providing education on the techniques and principles for development of these environmentally benign products and processes.

• Requires that the NNI Coordination Office sponsor a public meeting to review the research within the nanomanufacturing component of the NNI, assess the capabilities of NNI supported nanotechnology research facilities, and make recommendations on ways to strengthen the research portfolio and facilities. Tasks the NNI Advisory Panel to review the research under the nanomanufacturing component area and the capabilities of NNI sponsored nanotechnology research facilities and to report to Congress its findings and recommendations.

VII. Section-by-Section Analysis (by Title and Section)

Sec. 1. Short title

"National Nanotechnology Initiative Amendments Act of 2008."

Sec. 2. National Nanotechnology Program amendments

• Modifies the NNI strategic plan to require specification of (1) both near- and long-term objectives, (2) the timeframe for achieving near term objectives, (3) the metrics for measuring progress toward objectives, and (4) multi-agency funded projects in areas of significant economic and societal impacts authorized under section 5.

• Requires agencies participating in the NNI to support the activities of committees involved in the development of standards for nanotechnology and authorizes reimbursement of travel expenses for scientists participating in such standards setting activities.

• Provides an explicit funding source for the National Nanotechnology Coordination Office (NNCO)—each participating agency provides funds in proportion to the agency's fraction of the overall NNI budget—and requires the NNCO to report annually on its current and future budget requirements, including funding needed to create and maintain new public databases (see following provision), to fulfill the public input and outreach requirements specified in P.L. 108–153, and to support the National Academy of Sciences in carrying out its triennial reviews of the NNI.

• Requires the NNCO to (1) develop a public database for projects funded under the Environmental, Health and Safety (EHS), Education and Societal Dimensions, and Nanomanufacturing program component areas, with sub-breakouts for education, public outreach and ethical, legal and other societal issues projects; and (2) develop, maintain and publicize information about NNI supported (and may include State-supported) nanotechnology facilities available for use by academia and industry.

• Specifies that the NNI Advisory Panel must be a stand-alone advisory committee (at present the President's Council of Advisors on Science and Technology is assigned this role) and requires that at least one member be a representative of a minority-serving institution of higher education.

• Requires the NNI Advisory Panel to establish a subpanel with members having qualifications tailored to assessing the societal, ethical, legal, environmental, and workforce activities supported by the NNI.

• Revises the charge to the National Academy of Sciences' National Research Council (NRC) for the content and scope of the triennial reviews of the NNI, and provides explicit funding to the NNCO of $500,000 per year for FY 09–11 for the NRC triennial reviews.

Sec. 3. Societal dimensions of nanotechnology

• Assigns responsibility to an OSTP associate director (to be determined by the OSTP Director) to fulfill the role of Coordinator for the societal dimensions component of NNI. The coordinator (1) is responsible for ensuring the strategic plan for EHS research is completed and implemented; (2) serves as the focal point for encouraging and advocating buy-in by the agencies, and monitoring their compliance in providing the resources and management at-

tention necessary; and (3) is responsible for encouraging the agencies to explore suitable mechanisms for establishing public-private partnerships for support of EHS research.

• Requires the Coordinator to convene and chair a panel of representatives from agencies supporting research under the EHS program component area to develop, annually update, and coordinate the implementation of a research plan for this program component. The plan, which is to be appended to the statutorily required NNI annual report, must contain near and long-term research goals and milestones, include multiyear funding requirements by agency and by goal, and take into consideration the recommendations of the NNI Advisory Panel and the agencies responsible for environmental and safety regulations. The plan must include standards development activities related to nomenclature, standard reference materials, and testing methods and procedures.

• Establishes Nanotechnology Education Partnerships as part of the NSF Math and Science Partnership (MSP) program to recruit and help prepare secondary school students to pursue postsecondary education in nanotechnology. These partnerships are similar to other MSPs, but must include one or more businesses engaged in nanotechnology and focus the educational activities on curriculum development, teacher professional development, and student enrichment (including access by students to nanotechnology facilities and equipment) in areas related to nanotechnology.

• Requires the Program to include, within the Education and Societal Dimensions program component area, activities to support nanotechnology undergraduate education, including support for course development, faculty professional development, and acquisition of equipment and instrumentation. To carry out these activities, the bill authorizes an additional $5 million per year for FY 2009 and FY 2010 for the NSF Course, Curriculum, and Laboratory Improvement program (undergraduate STEM education program open to all institutions of higher education) and an additional $5 million per year for FY 2009 and FY 2010 for the NSF Advanced Technological Education program (open only to 2-year institutions).

• Requires formation of an Education Working Group to coordinate, prioritize, and plan the educational activities funded under the NNI.

• Requires that K–16 and informal science education activities sponsored by the NNI include education regarding environmental, health and safety, and other societal aspects of nanotechnology.

• Requires NNI supported nanotechnology facilities to allow, and support, remote access via the Internet to their instruments and equipment for educational purposes by secondary school students and teachers.

Sec. 4. Technology transfer

• Requires agencies supporting nanotechnology research facilities under the NNI to allow, and encourage, use of these facilities to assist companies in developing prototype products, devices, or processes for determining proof of concept. The agencies are required to publicize the availability of these facilities and provide descriptions of the capabilities of the facilities and the procedures and rules for their use. For cases in which full cost recovery for use

of facilities is not required, the agencies must develop criteria for access, including the significance of the project for meeting national needs, readiness of the project for demonstration, and the prospects for commercial follow-on development of a successfully demonstrated concept.

• Requires agencies to encourage applications for support of nanotechnology projects under SBIR and STTR programs, requires publication of the plan to encourage this within six months, and requires a report that will track the success of the programs in attracting and supporting nanotechnology projects.

• Requires the National Institute of Standards and Technology to encourage submission of proposals under the Technology Innovation Program (TIP) for support of nanotechnology related projects and to report to Congress on how this is to be accomplished and on the outcome of the effort over time. Requires the TIP Advisory Board to provide advice to the program on ways to increase the number of nanotechnology related proposals and to assess the adequacy of funding provided for such proposals.

• Encourages the creation of industry liaison groups in all relevant industry sectors (four currently exist) to foster technology transfer and to help guide the NNI research agenda.

• Adds coordination and leveraging of federal investments with nanotechnology research, development, and technology transition initiatives supported by the States to the activities enumerated by P.L. 108–153 that are required to be carried out under the NNI.

Sec. 5. Research in areas of national importance

• Requires the NNI to include support for large-scale research and development activities in application areas with potential for significant contributions to national economic competitiveness or other important societal benefits. The activities, which must involve collaborations among universities and industry (and federal laboratories and non-profit research organizations, as appropriate), are to be designed to advance the development of promising nanotechnology research discoveries by demonstrating technical solutions to important problems in areas of national importance, such as nano-electronics, energy efficiency, health care, and water remediation.

• Requires that the competitive, merit based selection process for awards and the funding of these awards be carried out through a collaboration between at least two agencies, that the award selection process favorably consider the availability of cost sharing from non-federal sources, and that federal funds be leveraged by collaborations with relevant state initiatives.

• Specifies that research and development activities may be carried out through awards for support of interdisciplinary research centers, and all activities supported must include a plan for fostering the transfer of research discoveries and technology demonstration activities to industry for commercial development.

• Requires the NNI annual report to include a description of the activities supported in accordance with this section at the same level of budget detail as for NNI program component areas.

Sec. 6. Nanomanufacturing research

• Specifies inclusion of research under the Nanomanufacturing program component area to include projects to develop instrumentation/tools for rapid characterization and monitoring for nanoscale manufacturing and to develop techniques for scaling nanomaterial synthesis to industrial-level production rates.

• Requires that centers established under the NNI that focus on nanomanufacturing and on applications in areas of national importance in accordance with section 5 include support for interdisciplinary research and education on methods and approaches to develop environmentally benign nanoscale products and nanoscale manufacturing processes. These centers must also develop their research and development agendas taking into consideration research findings and results from activities supported under the NNI's EHS program component area and must include activities to help transfer the results of the centers' research to industry.

• Requires a public meeting and subsequent review by the NNI Advisory Panel of the adequacy of (1) the funding level and the relevance to industry's needs of research under the Nanomanufacturing program component area and (2) the capabilities of nanotechnology facilities for meeting the needs of the nanotechnology research and development community, including access via electronic networks to the facilities by individuals at remote locations, and the funding required to support acquisition of instrumentation, equipment, and networking technology and facilities operations. The results of the review are to be submitted to Congress.

Sec. 7. Definitions

Defines terms used in the text.

VIII. Committee Views

ENVIRONMENTAL, HEALTH, AND SAFETY (EHS) RESEARCH

The Committee believes that an effective environmental, health, and safety (EHS) research program is essential to ensure that science guides the formulation of regulatory rules and requirements that may be applied to nanotechnology applications. EHS research that is focused on the key issues will reduce the current uncertainty that inhibits commercial development of nanotechnology and will provide a sound basis for future rulemaking.

Although the NNI has included EHS research activities from its inception, the Committee is concerned that the agencies involved have not yet put in place a well designed, adequately funded, and effectively executed EHS research program and have not yet completed the development of a comprehensive EHS research plan and implementation strategy to carry out the plan. The latest version of the NNI's EHS research plan, "Strategy for Nanotechnology-Related Environmental, Health, and Safety Research," demonstrates progress, but still does not identify the priorities among the research objectives that are described, does not assign funding targets needed to reach the objectives, and does not indicate the allocation of resources among the agencies identified as working to achieve the objectives.

Consequently, the Committee has charged the agencies involved in supporting EHS research to develop and annually update an EHS research plan that: Specifies both near-term and long-term research objectives; indicates the path for achieving the near-term objectives, including estimated time and resources needed; and specifies which agencies will participate in working toward meeting which objectives, including estimates of current and outyear funding required. In developing the plan, the Committee expects the agencies to be responsive to recommendations of the NNI Advisory Panel and of the NRC triennial NNI review reports and to include representation in all planning activities by representatives of agencies, whether they sponsor research under the NNI or not, that are responsible for EHS regulations associated with production, use or disposal of nanoscale materials or products. The Committee emphasizes the particular importance of identifying and prioritizing the near-term EHS research objectives and supporting research projects clearly relevant to achieving those objectives.

The Committee applauds the recent funding increases for the EHS research component of the NNI, and the Committee strongly encourages continued emphasis and funding growth because of concerns that the level of resources currently allocated for this research is inadequate. Some witness testimony from hearings before the Committee recommended that the EHS research funding target should be on the order of ten percent of the overall NNI budget. The Committee has not specified an EHS research funding level in the bill but expects the appropriate funding level to be determined through the process of developing the EHS research plan. The Committee also expects the NNI Advisory Panel and the NRC triennial reviews to provide guidance to the NNI agencies on funding requirements as part of their assessments of the EHS research plan.

The Committee emphasizes that the plan must be designed to assist in the development of nanotechnology standards for terminology, reference materials, and testing procedures, but does not intend to bypass or alter the usual consensus-based, voluntary standards setting process. The Committee expects the EHS research plan to be coordinated with related international research efforts to avoid duplication of effort and to take advantage of opportunities to leverage resources.

COORDINATOR FOR SOCIETAL DIMENSIONS OF NANOTECHNOLOGY

The Committee has created the position of Coordinator for Societal Dimensions of Nanotechnology in order to assign to a high-level position within the Administration the responsibility to ensure that the ethical, legal, environmental, and other appropriate societal concerns are considered during the development of nanotechnology, as required by section 2(b)(10) of the 21st Century Nanotechnology Research and Development Act (P.L. 108–153). These responsibilities of the Coordinator extend to all relevant program component areas, including EHS and Education and Societal Dimensions. The Committee expects the Coordinator to serve as the principal advocate for the activities carried out under these program component areas and to work with senior officials in the NNI agencies to ensure that the agencies provide the resources needed to develop and carry out the EHS research plan and also

to support a vigorous, coordinated research program on ethical, legal, and other societal impacts of nanotechnology.

One of the responsibilities of the Coordinator is to encourage and work with the agencies involved in the EHS program component area to explore ways to engage private sector support for EHS research through creation of appropriate public-private partnerships. The Committee anticipates that the characteristics of such partnerships (1) will include mechanisms for incorporating public input into the research agenda of the partnership and for public access to all research results; and (2) will ensure that the selection, direction and evaluation of research supported will be science-based, fully independent of the private sector sponsors of the research, and open to public scrutiny.

RESEARCH IN AREAS OF NATIONAL IMPORTANCE

The Committee intends that the NNI agencies identify a few focused research and development areas that have particular potential to provide significant societal payoffs. The areas selected could be ones for which there is an expectation that a technology application can be achieved in the relatively near-term, or they could be more speculative and risky ones that are mainly in the realm of basic research but offer substantial payoffs that justify the investment and risk.

The NNI agencies are responsible for selecting the research areas to pursue, with advice from the NNI Advisory Panel. The Committee intends that the areas selected have relevance to the mission responsibilities of more than one agency so that the level of resources provided will enable multiple projects and a variety of modes of research to be supported, including multiple investigator awards and interdisciplinary research centers. The Committee encourages the agencies to support research activities that are informed by EHS and other societal considerations in order to help guide technology developments in environmentally benign directions, to avoid health risks, and to ensure the technology provides balanced benefits to society overall.

The Committee intends that the agencies treat planning and reporting on research areas under section 5 in the same way as for NNI program component areas. The NNI strategic plan is required to include a description of research areas to be addressed in accordance with section 5.

The Committee has not designated particular research areas that must be selected, but encourages the NNI agencies to consider current multi-agency research activities related to nano-electronics as providing the core for a more extensive effort that could be carried out under the authority of section 5. In addition, developing focused research efforts in areas related to energy conservation and green energy generation should be given careful consideration when preparing the NNI strategic plan and, in particular, when formulating research plans in accordance with section 5.

NATIONAL NANOTECHNOLOGY COORDINATION OFFICE

The National Nanotechnology Coordination Office (NNCO) has been assigned several specific tasks in addition to its basic responsibilities for staffing the interagency coordination and planning process for the NNI under the NSET Subcommittee of the National

Science and Technology Council. The Committee expects that the annual NNCO budget required by section 3(b) of P.L. 108–153, as amended by this bill, will include the funding needed to develop and maintain the public databases of information of funded projects and information on nanotechnology facilities in accordance with section 3(d) of P.L. 108–153, as amended; to support the triennial reviews of NNI by the National Research Council; and to support the public input and outreach activities required under section 2(b)(10)(D) of P.L. 108–153.

The Committee expects the database of information on funded research projects, as required under section 3(d)(1), to provide sufficient information to allow assessment of the relevance of each project to the research objective with which it is grouped and to include the funding of the project, by year, from its inception to the current fiscal year.

For the information on nanotechnology facilities under section 3(d)(2), the Committee expects the NNCO to publicize the information widely through such means as industry group notifications, announcements and materials distribution at relevant scientific conferences and workshops, and partnering with agency notification of programs, such as the SBIR. The Committee's intention is that the NNCO use this publicity to encourage use of NNI nanotechnology facilities by industry to promote technology transfer and commercialization of research results. The Committee emphasizes that the inclusion of information on State-funded nanotechnology facilities in the compilation of public information is voluntary on the part of the State-funded facilities. Also, the NNCO is not required to solicit information about such facilities but should include any information in the compilation that is provided voluntarily by a State-funded facility. The Committee encourages the NNCO to establish procedures for such voluntary submissions, including appropriate formats, and to include this information on the NNCO website.

The Committee reminds the NNCO Director that P.L. 108–153 requires that public input and outreach with regard to the societal implications of nanotechnology "be integrated into the Program by the convening of regular and ongoing public discussions . . ." and that the NNCO is responsible for convening such discussions. The Committee believes that the future acceptance of the technology will be determined by public attitudes and that it is necessary to seek broad public input to the process for determining NNI research and development objectives. The Committee expects the NNCO to carry out its responsibilities with regard to section 2(b)(10)(D) of P.L. 108–153 and requests that the NNCO Director provide a report to Congress by September 30, 2008 describing the actions the NNCO has taken to meet this requirement during the current and previous two fiscal years.

TRIENNIAL REVIEWS

Provision is made under P.L. 108–153 for the National Research Council to carry out reviews of the NNI at 3-year intervals. The bill amends this provision to clarify and reduce the number of subject areas to be addressed in each review. The Committee emphasizes that each of the items specified in section 5(a)(1) through (4) of P.L. 108–153, as amended by this bill, should be covered in each review.

The Committee intends that in addressing item 5(a)(1) the NRC include an assessment of the priorities and technical content of research in areas of national importance authorized under section 5 of the bill. Also, the Committee expects the NRC, in addressing item 5(a)(4), to provide an assessment of (1) the EHS research plan and a determination of whether the EHS research projects in the NNCO database are consistent with the objectives and priorities of the EHS research plan; and (2) the effectiveness of the NNI in seeking and obtaining public input to the planning and prioritization process for all activities supported in accordance with section 2(b)(10) of P.L. 108–153.

NNI ADVISORY PANEL

An NNI Advisory Panel was established by P.L. 108–153 to review, assess and make recommendations regarding the administration, priorities, and content of the NNI. This function was assigned by the President to the President's Council of Advisors on Science and Technology (PCAST). The Committee believes the responsibilities assigned to the NNI Advisory Panel by P.L. 108–153 are such that a high-level advisory committee with the broad policy role of PCAST cannot adequately provide the degree of attention and focused expertise required for detailed assessments of the functioning and programmatic content of the NNI. Consequently, the Committee has specified that the NNI Advisory Panel be a separate and distinct entity with membership composed of subject matter experts with collective expertise spanning the full range of activities authorized under the NNI. The NNI Advisory Panel should have no responsibilities regarding matters not related to the NNI.

The Committee expects the NNI Advisory Panel to provide recommendations on the content of the NNI strategic plan and the EHS research plan and to make recommendations for areas of research to be pursued by the NNI in accordance with section 5 of the bill. The Committee has specified that the NNI Advisory Panel include a subpanel with members having specific expertise necessary to assess and provide guidance on all aspects of the ethical, legal, environmental, and other societal concerns required to be addressed under the NNI in accordance with section 2(b)(10) of P.L. 108–153. The Committee expects that members of this subpanel will include representation from relevant non-profit public interest groups. In addition, the Committee encourages the Advisory Panel to consult with subject matter experts in instances when sufficient expertise does not exist on the Panel and to convene public meetings to gather information from all communities of interest regarding nanotechnology to assist it in its assessments of the priorities and content of the NNI.

The Committee expects that PCAST, while no longer the designated Advisory Panel for the NNI, will continue to provide advice on the NNI in its advisory role to the President on national technology issues, scientific research priorities, and math and science education.

NANOTECHNOLOGY FACILITIES

Section 4(a) of the bill requires agencies that support nanotechnology facilities under the NNI to provide access to these facilities for companies to carry out development of prototype prod-

ucts, devices or processes in order to help establish proof of concept and thereby assist the companies in attracting support for commercial development of the product, device or process from private sector sources. Agencies operating nanotechnology facilities are charged to publicize the availability of their facilities and to ensure that the NNCO is provided with up to date information on the terms and conditions for use of the facilities, the capabilities of instruments and equipment available, and the availability of technical support for users. For cases when companies reimburse the costs for the use of facilities, the Committee intends that "costs" means the direct costs associated with a project, such as costs of operation of equipment, labor costs directly applicable to use of instruments and equipment, supplies and materials, but does not include reimbursement of overhead costs.

The Committee emphasizes that the requirements of section 4(a) of the bill apply only to the use of NNI nanotechnology facilities for the purpose specified in that section. This provision does not change the conditions or policies now in place that are applicable to other uses of the NNI nanotechnology facilities by researchers from academia, industry or government agencies.

In section 6(c) of the bill, the NNCO is required to organize a public meeting to gain advice from the public on the adequacy of NNI-supported nanotechnology research facilities. The NNI Advisory Panel is subsequently required to carry out its own review, taking into consideration the findings of the public meeting, of whether such facilities are adequate and to provide an estimate of the resources needed for instrumentation and equipment acquisition, operation and maintenance. The Committee believes that the NNI should make the investments needed to ensure that the NNI supported facilities meet current requirements and that future needs are assessed and adequate resource allocations made to ensure that these facilities can satisfy current and future requirements, including provision for access and use of the facilities by individuals at remote locations.

NANOTECHNOLOGY RESEARCH CENTERS AND STATE-BASED ACTIVITIES

The Committee commends the groundbreaking work of the NNI's interdisciplinary nanotechnology research centers, which were established in accordance with section 2(b)(4) of P.L. 108–153. The Committee believes they are placing significant focus in areas critically important to the United States. The Committee strongly supports continued investment in these centers, encourages expansion of their efforts in areas of national importance, and supports the creation of new centers in the future, as necessary to meet future research requirements.

The Committee further recognizes the state-of-the-art work being conducted nationally by cutting-edge research universities, pioneering national laboratories, and innovative businesses. These efforts are vital to economic development and essential to the creation of innovative jobs that are increasing the competitiveness of the United States. The Committee strongly encourages increased investment in this work and recommends more federal investments in these groundbreaking activities.

NANOTECHNOLOGY EDUCATION

The Committee strongly supports activities under the NNI related to nanotechnology education in formal and informal settings, as well as activities to advance public understanding of nanotechnology, such as the NISE Network. The Committee encourages all the NNI agencies to consider ways they could contribute to the education portfolio of the Education and Societal Dimensions program component area. The Committee specifically included the requirement for allowing remote access via the Internet to NNI supported facilities by secondary school students and teachers as a way to expand the use of the existing research infrastructure for educational purposes. The Committee encourages other initiatives by the agencies to incorporate education activities as part of their sponsored research activities.

The Committee also encourages the NNI agencies to carry out a more closely coordinated and effectively planned and prioritized nanotechnology education effort under the NNI, and to that end, put in place the requirement in the bill for the establishment of an Education Working Group under the Nanoscale, Science, Engineering, and Technology Subcommittee.

The Committee believes that nanotechnology education activities should encompass all aspects of nanotechnology. In addition to topics related to the unique properties and characteristics of matter at the nanoscale, the Committee expects nanotechnology education activities to include the implications of the technology with regard to environmental, health, safety, and other societal impacts. For example, educational programs that address nanotechnology implications in areas of societal impacts should encompass green nanotechnology since the concepts and approaches of green nanotechnology will lead to technology applications that are environmentally benign and safe.

MATH AND SCIENCE PARTNERSHIPS

Section 3(c) of the bill establishes Nanotechnology Education Partnerships as part of the National Science Foundation (NSF) Math and Science Partnership (MSP) program to recruit and help prepare secondary school students to pursue postsecondary education in nanotechnology. These partnerships differ from existing MSPs by specifying that they must include one or more businesses engaged in the production of nanoscale materials. By means of this requirement, the Committee intends to foster strong involvement in the partnerships from the nanotechnology industry. The Committee encourages these industry partners to supply hands-on experiences for teachers and students with equipment and facilities and to provide other contributions, such as providing teacher internships, sponsoring workshops, and making product or equipment donations to schools. The Committee expects that NSF, when making awards, will take into consideration the extent and nature of the involvement proposed by industry partners.

NNI STRATEGIC PLAN

The Committee modified the provision in P.L. 108–153 that requires the development of an NNI strategic plan in order to make the plan a more useful guide to program priorities and anticipated

time scales for reaching program objectives. In particular, the Committee expects the plan to be a succinct document that clearly indicates the near-term and long-term objectives of the NNI and groups them by program component area. The Committee recommends that the near-term objectives correspond to the three year period between updates to the plan and that the plan explain how these near-term objectives will be met, including expected milestones and metrics for the assessment of progress.

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 and Technology 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. 5940 does not contain new budget authority, credit authority, or changes in revenues or tax expenditures.

X. Congressional Budget Office Cost Estimate

H.R. 5940—National Nanotechnology Initiative Amendments Act of 2008

H.R. 5940 would modify certain research guidelines and educational activities and provide for more oversight of the National Nanotechnology Initiative (NNI), an interagency program under the Office of Science and Technology Policy (OSTP) devoted to advancing nanotechnology. (Nanotechnology refers to a field of applied science focusing on the control of matter on the atomic and molecular scale, generally 100 nanometers or smaller, and the fabrication of materials that lie within that size range.) CBO estimates that implementing H.R. 5940 would cost about $5 million over the 2009–2013 period. Enacting H.R. 5940 would not affect direct spending or revenues.

H.R. 5940 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act and would impose no costs on state, local, or tribal governments.

Currently, 13 federal agencies participate in the NNI, with a total budget of about $1.5 billion in 2008. Generally, H.R. 5940 would modify research guidelines and provide for more oversight of certain NNI research programs, including the Environmental, Health, and Safety (EHS) and Societal Dimensions programs, which are dedicated to understanding the effects of nanomaterials on public health and safety. The bill also would increase the emphasis on education programs for nanotechnology, nanomanufacturing, and large-scale research in certain areas.

H.R. 5940 would authorize new activities for the National Nanotechnology Coordinating Office, which provides technical and administrative support for the NNI. Those activities would include developing a public database listing projects funded under the EHS, Societal Dimensions, and nanomanufacturing program areas, and publicizing information on nanotechnology facilities available for use by academia and industry. CBO estimates that implementing those activities would cost about $3 million over the 2009–2013 period.

Based on the cost of similar activities, CBO estimates that other activities required by the bill would cost about $2 million over the 2009–2013 period. Those activities include:

- Establishing a stand-alone NNI Advisory Panel and modifying NNI reporting requirements;
- Conducting a public meeting and subsequent review by the NNI Advisory Panel addressing the NNI's nanomanufacturing program; and
- Offering access to federal nanotechnology research facilities and encouraging small businesses to submit nanotechnology-related proposals under certain federal grant programs.

The CBO staff contact for this estimate is Leigh Angres. The estimate was approved by Theresa Gullo, Deputy Assistant Director for Budget Analysis.

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

H.R. 5940 contains no unfunded mandates.

XII. Committee Oversight Findings and Recommendations

The Committee on Science and Technology'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. 5940 are to require the timely development of a strategic plan for the NNI and an implementation plan for the environmental and safety research component of the NNI; require the Director of OSTP to designate an associate director as the Coordinator for Societal Dimensions; establish Nanotechnology Education Partnerships as part of the NSF Math and Science Partnership program; authorize and encourage access by industry to NNI nanotechnology research facilities; require the NNI to support research and development in application areas of national importance; specify research objectives in the nanomanufacturing component of NNI; require that the NNI Coordination Office sponsor a public meeting to review the research within the nanomanufacturing component area and require the NNI Advisory Panel to review the research under the nanomanufacturing component area and facility capabilities and report findings and recommendations to Congress.

XIV. Constitutional Authority Statement

Article I, section 8 of the Constitution of the United States grants Congress the authority to enact H.R. 5940.

XV. Federal Advisory Committee Statement

H.R. 5940 does not establish nor authorize the establishment of any new advisory committee, but modifies the membership of an existing advisory committee.

XVI. Congressional Accountability Act

The Committee finds that H.R. 5940 does not relate to the terms and conditions of employment or access to public services or accom-

modations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVII. EARMARK IDENTIFICATION

H.R. 5940 does not contain any congressional earmarks, limited tax benefits, or limited tariff benefits as defined in clause 9(d), 9(e), or 9(f) of rule XXI.

XVIII. STATEMENT ON PREEMPTION OF STATE, LOCAL, OR TRIBAL LAW

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

XIX. 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 (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

21ST CENTURY NANOTECHNOLOGY RESEARCH AND DEVELOPMENT ACT

* * * * * * *

SEC. 2. NATIONAL NANOTECHNOLOGY PROGRAM.

(a) * * *

(b) PROGRAM ACTIVITIES.—The activities of the Program shall include—

(1) * * *

* * * * * * *

[(5) ensuring United States global leadership in the development and application of nanotechnology;**]**

(5) ensuring United States global leadership in the development and application of nanotechnology, including through coordination and leveraging Federal investments with nanotechnology research, development, and technology transition initiatives supported by the States;

* * * * * * *

(c) PROGRAM MANAGEMENT.—The National Science and Technology Council shall oversee the planning, management, and coordination of the Program. The Council, itself or through an appropriate subgroup it designates or establishes, shall—

(1) * * *

* * * * * * *

[(4) develop, within 12 months after the date of enactment of this Act, and update every 3 years thereafter, a strategic plan to guide the activities described under subsection (b), meet the goals, priorities, and anticipated outcomes of the participating agencies, and describe—

[(A) how the Program will move results out of the laboratory and into application for the benefit of society;

[(B) the Program's support for long-term funding for interdisciplinary research and development in nanotechnology; and

[(C) the allocation of funding for interagency nanotechnology projects;]

(4) develop, within 12 months after the date of enactment of the National Nanotechnology Initiative Amendments Act of 2008, and update every 3 years thereafter, a strategic plan to guide the activities described under subsection (b) that specifies near-term and long-term objectives for the Program, the anticipated time frame for achieving the near-term objectives, and the metrics to be used for assessing progress toward the objectives, and that describes—

(A) how the Program will move results out of the laboratory and into applications for the benefit of society, including through cooperation and collaborations with nanotechnology research, development, and technology transition initiatives supported by the States;

(B) how the Program will encourage and support interdisciplinary research and development in nanotechnology; and

(C) proposed research in areas of national importance in accordance with the requirements of section 5 of the National Nanotechnology Initiative Amendments Act of 2008;

* * * * * * *

(d) ANNUAL REPORT.—The Council shall prepare an annual report, to be submitted to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Science, and other appropriate committees, at the time of the President's budget request to Congress, that includes—

(1) the Program budget, for the previous fiscal year, for each agency that participates in the Program, including a breakout of spending for the development and acquisition of research facilities and instrumentation, for each program component area, and for all activities pursuant to subsection (b)(10);

[(1)] *(2)* the Program budget, for the current fiscal year, for each agency that participates in the Program, including a breakout of spending for the development and acquisition of research facilities and instrumentation, for each program component area, and for all activities pursuant to subsection (b)(10);

[(2)] *(3)* the proposed Program budget for the next fiscal year, for each agency that participates in the Program, including a breakout of spending for the development and acquisition of research facilities and instrumentation, for each program component area, and for all activities pursuant to subsection (b)(10);

[(3)] *(4)* an analysis of the progress made toward achieving the goals and priorities established for the Program;

[(4)] *(5)* an analysis of the extent to which the Program has incorporated the recommendations of the Advisory Panel; and

[(5)] *(6)* an assessment of how Federal agencies are implementing the plan described in subsection (c)(7), and a description of the amount of Small Business Innovative Research and Small Business Technology Transfer Research funds supporting the plan.

(e) STANDARDS SETTING.—The agencies participating in the Program shall support the activities of committees involved in the development of standards for nanotechnology and may reimburse the travel costs of scientists and engineers who participate in activities of such committees.

SEC. 3. PROGRAM COORDINATION.

(a) * * *

[(b) FUNDING.—The National Nanotechnology Coordination Office shall be funded through interagency funding in accordance with section 631 of Public Law 108–7.]

(b) FUNDING.—(1) The operation of the National Nanotechnology Coordination Office shall be supported by funds from each agency participating in the Program. The portion of such Office's total budget provided by each agency for each fiscal year shall be in the same proportion as the agency's share of the total budget for the Program for the previous fiscal year, as specified in the report required under section 2(d)(1).

(2) The annual report under section 2(d) shall include—

(A) a description of the funding required by the National Nanotechnology Coordination Office to perform the functions specified under subsection (a) for the next fiscal year by category of activity, including the funding required to carry out the requirements of section 2(b)(10)(D), subsection (d) of this section, and section 5;

(B) a description of the funding required by such Office to perform the functions specified under subsection (a) for the current fiscal year by category of activity, including the funding required to carry out the requirements of subsection (d); and

(C) the amount of funding provided for such Office for the current fiscal year by each agency participating in the Program.

* * * * * * *

(d) PUBLIC INFORMATION.—(1) The National Nanotechnology Coordination Office shall develop and maintain a database accessible by the public of projects funded under the Environmental, Health, and Safety, the Education and Societal Dimensions, and the Nanomanufacturing program component areas, or any successor program component areas, including a description of each project, its source of funding by agency, and its funding history. For the Environmental, Health, and Safety program component area, or any successor program component area, projects shall be grouped by major objective as defined by the research plan required under section 3(b) of the National Nanotechnology Initiative Amendments Act of 2008. For the Education and Societal Dimensions program component area, or any successor program component area, the projects shall be grouped in subcategories of—

(A) education in formal settings;

(B) education in informal settings;

(C) public outreach; and

(D) ethical, legal, and other societal issues.

(2) The National Nanotechnology Coordination Office shall develop, maintain, and publicize information on nanotechnology facilities supported under the Program, and may include information on nanotechnology facilities supported by the States, that are accessible for use by individuals from academic institutions and from indus-

try. The information shall include at a minimum the terms and conditions for the use of each facility, a description of the capabilities of the instruments and equipment available for use at the facility, and a description of the technical support available to assist users of the facility.

SEC. 4. ADVISORY PANEL.

(a) IN GENERAL.—The President shall establish [or designate] a National Nanotechnology Advisory Panel *as a distinct entity. The Advisory Panel shall form a subpanel with membership having specific qualifications tailored to enable it to carry out the requirements of subsection (c)(7).*

(b) QUALIFICATIONS.—The Advisory Panel established [or designated] by the President under subsection (a) shall consist primarily of members from academic institutions and industry. Members of the Advisory Panel shall be qualified to provide advice and information on nanotechnology research, development, demonstrations, education, technology transfer, commercial application, or societal and ethical concerns. In selecting [or designating] an Advisory Panel, the President may also seek and give consideration to recommendations from the Congress, industry, the scientific community (including the National Academy of Sciences, scientific professional societies, and academia), the defense community, State and local governments, regional nanotechnology programs, and other appropriate organizations. *At least one member of the Advisory Panel shall be an individual employed by and representing a minority-serving institution.*

* * * * * * *

[SEC. 5. TRIENNIAL EXTERNAL REVIEW OF THE NATIONAL NANOTECHNOLOGY PROGRAM.

[(a) IN GENERAL.—The Director of the National Nanotechnology Coordination Office shall enter into an arrangement with the National Research Council of the National Academy of Sciences to conduct a triennial evaluation of the Program, including—

[(1) an evaluation of the technical accomplishments of the Program, including a review of whether the Program has achieved the goals under the metrics established by the Council;

[(2) a review of the Program's management and coordination across agencies and disciplines;

[(3) a review of the funding levels at each agency for the Program's activities and the ability of each agency to achieve the Program's stated goals with that funding;

[(4) an evaluation of the Program's success in transferring technology to the private sector;

[(5) an evaluation of whether the Program has been successful in fostering interdisciplinary research and development;

[(6) an evaluation of the extent to which the Program has adequately considered ethical, legal, environmental, and other appropriate societal concerns;

[(7) recommendations for new or revised Program goals;

[(8) recommendations for new research areas, partnerships, coordination and management mechanisms, or programs to be established to achieve the Program's stated goals;

[(9) recommendations on policy, program, and budget changes with respect to nanotechnology research and development activities;

[(10) recommendations for improved metrics to evaluate the success of the Program in accomplishing its stated goals;

[(11) a review of the performance of the National Nanotechnology Coordination Office and its efforts to promote access to and early application of the technologies, innovations, and expertise derived from Program activities to agency missions and systems across the Federal Government and to United States industry;

[(12) an analysis of the relative position of the United States compared to other nations with respect to nanotechnology research and development, including the identification of any critical research areas where the United States should be the world leader to best achieve the goals of the Program; and

[(13) an analysis of the current impact of nanotechnology on the United States economy and recommendations for increasing its future impact.

[(b) STUDY ON MOLECULAR SELF-ASSEMBLY.—As part of the first triennial review conducted in accordance with subsection (a), the National Research Council shall conduct a one-time study to determine the technical feasibility of molecular self-assembly for the manufacture of materials and devices at the molecular scale.

[(c) STUDY ON THE RESPONSIBLE DEVELOPMENT OF NANOTECHNOLOGY.—As part of the first triennial review conducted in accordance with subsection (a), the National Research Council shall conduct a one-time study to assess the need for standards, guidelines, or strategies for ensuring the responsible development of nanotechnology, including, but not limited to—

[(1) self-replicating nanoscale machines or devices;

[(2) the release of such machines in natural environments;

[(3) encryption;

[(4) the development of defensive technologies;

[(5) the use of nanotechnology in the enhancement of human intelligence; and

[(6) the use of nanotechnology in developing artificial intelligence.

[(d) EVALUATION TO BE TRANSMITTED TO CONGRESS.—The Director of the National Nanotechnology Coordination Office shall transmit the results of any evaluation for which it made arrangements under subsection (a) to the Advisory Panel, the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Science upon receipt. The first such evaluation shall be transmitted no later than June 10, 2005, with subsequent evaluations transmitted to the Committees every 3 years thereafter.]

SEC. 5. TRIENNIAL EXTERNAL REVIEW OF THE NATIONAL NANOTECHNOLOGY PROGRAM.

(a) IN GENERAL.—The Director of the National Nanotechnology Coordination Office shall enter into an arrangement with the National Research Council of the National Academy of Sciences to conduct a triennial review of the Program. The Director shall ensure that the arrangement with the National Research Council is concluded in order to allow sufficient time for the reporting require-

ments of subsection (b) to be satisfied. Each triennial review shall include an evaluation of the—

(1) research priorities and technical content of the Program, including whether the allocation of funding among program component areas, as designated according to section 2(c)(2), is appropriate;

(2) effectiveness of the Program's management and coordination across agencies and disciplines, including an assessment of the effectiveness of the National Nanotechnology Coordination Office;

(3) Program's scientific and technological accomplishments and its success in transferring technology to the private sector; and

(4) adequacy of the Program's activities addressing ethical, legal, environmental, and other appropriate societal concerns, including human health concerns.

(b) EVALUATION TO BE TRANSMITTED TO CONGRESS.—The National Research Council shall document the results of each triennial review carried out in accordance with subsection (a) in a report that includes any recommendations for ways to improve the Program's management and coordination processes and for changes to the Program's objectives, funding priorities, and technical content. Each report shall be submitted to the Director of the National Nanotechnology Coordination Office, who shall transmit it to the Advisory Panel, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science and Technology of the House of Representatives not later than September 30 of every third year, with the first report due September 30, 2009.

(c) FUNDING.—Of the amounts provided in accordance with section 3(b)(1), the following amounts shall be available to carry out this section:

(1) $500,000 for fiscal year 2009.

(2) $500,000 for fiscal year 2010.

(3) $500,000 for fiscal year 2011.

* * * * * * *

SEC. 10. DEFINITIONS.

In this Act:

(1) * * *

[(2) NANOTECHNOLOGY.—The term "nanotechnology" means the science and technology that will enable one to understand, measure, manipulate, and manufacture at the atomic, molecular, and supramolecular levels, aimed at creating materials, devices, and systems with fundamentally new molecular organization, properties, and functions.]

(2) NANOTECHNOLOGY.—The term "nanotechnology" means the science and technology that will enable one to understand, measure, manipulate, and manufacture at the nanoscale, aimed at creating materials, devices, and systems with fundamentally new properties or functions.

* * * * * * *

(7) NANOSCALE.—The term "nanoscale" means one or more dimensions of between approximately 1 and 100 nanometers.

XX. Committee Recommendations

On May 7, 2008, the Committee on Science and Technology favorably reported H.R. 5940, the National Nanotechnology Initiative Amendments Act of 2008, by voice vote, and recommended its enactment.

XXI. PROCEEDINGS OF THE FULL COMMITTEE MARKUP ON H.R. 5940, NATIONAL NANOTECHNOLOGY INITIATIVE AMENDMENTS ACT OF 2008

WEDNESDAY, MAY 7, 2008

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, DC.

The Committee met, pursuant to call, at 12:20 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chairman of the Committee] presiding.

Chairman GORDON. The Committee will come to order. Pursuant to notice the Committee on Science and Technology meets to consider the following measure: H.R. 5940, the *National Nanotechnology Initiative Amendments Act of 2008.*

We will now proceed with the markup. H.R. 5940 is a bipartisan bill which I and Ranking Member Hall jointly introduced, along with 23 additional Democratic and Republican Members of the Committee.

I want to thank Ranking Member Hall for working with me in a cooperative way to develop this legislation and to bring it before the Committee today.

This committee was instrumental in establishing the National Nanotechnology Initiative, or the NNI as it is usually called, through the enactment of the *21st Century Nanotechnology Research and Development Act of 2003.*

H.R. 5940 amends the statute based on findings and recommendations from the four hearings during the current Congress that examined various aspects of the NNI.

The bill also reflects recommendations from formal reviews of the NNI by the National Academy of Sciences and the NNI Advisory Panel. And finally, we circulated the draft bill widely to the various communities of interest and have incorporated many of the suggestions we received.

H.R. 5940 does not substantially alter the NNI but makes adjustments to some of the priorities of the program and strengthens one of the core components, environmental and safety research.

With regard to risk reduction research, a key provision of the bill is to require that the NNI develop a plan for the environmental, health, and safety research component and a roadmap for implementing it, which includes explicit near-term and long-term goals and the funding required by goal and by agency.

The bill also assigns responsibility to a senior official at the Office of Science and Technology Policy to oversee this planning and implementation process.

And, finally, the bill requires accountability by establishing a publicly accessible database containing information on the content and funding of each environmental, health, and safety research project supported.

Another important area addressed by the legislative action or legislation involves ways to capture the economic benefits of nanotechnology.

We need to ensure that this nation successfully capitalizes on commercial developments that will flow from the new discoveries resulting from our substantial investment in research.

It is now time to give increased consideration to rebalancing NNI investments toward activities to foster the transfer of new discoveries of commercial products and processes.

To that end, H.R. 5940 specifies steps for increasing the number of nanotechnology-related projects supported under the Small Business Innovation Research Program and by the Technology Innovation Program, established under the COMPETES Act.

It includes provisions to encourage and expand the use of nanotechnology facilities by companies for prototyping and proof of concept studies.

Also, the bill authorizes large-scale, focused, multi-agency research and development initiatives in areas of national need. For example, these efforts could explore development of nanotechnology-based devices for harvesting solar energy more cheaply, or perhaps nanoscale sensors for detecting cancer and drug delivery devices for treating the disease.

And finally, I want to highlight some provisions of the bill that address another key issue, future STEM workforce needs. One provision builds on the NSF Math and Science Partnership Program to use nanotechnology education activities as a vehicle to raise the interest of secondary school students in possible STEM careers.

The key component of these new partnerships is involvement by nanotechnology companies in offering hands-on learning opportunities at their facilities for students and teachers.

Another education provision supports the development of undergraduate courses of study in nanotechnology fields to help prepare future technicians, scientists, and engineers, who will be needed to meet the demands of industry as nanotechnology commercialization continues to expand.

H.R. 5940 is an excellent, bipartisan bill that will improve and strengthen the NNI and thereby, keep the United States at the forefront of nanotechnology. To date, we have received letters of support for the bill from the Semiconductor Industry Association, the NanoBusiness Alliance, the American Chemical Society, and the National Science Teachers Association.

I urge my colleagues to support H.R. 5940 and to continue to work with me to ensure passage by the House and final enactment during this Congress.

I now recognize Mr. Hall to present his opening statement.

Mr. HALL. Mr. Chairman, I thank you for your statement, and I, of course, was pleased to co-sponsor the *21st Century*

Nanotechnology Research and Development Act with you, and I am pleased to join you as an original co-sponsor of its reauthorization, which is before us today.

We are using nanotechnology to help create clean, secure, affordable energy, medical devices and drugs, sensors to detect and identify harmful chemical and biological agents, low-cost filters to provide clean drinking water, and techniques to clean up hazardous chemicals in the environment. I am especially pleased that this bill addresses the emerging fields of nanoelectronics, a field that Texas Instruments has been very involved in, and this is just the beginning of the list. So reauthorizing our national nanotechnology program certainly should be a priority.

We have worked together on this legislation from the beginning, and thus far it has been a very pleasant and a very bipartisan effort. While it is still not a perfect bill, I guess, I think it is a good bill. I appreciate the time you and your staff have put in on this, and I also want to acknowledge the efforts of Chairman Baird and Dr. Ehlers for their work on the Subcommittee, all the good, hard work they have done on this issue. My main interest in the process has been to make sure that we are careful to allow this multi-agency program, which seems to be working well, to continue to have the flexibility it needs to do its work without being overly prescriptive. Up to this point I think we have managed to do that, and I look forward to working with you to move the bill to the Floor.

And I yield back my time.

Chairman GORDON.Thank you, Mr. Hall.

As we move to the Senate and on to Conference, we are going to work to try to have a perfect bill.

Does anyone else wish to be recognized?

Mr. LIPINSKI. Chairman.

Chairman GORDON. The Vice Chair of the Committee, Mr. Lipinski, is recognized.

Mr. LIPINSKI. Thank you, Mr. Chairman. I would like to commend you and the Committee staff and Ranking Member Hall also for this bill today.

As I have said here on the Committee on a number of occasions, I believe nanotech is one of the most important keys, maybe the most important technological key to our nation's future economic growth. Not only is America currently at the forefront of nanotech innovation, my home State of Illinois is an international leader in many nanotech fields.

But we cannot stand still in this fast-changing world, and this Act will help get us over some of the hurdles that could disrupt our progress in unleashing this new industrial revolution.

One of these hurdles is the technology transfer Chairman Gordon mentioned. I mean, from my own experiences in Illinois, with two national labs as well as numerous research universities, including Northwestern University and University of Illinois, which are leading the way in nanotech research, I understand how important it is to be able to facilitate successful technology transfer.

Among other provisions this bill provides companies with access to research facilities, encourages nanotech-related projects under SBIR, STTR, and TIP ATNIST, and coordinates federal with State nanotech initiatives.

As a former professor I also understand that education is critical for promoting American nanotech innovation, and this bill makes important steps forward in promoting nanotech education at the secondary and post-secondary levels.

In addition, I want to comment on the bill's focus on areas of national importance, especially on nanoelectronics and nanoenergy. We all understand that energy represents one of today's greatest challenges, and nanotechnology is already playing a major role in facilitating green energy. From increasing the effectiveness of solar cells to saving energy by reducing friction in pipelines, innovative nanotechnologies have shown their promise in furthering our efforts to become more energy independent.

But we must find more ways for the Federal Government to help increase the promotion of green nanoenergy. I think this is critical for our future. We talk about it constantly in this committee and in promoting green energy as critical for our national security and for the environment.

Finally, I firmly believe that the field of nanoelectronics will be as important, if not more important than microelectronics, as Chairman Gordon and Ranking Member Hall mentioned. Many experts are predicting that by 2020, we will not be able to reduce the size of circuits, so we will need to find a new technology to replace the traditional semiconductor device. This is really critical for the future. Nanoelectronics will likely allow us to leap this technological barrier, and we are wise to accelerate research, invest heavily in this field in order to remain ahead of the curve. I think this is one of the most critical fields for American technology.

I am proud that Northwestern University, University of Illinois at Chicago and at Champagne Urbana, as well as Argonne National Lab, are doing great work right now on nanoelectronics.

Mr. Chairman, as nanotechnology moves from a multi-billion to a multi-trillion dollar industry in just the next few years, there is a great promise in store for economic development and job creation. It is critical we do all we can to help ensure that Americans lead the way in nanotech innovation, and we reap the benefits for our nation as we improve the quality of life for the world.

This bill is a great next step, and I look forward to working with you and the rest of the Committee on moving it forward. Thank you.

Chairman GORDON. Thank you, Mr. Lipinski.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF REPRESENTATIVE EDDIE BERNICE JOHNSON

Thank you, Mr. Chairman.

I want to commend the leadership for bringing H.R. 5940, the *National Nanotechnology Initiative Amendments Act of 2008* before the Committee today.

H.R. 5940 contains some important modifications that will enhance our federal investments in nanotechnology research and related education activities.

More specifically, the bill contains:

- better planning mechanisms and interagency coordination;
- improved grant award data statistics reporting;
- it creates a coordinator for the Societal Dimensions of Nanotechnology;
- it carves out one award of the NSF Math and Science Partnerships (middle and high school enrichment) for partnership with a nanotech emphasis;
- it includes a technology transfer section to help bring research at nano user facilities to market applications;

- it requires interagency partnership in awarding competitive research grants; and
- it specifies that nano research activities be environmentally benign.

This spring, the Committee had a hearing on the merits and needs of the legislation we are considering today.

I am proud that we have received strongly positive feedback from the stakeholder community.

The Committee also had a hearing on the commercialization of nanotechnology this spring.

Last fall, the Committee held a hearing on nanotechnology education for younger children—a response to legislation introduced by my friend and educator-colleague, Congresswoman Hooley.

I am proud that the Committee has worked hard to promote nanotechnology research and education programs.

I feel that our current federal programs will be enhanced by today's legislation.

My state of Texas is strong in nanotechnology research and manufacturing. Scientists at the Nanotech Institute at U.T. Dallas are internationally known for their excellent work.

For example, Dr. Ray Baughman, one of the most talented and pioneering nanotechnologists of his time, has been recognized in 2008 by his peers through election to the National Academy of Engineering (NAE).

He was one of only two Texans among 65 new members added by the Academy. Upon his arrival at UT Dallas, Baughman established the NanoTech Institute for the purposes of conducting research on the nanoscale.

The institute provides a terrific environment where physicists, chemists, biologists, ceramicists, metallurgists and mathematicians can join engineers in solving problems.

The institute is named in honor of the late Dr. Alan MacDiarmid, who shared the 2000 Nobel Prize in chemistry with Alan Heeger and Hideki Shirakawa for their discoveries that plastics can be made electrically conductive.

These are examples of outstanding nanotechnology researchers in the Dallas area.

The Governor has also helped Texas by investing in start-up nanotechnology companies.

Texas is a place for business.

The investments in research are yielding fruit in terms of commercial applications, and I'm proud that H.R. 5940 will strengthen, streamline and better coordinate our federal activities.

Chairman GORDON. If no one else has an opening statement, then I will ask unanimous consent that the bill is considered as read and open to amendments at any point and that the Members proceed with the amendments in the order of the roster.

Without objection, so ordered.

The first amendment on the roster is an amendment offered by the gentlelady from Texas, Ms. Johnson. Are you ready to proceed with your amendment?

Ms. JOHNSON. Yes.

Chairman GORDON. The Clerk will report the amendment.

The CLERK. Amendment number 110, amendment to H.R. 5940, offered by Ms. Eddie Bernice Johnson of Texas.

Chairman GORDON. I ask unanimous consent to dispense with the reading.

Without objection, so ordered, and I recognize the gentlelady for five minutes to explain her amendment.

Ms. JOHNSON. Thank you, Mr. Chairman and Ranking Member Hall, for considering the amendment, Johnson 110, during today's Full Committee markup on H.R. 5940, the *National Nanotechnology Initiative Amendments Act of 2008.* My amendment is focused on Section 4 of the original *21st Century Nanotechnology Research and Development Act.* That section describes an advisory panel to be established by the President. The panel shall consist primarily of members from academic institutions and industry.

This advisory panel provides advice to the President on matters relating to the National Nanotechnology Program. The original bill goes on to say that the advisory panel shall be qualified to provide advice and information on nanotech research, development, demonstrations, education, tech transfer, and other matters.

As stated in the legislation, this is, this advice includes trends in nanotech science and engineering. Progress made in implementing the program, the need to revise the program, the balance among different components of the program, as well as other forms of advice, my amendment would make an addition to Subsection B within Section 4 of the original bill, and the amendment states that at least one member of the advisory panel shall be an individual employed by or representing a minority serving institution.

I am certain that my colleagues on this committee understand why I feel this provision is important. African Americans and Hispanics are severely under-represented in careers in the physical sciences and engineering. These fields are the foundation of nanotechnology.

I have been trying this for a long time. The reasons for the disparities are complex, subtle biases are pervasive. My amendment ensures that someone representing a minority-serving intuition sit on this advisory panel. Minority-serving institutions, also called MSIs, include historically black colleges and universities, Hispanic-serving institutions, and tribal colleges and universities.

There are 110 historically black colleges in the U.S. today and even more predominantly black colleges. There are approximately 300 Hispanic-serving institutions, and there are 32 tribal colleges and universities.

The President should have no trouble in finding one person who is well qualified from one of those many institutions to serve on the advisory panel. Consider the important contribution that the MSI make regarding education, an educated workforce. Needless to say, the majority in this country will be a new one come 2020. It will be majority, there will be a new majority.

The 2004 MSIs accounted just under one-third of all degree-granting Title IV institutions. These are schools that can disperse federal financial aid and they enroll nearly 60 percent of the 4.7 million minority undergraduates. In 2000, the historically-black college university graduated 40 percent or more of all African Americans who received degrees in physics, chemistry, astronomy, environmental sciences, mathematics, biology, and I might add engineering. In almost every STEM field, HBCU's leads the Nation's larger, better-equipped colleges in producing black graduates.

The National Science Foundation has found that African Americans who graduate from historically black colleges and universities' undergraduate institutions in STEM are more likely to go to graduate school and complete their doctor degrees than African American undergraduates from other institutions.

Under-represented minorities deserve a seat at the table. Mr. Chairman, my amendment reserves that seat for them. One out of many, and thank you, Mr. Chairman and Ranking Member Hall, and I ask for support for this amendment.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF REPRESENTATIVE EDDIE BERNICE JOHNSON

Thank you, Chairman Gordon and Ranking Member Hall, for considering the amendment, "JOHNSON 110" during today's Full Committee markup of H.R. 5940, the *National Nanotechnology Initiative Amendments Act of 2008*.

My amendment is focused on Section 4 of the original *21st Century Nanotechnology Research and Development Act*.

That section describes an Advisory Panel, to be established by the President. The panel shall consist primarily of members from academic institutions and industry.

This Advisory Panel provides advice to the President on matters relating to the National Nanotechnology Program.

The original bill goes on to say that the Advisory Panel members shall be qualified to provide advice and information on nanotech research, development, demonstrations, education, tech transfer and other matters.

As stated in the legislation, this advice includes trends in nanotech science and engineering;

- progress made in implementing the Program;
- the need to revise the Program;
- the balance among different components of the Program;
- forms of advice.

My amendment would make an addition to subsection "B" within Section 4 of the original bill.

The amendment states that:

> *"At least one member of the Advisory Panel shall be an individual employed by and representing a minority-serving institution."*

I am certain that my colleagues on this committee understand why I feel that this provision is important.

Blacks and Hispanics are severely under-represented in careers in the physical sciences and engineering.

These fields are the foundation of nanotechnology.

The reasons for the disparities are complex; the subtle biases are pervasive.

My amendment ensures that someone representing a minority-serving institution sit on this advisory panel.

Minority-serving institutions, also called MSIs, include historically black colleges and universities, Hispanic-serving institutions and tribal colleges and universities.

There are 110 historically black colleges in the United States today and even more predominantly black colleges.

There are approximately 300 Hispanic-serving institutions.

There are 32 tribal colleges and universities.

The President should have no trouble finding one person who is well-qualified from one of those many institutions to serve on that advisory panel.

Consider the important contributions that MSIs make regarding our educated workforce:

- In 2004, MSIs accounted for just under one-third of all degree-granting Title 4 institutions—these are schools that can disburse federal financial aid—but they enrolled nearly 60 percent of the 4.7 million minority undergraduates.
- In 2000, HBCUs graduated 40 percent or more of all African Americans who received degrees in physics, chemistry, astronomy, environmental sciences, mathematics and biology.
- In almost every STEM field, HBCUs lead the Nation's larger, better-equipped colleges in producing Black graduates.
- The National Science Foundation has found that African Americans who graduate from HBCU undergraduate institutions in STEM are more likely to go to graduate school and complete their doctoral degrees than African American undergraduates from other institutions.

Under-represented minorities deserve a seat at the table, Mr. Chairman. My amendment reserves that seat for them.

Thank you, Mr. Chairman and Ranking Member. I thank my colleagues for considering this amendment and yield back my time.

Chairman GORDON. Thank you, Ms. Johnson.

Is there further discussion on the amendment?

If no, the vote occurs on the amendment. All in favor, say aye. Opposed, no. The ayes have it. The amendment is agreed to.

The second amendment on the roster is offered by the gentlelady from Texas, Ms. Johnson. Are you ready to proceed with your amendment?

Ms. JOHNSON. Yes, I am.

Chairman GORDON. The Clerk will report the amendment.

The CLERK. Amendment number 114, amendment to H.R. 5940, offered by Ms. Eddie Bernice Johnson of Texas.

Chairman GORDON. I ask unanimous consent to dispense with the reading.

Without objection, so ordered.

The gentlelady is recognized for five minutes to explain her amendment.

Ms. JOHNSON. Thank you, Mr. Chairman. I appreciate the Committee's consideration of my amendment.

The amendment, Johnson 114, focuses on the end of Section 3 of H.R. 5940. This section is called societal dimensions of nanotechnology.

Specifically, it details educational activities. Education is the key to ensuring that our future workforce is competitive. We must captivate young people's imaginations from as early as elementary school and middle school to get them interested in nanotechnology. I am glad that the nanotechnology initiative contains good education activities that are inclusive to all students.

My amendment seeks to ensure that such educational activities include environmental, health, and safety considerations. More specifically, at the end of Section 3 it adds a brief section to the societal dimensions of nanotechnology education activities.

My amendment states activities supported under the education and societal dimensions program component area or any successor program component area, that involve informal, pre-college, or undergraduate nanotechnology education shall include education regarding the environmental, health, and safety, and other societal aspects.

During the development of H.R. 5940 we received feedback from environmental groups that federal nanotechnology education programs needed stronger environmental and health components. My amendment respects the request of the environmental community. It ensures that educational activities within the education and societal dimensions programs contain those appropriate safety considerations.

Mr. Chairman, there was a previous version of this amendment that contained the words, green nanotechnology. My colleagues, Mr. Wu and Dr. Ehlers and Dr. Gingrey, as well as other Members of this committee, have been great supporters of green science that invokes no environment or health harms.

However, because I sensed a lack of unanimous consent for codifying the words, green nanotechnology, I agreed to remove it from my amendment. However, the condition was that the term, green nanotechnology, shall be included in report language. It is my hope that the Committee leadership will honor my request.

And, again, I thank you very much for your consideration, and I yield back the, I am requesting support and yield back the balance of my time.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF REPRESENTATIVE EDDIE BERNICE JOHNSON

Thank you, Mr. Chairman. I appreciate the Committee's consideration of my amendment.

The amendment—JOHNSON 114—focuses on the end of Section 3 of H.R. 5940. This section is called, "Societal Dimensions of Nanotechnology."

Specifically, it details educational activities.

Education is the key to ensuring that our future workforce is competitive.

We must captivate young people's imaginations—from as early as elementary and middle school—to get them interested in nanotechnology.

I am glad that the Nanotechnology Initiative contains good education activities that are inclusive to all students.

My amendment seeks to ensure that such education activities include environmental, health, and safety considerations.

More specifically, at the end of Section 3, it adds a brief section to the Societal Dimensions in Nanotechnology education activities.

My amendment states,

> *"Activities supported under the Education and Societal Dimensions program component area, or any successor program component area, that involve informal, precollege, or undergraduate nanotechnology education shall include education regarding the environmental, health and safety, and other societal aspects."*

During the development of H.R. 5940, we received feedback from environmental groups that federal nanotechnology education programs needed stronger environmental and health components.

My amendment respects the requests of the environmental community.

It ensures that education activities within the Education and Societal Dimensions programs contain those appropriate safety considerations.

Mr. Chairman, there was a previous version of this amendment that contained the words, "green nanotechnology."

My colleagues, Mr. Wu, Dr. Ehlers and Dr. Gingrey, as well as other Members of this committee have been great supporters of "green science" that invokes no environmental or health harms.

However, because I sensed a lack of unanimous consent for codifying the words, "green nanotechnology," I agreed to remove them from my amendment.

However, the condition was that the term, "green nanotechnology" shall be included in report language.

It is my hope that the Committee leadership will honor my request.

Again, I thank the Committee for considering my amendment, and I yield back the balance of my time.

Chairman GORDON. Thank you, Ms. Johnson, and you can certainly count on us or at least my following through on any agreement that was reached with you and your staff.

Mr. HALL. Mr. Chairman.

Chairman GORDON. Mr. Hall.

Mr. HALL. Yeah. I would like to say that I appreciate my neighbor from Dallas who worked on this and other legislation and her willingness always to work with us on her amendments. This amendment simply includes environmental, health, and safety education as part of any educational activities supported under the education and societal dimensions program component here. I think this is reasonable and I certainly support and recommend its adoption.

I yield back.

Chairman GORDON. Is there further discussion on the amendment?

If no, the vote occurs on the amendment. All in favor, say aye. Those opposed, no. The ayes have it. The amendment is agreed to.

The third amendment on the roster is offered by the gentleman from Washington, Mr. Baird. Are you ready to proceed with your amendment?

Mr. BAIRD. Yes. I have an amendment at the desk.

Chairman GORDON. The Clerk will report the amendment.

The CLERK. Amendment number 063, amendment to H.R. 5940, offered by Mr. Baird of Washington.

Chairman GORDON. I ask unanimous consent to dispense with the reading.

Without objection, so ordered.

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

Mr. BAIRD. I thank the Chairman.

Consistent with the mission of our Research and Education Subcommittee, Mr. Chairman, this amendment deals with remote access, which would be a benefit to secondary schools.

During our hearings on the nanotech initiative, one of the witnesses talked about the importance of having a strong pipeline of students who are familiar with and excited about nanotechnology's potential and procedures. This amendment simply requires that the recipients of funding of the NNI would make available via remote access where appropriate and not cost prohibitative, access to secondary high school students and teachers.

This is particularly important because the infrastructure, the equipment that goes into nanotechnology is prohibitatively expensive to be available to high school students, yet we want that part of our pipeline to get enthused early, early on. Folks in disadvantaged portions of our cities or people in rural district like I represent could nevertheless have high school students have access to state-of-the-art equipment and the enthusiasm and excitement that goes with that, and thereby, when they go onto college, hit the ground running as it were.

The amendment should not be prohibitively expensive in any way, shape, or form. We have talked to nanotech research facilities in and near my district, and they are very supportive of the concept, as are educators.

And with that I would urge passage and yield back.

Chairman GORDON. Thank you, Mr. Baird. Is there further discussion on the amendment?

If no, the vote occurs on the amendment. All in favor, say aye. Opposed, no. The ayes have it. The amendment is agreed to.

The fourth amendment on the roster is offered by the gentleman from Washington also, Mr. Baird. Are you ready to proceed with your amendment?

Mr. BAIRD. I am indeed, sir.

Chairman GORDON. The Clerk will report the amendment.

The CLERK. Amendment number 064, amendment to H.R. 5940, offered by Mr. Baird of Washington.

Chairman GORDON. I ask unanimous consent to dispense with the reading.

Without objection, so ordered.

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

Mr. BAIRD. Mr. Chairman, this amendment like the prior one deals with remote access, again, a topic which was recommended to us by some of our witnesses, but in this case it is not just for educational purposes but for other researchers to be able to utilize nanotech facilities.

As the field of nanotechnology continues to grow, we have to ensure that we have the available instruments and facilities to meet the growing demand. We have finite resources and imagine it will be difficult to get everyone who needs it access to such equipment in the future, and for this reason we need to do what we can to develop and foster the technology to allow remote access to these facilities.

This amendment requires the National Nanotechnology Coordination Office and the National Nanotechnology Advisory Panel to look at the capabilities of nanotechnology research facilities and discern whether they are adequate to provide individuals the means of network technology access to use the instrumentation and equipment at the facilities.

It also charges the Advisory Panel with determining a level of funding that would be needed to support acquisition of network technology to provide this capability at nanotech research facilities.

In essence what we are doing is as we look at the existing capacity, the facilities, one of the factors we look at during a public input process which is included in the NNI already, as part of that public input and evaluation process we see the degree to which remote access is available and should be made available.

That is the essence of this amendment, and I yield back.

Chairman GORDON. Is there further discussion on the amendment?

If no, all in favor of the amendment, say aye. Opposed, no. The ayes have it. The amendment is agreed to.

Are there any other amendments?

If no, then the vote is on the bill H.R. 5940 as amended. All those in favor, say aye. All those opposed, no. In the opinion of the Chair the ayes have it.

I now recognize Mr. Hall for a motion.

Mr. HALL. Mr. Chairman, I move that the Committee favorably report H.R. 5940 as amended in 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 all necessary technical and conforming changes and that the Chairman take all necessary steps to bring the bill before the House for consideration.

Yield back.

Chairman GORDON. The question is on the motion to report the bill favorably. Those in favor of the motion will signify by saying aye. The ayes have it, and the bill is favorably reported.

Let me—should I say anybody wants to or does anyone want to vote no? So let me be clear. I did not want to just give one option here.

Okay. The ayes have it, and the bill is reported favorably.

Without objection, the motion is reconsidered and laid upon the table. The Members will have two subsequent calendar days in which to submit supplemental, Minority, or additional views on the measure, ending Monday, May the 12th, at 9:00 a.m.

I move pursuant to clause 1 of rule 22 of the Rules of the House of Representatives that the Committee authorize the Chairman to offer such motions as may be necessary in the House to adopt and

pass H.R. 5940, the *National Nanotechnology Initiative Amendments Act of 2008,* as amended.

Without objection, so ordered.

And I want to thank all Members for attendance and for all the Members working together on getting, you know, a good bill and also a very important bill, and again, just because things aren't controversial doesn't mean they are not important.

Thank you very much.

[Whereupon, at 12:48 p.m., the Committee was adjourned.]

Appendix:

H.R. 5940, Section-by-Section Analysis, Amendment Roster

I

110TH CONGRESS
2D SESSION

H. R. 5940

To authorize activities for support of nanotechnology research and development, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

MAY 1, 2008

Mr. GORDON of Tennessee (for himself, Mr. HALL of Texas, Mr. BAIRD, Mr. EHLERS, Ms. EDDIE BERNICE JOHNSON of Texas, Mr. SENSENBRENNER, Mr. UDALL of Colorado, Mr. SMITH of Texas, Mr. WU, Mr. BARTLETT of Maryland, Mr. MILLER of North Carolina, Mr. LUCAS, Mr. LIPINSKI, Mrs. BIGGERT, Ms. GIFFORDS, Mr. AKIN, Ms. HOOLEY, Mr. NEUGEBAUER, Mr. ROTHMAN, Mr. INGLIS of South Carolina, Mr. WILSON of Ohio, Mr. MCCAUL of Texas, Mr. MARIO DIAZ-BALART of Florida, Mr. GINGREY, and Mr. BILBRAY) introduced the following bill; which was referred to the Committee on Science and Technology

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A BILL

To authorize activities for support of nanotechnology research and development, 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 "National Nanotechnology Initiative Amendments Act of 2008".

SEC. 2. NATIONAL NANOTECHNOLOGY PROGRAM AMENDMENTS.

The 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501 et seq.) is amended—

(1) by striking section 2(c)(4) and inserting the following new paragraph:

"(4) develop, within 12 months after the date of enactment of the National Nanotechnology Initiative Amendments Act of 2008, and update every 3 years thereafter, a strategic plan to guide the activities described under subsection (b) that specifies near-term and long-term objectives for the Program, the anticipated time frame for achieving the near-term objectives, and the metrics to be used for assessing progress toward the objectives, and that describes—

"(A) how the Program will move results out of the laboratory and into applications for the benefit of society, including through cooperation and collaborations with nanotechnology research, development, and technology transition initiatives supported by the States;

"(B) how the Program will encourage and support interdisciplinary research and development in nanotechnology; and

"(C) proposed research in areas of national importance in accordance with the requirements of section 5 of the National Nanotechnology Initiative Amendments Act of 2008;";

(2) in section 2—

(A) in subsection (d)—

(i) by redesignating paragraphs (1) through (5) as paragraphs (2) through (6), respectively; and

(ii) by inserting the following new paragraph before paragraph (2), as so redesignated by clause (i) of this subparagraph:

"(1) the Program budget, for the previous fiscal year, for each agency that participates in the Program, including a breakout of spending for the development and acquisition of research facilities and instrumentation, for each program component area, and for all activities pursuant to subsection (b)(10);"; and

(B) by inserting at the end the following new subsection:

"(e) STANDARDS SETTING.—The agencies participating in the Program shall support the activities of committees involved in the development of standards for

1 nanotechnology and may reimburse the travel costs of sci-
2 entists and engineers who participate in activities of such
3 committees.";

4 (3) by striking section 3(b) and inserting the
5 following new subsection:

6 "(b) FUNDING.—(1) The operation of the National
7 Nanotechnology Coordination Office shall be supported by
8 funds from each agency participating in the Program. The
9 portion of such Office's total budget provided by each
10 agency for each fiscal year shall be in the same proportion
11 as the agency's share of the total budget for the Program
12 for the previous fiscal year, as specified in the report re-
13 quired under section 2(d)(1).

14 "(2) The annual report under section 2(d) shall in-
15 clude—

16 "(A) a description of the funding required by
17 the National Nanotechnology Coordination Office to
18 perform the functions specified under subsection (a)
19 for the next fiscal year by category of activity, in-
20 cluding the funding required to carry out the re-
21 quirements of section 2(b)(10)(D), subsection (d) of
22 this section, and section 5;

23 "(B) a description of the funding required by
24 such Office to perform the functions specified under
25 subsection (a) for the current fiscal year by category

of activity, including the funding required to carry out the requirements of subsection (d); and

"(C) the amount of funding provided for such Office for the current fiscal year by each agency participating in the Program.";

(4) by inserting at the end of section 3 the following new subsection:

"(d) PUBLIC INFORMATION.—(1) The National Nanotechnology Coordination Office shall develop and maintain a database accessible by the public of projects funded under the Environmental, Health, and Safety, the Education and Societal Dimensions, and the Nanomanufacturing program component areas, or any successor program component areas, including a description of each project, its source of funding by agency, and its funding history. For the Environmental, Health, and Safety program component area, or any successor program component area, projects shall be grouped by major objective as defined by the research plan required under section 3(b) of the National Nanotechnology Initiative Amendments Act of 2008. For the Education and Societal Dimensions program component area, or any successor program component area, the projects shall be grouped in subcategories of—

"(A) education in formal settings;

"(B) education in informal settings;

"(C) public outreach; and

"(D) ethical, legal, and other societal issues.

"(2) The National Nanotechnology Coordination Office shall develop, maintain, and publicize information on nanotechnology facilities supported under the Program, and may include information on nanotechnology facilities supported by the States, that are accessible for use by individuals from academic institutions and from industry. The information shall include at a minimum the terms and conditions for the use of each facility, a description of the capabilities of the instruments and equipment available for use at the facility, and a description of the technical support available to assist users of the facility.";

(5) in section 4(a)—

(A) by striking "or designate";

(B) by inserting "as a distinct entity" after "Advisory Panel"; and

(C) by inserting at the end "The Advisory Panel shall form a subpanel with membership having specific qualifications tailored to enable it to carry out the requirements of subsection (c)(7).";

(6) in section 4(b), by striking "or designated" and "or designating";

(7) by amending section 5 to read as follows:

"SEC. 5. TRIENNIAL EXTERNAL REVIEW OF THE NATIONAL NANOTECHNOLOGY PROGRAM.

"(a) IN GENERAL.—The Director of the National Nanotechnology Coordination Office shall enter into an arrangement with the National Research Council of the National Academy of Sciences to conduct a triennial review of the Program. The Director shall ensure that the arrangement with the National Research Council is concluded in order to allow sufficient time for the reporting requirements of subsection (b) to be satisfied. Each triennial review shall include an evaluation of the—

"(1) research priorities and technical content of the Program, including whether the allocation of funding among program component areas, as designated according to section 2(c)(2), is appropriate;

"(2) effectiveness of the Program's management and coordination across agencies and disciplines, including an assessment of the effectiveness of the National Nanotechnology Coordination Office;

"(3) Program's scientific and technological accomplishments and its success in transferring technology to the private sector; and

"(4) adequacy of the Program's activities addressing ethical, legal, environmental, and other ap-

1 propriate societal concerns, including human health
2 concerns.
3 "(b) EVALUATION TO BE TRANSMITTED TO CON-
4 GRESS.—The National Research Council shall document
5 the results of each triennial review carried out in accord-
6 ance with subsection (a) in a report that includes any rec-
7 ommendations for ways to improve the Program's man-
8 agement and coordination processes and for changes to
9 the Program's objectives, funding priorities, and technical
10 content. Each report shall be submitted to the Director
11 of the National Nanotechnology Coordination Office, who
12 shall transmit it to the Advisory Panel, the Committee on
13 Commerce, Science, and Transportation of the Senate,
14 and the Committee on Science and Technology of the
15 House of Representatives not later than September 30 of
16 every third year, with the first report due September 30,
17 2009.
18 "(c) FUNDING.—Of the amounts provided in accord-
19 ance with section 3(b)(1), the following amounts shall be
20 available to carry out this section:
21 "(1) $500,000 for fiscal year 2009.
22 "(2) $500,000 for fiscal year 2010.
23 "(3) $500,000 for fiscal year 2011."; and
24 (8) in section 10—

(A) by amending paragraph (2) to read as follows:

"(2) NANOTECHNOLOGY.—The term 'nanotechnology' means the science and technology that will enable one to understand, measure, manipulate, and manufacture at the nanoscale, aimed at creating materials, devices, and systems with fundamentally new properties or functions."; and

(B) by adding at the end the following new paragraph:

"(7) NANOSCALE.—The term 'nanoscale' means one or more dimensions of between approximately 1 and 100 nanometers.".

SEC. 3. SOCIETAL DIMENSIONS OF NANOTECHNOLOGY.

(a) COORDINATOR FOR SOCIETAL DIMENSIONS OF NANOTECHNOLOGY.—The Director of the Office of Science and Technology Policy shall designate an associate director of the Office of Science and Technology Policy as the Coordinator for Societal Dimensions of Nanotechnology. The Coordinator shall be responsible for oversight of the coordination, planning, and budget prioritization of activities required by section 2(b)(10) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(b)(10)). The Coordinator shall, with the assistance of appropriate senior officials of the

1 agencies funding activities within the Environmental,
2 Health, and Safety and the Education and Societal Di-
3 mensions program component areas of the Program, or
4 any successor program component areas, ensure that the
5 requirements of such section 2(b)(10) are satisfied. The
6 responsibilities of the Coordinator shall include—

7 (1) ensuring that a research plan for the envi-
8 ronmental, health, and safety research activities re-
9 quired under subsection (b) is developed, updated,
10 and implemented and that the plan is responsive to
11 the recommendations of the subpanel of the Advi-
12 sory Panel established under section 4(a) of the 21st
13 Century Nanotechnology Research and Development
14 Act (15 U.S.C. 7503(a)), as amended by this Act;

15 (2) encouraging and monitoring the efforts of
16 the agencies participating in the Program to allocate
17 the level of resources and management attention
18 necessary to ensure that the ethical, legal, environ-
19 mental, and other appropriate societal concerns re-
20 lated to nanotechnology, including human health
21 concerns, are addressed under the Program, includ-
22 ing the implementation of the research plan de-
23 scribed in subsection (b); and

24 (3) encouraging the agencies required to de-
25 velop the research plan under subsection (b) to iden-

1 tify, assess, and implement suitable mechanisms for
2 the establishment of public-private partnerships for
3 support of environmental, health, and safety re-
4 search.
5 (b) RESEARCH PLAN.—
6 (1) IN GENERAL.—The Coordinator for Societal
7 Dimensions of Nanotechnology shall convene and
8 chair a panel comprised of representatives from the
9 agencies funding research activities under the Envi-
10 ronmental, Health, and Safety program component
11 area of the Program, or any successor program com-
12 ponent area, and from such other agencies as the
13 Coordinator considers necessary to develop, periodi-
14 cally update, and coordinate the implementation of
15 a research plan for this program component area. In
16 developing and updating the plan, the panel con-
17 vened by the Coordinator shall solicit and be respon-
18 sive to recommendations and advice from—
19 (A) the subpanel of the Advisory Panel es-
20 tablished under section 4(a) of the 21st Cen-
21 tury Nanotechnology Research and Develop-
22 ment Act (15 U.S.C. 7503(a)), as amended by
23 this Act; and
24 (B) the agencies responsible for environ-
25 mental, health, and safety regulations associ-

1 ated with the production, use, and disposal of
2 nanoscale materials and products.
3 (2) DEVELOPMENT OF STANDARDS.—The plan
4 required under paragraph (1) shall include a de-
5 scription of how the Program will help to ensure the
6 development of—
7 (A) standards related to nomenclature as-
8 sociated with engineered nanoscale materials;
9 (B) engineered nanoscale standard ref-
10 erence materials for environmental, health, and
11 safety testing; and
12 (C) standards related to methods and pro-
13 cedures for detecting, measuring, monitoring,
14 sampling, and testing engineered nanoscale ma-
15 terials for environmental, health, and safety im-
16 pacts.
17 (3) COMPONENTS OF PLAN.—The plan required
18 under paragraph (1) shall, with respect to activities
19 described in paragraphs (1) and (2)—
20 (A) specify near-term research objectives
21 and long-term research objectives;
22 (B) specify milestones associated with each
23 near-term objective and the estimated time and
24 resources required to reach each milestone;

(C) with respect to subparagraphs (A) and (B), describe the role of each agency carrying out or sponsoring research in order to meet the objectives specified under subparagraph (A) and to achieve the milestones specified under subparagraph (B);

(D) specify the funding allocated to each major objective of the plan and the source of funding by agency for the current fiscal year; and

(E) estimate the funding required for each major objective of the plan and the source of funding by agency for the following 3 fiscal years.

(4) TRANSMITTAL TO CONGRESS.—The plan required under paragraph (1) shall be submitted not later than 60 days after the date of enactment of this Act to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives.

(5) UPDATING AND APPENDING TO REPORT.—The plan required under paragraph (1) shall be updated annually and appended to the report required under section 2(d) of the 21st Century Nanotechnol-

ogy Research and Development Act (15 U.S.C. 7501(d)).

(c) NANOTECHNOLOGY PARTNERSHIPS.—

(1) ESTABLISHMENT.—As part of the program authorized by section 9 of the National Science Foundation Authorization Act of 2002, the Director of the National Science Foundation shall provide 1 or more grants to establish partnerships as defined by subsection (a)(2) of that section, except that each such partnership shall include 1 or more businesses engaged in the production of nanoscale materials, products, or devices. Partnerships established in accordance with this subsection shall be designated as ''Nanotechnology Education Partnerships''.

(2) PURPOSE.—Nanotechnology Education Partnerships shall be designed to recruit and help prepare secondary school students to pursue postsecondary level courses of instruction in nanotechnology. At a minimum, grants shall be used to support—

(A) professional development activities to enable secondary school teachers to use curricular materials incorporating nanotechnology and to inform teachers about career possibilities for students in nanotechnology;

(B) enrichment programs for students, including access to nanotechnology facilities and equipment at partner institutions, to increase their understanding of nanoscale science and technology and to inform them about career possibilities in nanotechnology as scientists, engineers, and technicians; and

(C) identification of appropriate nanotechnology educational materials and incorporation of nanotechnology into the curriculum for secondary school students at one or more organizations participating in a Partnership.

(3) SELECTION.—Grants under this subsection shall be awarded in accordance with subsection (b) of such section 9, except that paragraph (3)(B) of that subsection shall not apply.

(d) UNDERGRADUATE EDUCATION PROGRAMS.—

(1) ACTIVITIES SUPPORTED.—As part of the activities included under the Education and Societal Dimensions program component area, or any successor program component area, the Program shall support efforts to introduce nanoscale science, engineering, and technology into undergraduate science and engineering education through a variety of

interdisciplinary approaches. Activities supported may include—

(A) development of courses of instruction or modules to existing courses;

(B) faculty professional development; and

(C) acquisition of equipment and instrumentation suitable for undergraduate education and research in nanotechnology.

(2) COURSE, CURRICULUM, AND LABORATORY IMPROVEMENT AUTHORIZATION.—There are authorized to be appropriated to the Director of the National Science Foundation to carry out activities described in paragraph (1) through the Course, Curriculum, and Laboratory Improvement program—

(A) from amounts authorized under section 7002(b)(2)(B) of the America COMPETES Act, $5,000,000 for fiscal year 2009; and

(B) from amounts authorized under section 7002(c)(2)(B) of the America COMPETES Act, $5,000,000 for fiscal year 2010.

(3) ADVANCED TECHNOLOGY EDUCATION AUTHORIZATION.—There are authorized to be appropriated to the Director of the National Science Foundation to carry out activities described in para-

graph (1) through the Advanced Technology Education program—

(A) from amounts authorized under section 7002(b)(2)(B) of the America COMPETES Act, $5,000,000 for fiscal year 2009; and

(B) from amounts authorized under section 7002(c)(2)(B) of the America COMPETES Act, $5,000,000 for fiscal year 2010.

(e) INTERAGENCY WORKING GROUP.—The National Science and Technology Council shall establish under the Nanoscale Science, Engineering, and Technology Subcommittee an Education Working Group to coordinate, prioritize, and plan the educational activities supported under the Program.

SEC. 4. TECHNOLOGY TRANSFER.

(a) PROTOTYPING.—

(1) ACCESS TO FACILITIES.—In accordance with section 2(b)(7) of 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(b)(7)), the agencies supporting nanotechnology research facilities as part of the Program shall provide access to such facilities to companies for the purpose of assisting the companies in the development of prototypes of nanoscale products, devices, or processes (or products, devices, or processes enabled

1 by nanotechnology) for determining proof of concept.
2 The agencies shall publicize the availability of these
3 facilities and encourage their use by companies as
4 provided for in this section.
5 (2) PROCEDURES.—The agencies identified in
6 paragraph (1)—
7 (A) shall establish and publish procedures,
8 guidelines, and conditions for the submission
9 and approval of applications for use of
10 nanotechnology facilities;
11 (B) shall publish descriptions of the capa-
12 bilities of facilities available for use under this
13 subsection, including the availability of tech-
14 nical support; and
15 (C) may waive recovery, require full recov-
16 ery, or require partial recovery of the costs as-
17 sociated with use of the facilities for projects
18 under this subsection.
19 (3) SELECTION AND CRITERIA.—In cases when
20 less than full cost recovery is required pursuant to
21 paragraph (2)(C), projects provided access to
22 nanotechnology facilities in accordance with this sub-
23 section shall be selected through a competitive,
24 merit-based process, and the criteria for the selec-
25 tion of such projects shall include at a minimum—

(A) the readiness of the project for technology demonstration;

(B) evidence of a commitment by the applicant for further development of the project to full commercialization if the proof of concept is established by the prototype; and

(C) evidence of the potential for further funding from private sector sources following the successful demonstration of proof of concept.

The agencies may give special consideration in selecting projects to applications that are relevant to important national needs or requirements.

(b) USE OF EXISTING TECHNOLOGY TRANSFER PROGRAMS.—

(1) PARTICIPATING AGENCIES.—Each agency participating in the Program shall—

(A) encourage the submission of applications for support of nanotechnology related projects to the Small Business Innovation Research Program and the Small Business Technology Transfer Program administered by such agencies; and

(B) through the National Nanotechnology Coordination Office and within 6 months after

the date of enactment of this Act, submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives—

(i) the plan described in section 2(c)(7) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(c)(7)); and

(ii) a report specifying, if the agency administers a Small Business Innovation Research Program and a Small Business Technology Transfer Program—

(I) the number of proposals received for nanotechnology related projects during the current fiscal year and the previous 2 fiscal years;

(II) the number of such proposals funded in each year;

(III) the total number of nanotechnology related projects funded and the amount of funding provided for fiscal year 2003 through fiscal year 2007; and

(IV) a description of the projects identified in accordance with subclause (III) which received private sector funding beyond the period of phase II support.

(2) NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.—The Director of the National Institute of Standards and Technology in carrying out the requirements of section 28 of the National Institute of Standards and Technology Act (15 U.S.C. 278n) shall—

(A) in regard to subsection (d) of that section, encourage the submission of proposals for support of nanotechnology related projects; and

(B) in regard to subsection (g) of that section, include a description of how the requirement of subparagraph (A) of this paragraph is being met, the number of proposals for nanotechnology related projects received, the number of such proposals funded, the total number of such projects funded since the beginning of the Technology Innovation Program, and the outcomes of such funded projects in terms of the metrics developed in accordance with such subsection (g).

(3) TIP ADVISORY BOARD.—The TIP Advisory Board established under section 28(k) of the National Institute of Standards and Technology Act (15 U.S.C. 278n(k)), in carrying out its responsibilities under subsection (k)(3), shall provide the Director of the National Institute of Standards and Technology with—

(A) advice on how to accomplish the requirement of paragraph (2)(A) of this subsection; and

(B) an assessment of the adequacy of the allocation of resources for nanotechnology related projects supported under the Technology Innovation Program.

(c) INDUSTRY LIAISON GROUPS.—An objective of the Program shall be to establish industry liaison groups for all industry sectors that would benefit from applications of nanotechnology. The Nanomanufacturing, Industry Liaison, and Innovation Working Group of the National Science and Technology Council shall actively pursue establishing such liaison groups.

(d) COORDINATION WITH STATE INITIATIVES.—Section 2(b)(5) of the 21st Century Nanotechnology Research and Development Act (15 U.S.C. 7501(b)(5)) is amended to read as follows:

"(5) ensuring United States global leadership in the development and application of nanotechnology, including through coordination and leveraging Federal investments with nanotechnology research, development, and technology transition initiatives supported by the States;".

SEC. 5. RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

(a) IN GENERAL.—The Program shall include support for nanotechnology research and development activities directed toward application areas that have the potential for significant contributions to national economic competitiveness and for other significant societal benefits. The activities supported shall be designed to advance the development of research discoveries by demonstrating technical solutions to important problems in such areas as nanoelectronics, energy efficiency, health care, and water remediation and purification. The Advisory Panel shall make recommendations to the Program for candidate research and development areas for support under this section.

(b) CHARACTERISTICS.—

(1) IN GENERAL.—Research and development activities under this section shall—

(A) include projects selected on the basis of applications for support through a competitive, merit-based process;

(B) involve collaborations among researchers in academic institutions and industry, and may involve nonprofit research institutions and Federal laboratories, as appropriate;

(C) when possible, leverage Federal investments through collaboration with related State initiatives; and

(D) include a plan for fostering the transfer of research discoveries and the results of technology demonstration activities to industry for commercial development.

(2) PROCEDURES.—Determination of the requirements for applications under this subsection, review and selection of applications for support, and subsequent funding of projects shall be carried out by a collaboration of no fewer than 2 agencies participating in the Program. In selecting applications for support, the agencies shall give special consideration to projects that include cost sharing from non-Federal sources.

(3) INTERDISCIPLINARY RESEARCH CENTERS.—Research and development activities under this section may be supported through interdisciplinary nanotechnology research centers, as authorized by section 2(b)(4) of the 21st Century Nanotechnology

1 Research and Development Act (15 U.S.C.
2 7501(b)(4)), that are organized to investigate basic
3 research questions and carry out technology dem-
4 onstration activities in areas such as those identified
5 in subsection (a).

6 (c) REPORT.—Reports required under section 2(d) of
7 the 21st Century Nanotechnology Research and Develop-
8 ment Act (15 U.S.C. 7501(d)) shall include a description
9 of research and development areas supported in accord-
10 ance with this section, including the same budget informa-
11 tion as is required for program component areas under
12 paragraphs (1) and (2) of such section 2(d).

13 **SEC. 6. NANOMANUFACTURING RESEARCH.**

14 (a) RESEARCH AREAS.—The Nanomanufacturing
15 program component area, or any successor program com-
16 ponent area, shall include research on—

17 (1) development of instrumentation and tools
18 required for the rapid characterization of nanoscale
19 materials and for monitoring of nanoscale manufac-
20 turing processes; and

21 (2) approaches and techniques for scaling the
22 synthesis of new nanoscale materials to achieve in-
23 dustrial-level production rates.

24 (b) GREEN NANOTECHNOLOGY.—Interdiciplinary re-
25 search centers supported under the Program in accord-

1 ance with section 2(b)(4) of the 21st Century
2 Nanotechnology Research and Development Act (15
3 U.S.C. 7501(b)(4)) that are focused on nanomanufactur-
4 ing research and centers established under the authority
5 of section 5(b)(3) of this Act shall include as part of the
6 activities of such centers—

7 (1) research on methods and approaches to de-
8 velop environmentally benign nanoscale products and
9 nanoscale manufacturing processes, taking into con-
10 sideration relevant findings and results of research
11 supported under the Environmental, Health, and
12 Safety program component area, or any successor
13 program component area;

14 (2) fostering the transfer of the results of such
15 research to industry; and

16 (3) providing for the education of scientists and
17 engineers through interdisciplinary studies in the
18 principles and techniques for the design and develop-
19 ment of environmentally benign nanoscale products
20 and processes.

21 (c) REVIEW OF NANOMANUFACTURING RESEARCH
22 AND RESEARCH FACILITIES.—

23 (1) PUBLIC MEETING.—Not later than 12
24 months after the date of enactment of this Act, the
25 National Nanotechnology Coordination Office shall

1 sponsor a public meeting, including representation
2 from a wide range of industries engaged in nano-
3 scale manufacturing, to—
4 (A) obtain the views of participants at the
5 meeting on—
6 (i) the relevance and value of the re-
7 search being carried out under the Nano-
8 manufacturing program component area of
9 the Program, or any successor program
10 component area; and
11 (ii) whether the capabilities of
12 nanotechnology research facilities sup-
13 ported under the Program are adequate to
14 meet current and near-term requirements
15 for the fabrication and characterization of
16 nanoscale devices and systems; and
17 (B) receive any recommendations on ways
18 to strengthen the research portfolio supported
19 under the Nanomanufacturing program compo-
20 nent area, or any successor program component
21 area, and on improving the capabilities of
22 nanotechnology research facilities supported
23 under the Program.
24 Companies participating in industry liaison groups
25 shall be invited to participate in the meeting. The

1 Coordination Office shall prepare a report docu-
2 menting the findings and recommendations resulting
3 from the meeting.

4 (2) ADVISORY PANEL REVIEW.—The Advisory
5 Panel shall review the Nanomanufacturing program
6 component area of the Program, or any successor
7 program component area, and the capabilities of
8 nanotechnology research facilities supported under
9 the Program to assess—

10 (A) whether the funding for the
11 Nanomanufacturing program component area,
12 or any successor program component area, is
13 adequate and receiving appropriate priority
14 within the overall resources available for the
15 Program;

16 (B) the relevance of the research being
17 supported to the identified needs and require-
18 ments of industry;

19 (C) whether the capabilities of
20 nanotechnology research facilities supported
21 under the Program are adequate to meet cur-
22 rent and near-term requirements for the fab-
23 rication and characterization of nanoscale de-
24 vices and systems; and

(D) the level of funding that would be needed to support—

(i) the acquisition of instrumentation and equipment sufficient to provide the capabilities at nanotechnology research facilities described in subparagraph (C); and

(ii) the operation and maintenance of such facilities.

In carrying out its assessment, the Advisory Panel shall take into consideration the findings and recommendations from the report required under paragraph (1).

(3) REPORT.—Not later than 18 months after the date of enactment of this Act, the Advisory Panel shall submit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives a report on its assessment required under paragraph (2), along with any recommendations and a copy of the report prepared in accordance with paragraph (1).

SEC. 7. DEFINITIONS.

In this Act, terms that are defined in section 10 of the 21st Century Nanotechnology Research and Develop-

1 ment Act (15 U.S.C. 7509) have the meaning given those
2 terms in that section.

○

SECTION-BY-SECTION ANALYSIS OF H.R. 5940,
NATIONAL NANOTECHNOLOGY INITIATIVE AMENDMENTS ACT

SEC. 1. Short Title

"National Nanotechnology Initiative Amendments Act of 2008"

SEC. 2. Amendments to the 2003 Act:

- Modifies the NNI strategic plan to require specification of (1) both near and long term objectives, (2) the timeframe for achieving near term objectives, (3) the metrics for measuring progress toward objectives, and (4) multi-agency funded projects in areas of significant economic and societal impacts (see SEC. 5).
- Requires agencies participating in the NNI to support the activities of committees involved in the development of standards for nanotechnology and authorizes reimbursement of travel expenses for scientists participating in such standards setting activities.
- Provides an explicit funding source for the National Nanotechnology Coordination Office (NNCO)—each participating agency provides funds in proportion to the agency's fraction of the overall NNI budget—and requires the NNCO to report annually on its current and future budget requirements, including funding needed to create and maintain new public databases (see following provision), to fulfill the public input and outreach requirements specified in the 2003 Act, and to allow the National Academy of Sciences to carry out its triennial reviews of the NNI.
- Requires the NNCO to (1) develop a public database for projects funded under the Environmental, Health and Safety (EHS), Education and Societal Dimensions, and Nanomanufacturing program component areas, with sub-breakouts for education, public outreach and ethical, legal and other societal issues projects; and (2) develop, maintain and publicize information about NNI supported (and may include State-supported) nanotechnology facilities available for use by academia and industry.
- Specifies that the NNI Advisory Panel must be a stand-alone advisory committee (at present the President's Council of Advisors for Science and Technology is assigned this role).
- Requires the NNI Advisory Panel to establish a sub-panel with members having qualifications tailored to assessing the societal, ethical, legal, environmental, and workforce activities supported by the NNI.
- Revises the charge to the National Research Council (NRC) for the content and scope of the triennial reviews of the NNI.
- Provides explicit funding to the NNCO of $500K/year for FY0909FY11 for the NRC triennial reviews.

SEC. 3. Societal Dimensions of Nanotechnology:

- Assigns responsibility to an OSTP associate director (to be determined by the OSTP Director) to fulfill the role of Coordinator for the societal dimensions component of NNI. The coordinator is (1) responsible for ensuring the strategic plan for EHS is completed and implemented; (2) serves as the focal point for encouraging and advocating buy-in by the agencies, and monitoring their compliance, in providing the resources and management attention necessary; and (3) is responsible for encouraging the agencies to explore suitable mechanisms for establishing public-private partnerships for support of EHS research.
- Requires the Coordinator to convene and chair a panel of representatives from agencies supporting research under the EHS program component area to develop, annually update, and coordinate the implementation of a research plan for this program component. The plan, which is to be appended to the statutorily required NNI annual report, must contain near and long term research goals and milestones, include multi-year funding requirements by agency and by goal, and take into consideration the recommendations of the NNI Advisory Panel and the agencies responsible for environmental and safety regulations. The plan must include standards development activities related to nomenclature, standard reference materials, and testing methods and procedures.
- Establishes Nanotechnology Education Partnerships as part of the NSF Math and Science Partnership (MSP) program to recruit and help prepare sec-

ondary school students to pursue post-secondary education in nanotechnology. These partnerships are similar to other MSPs, but must include one or more businesses engaged in nanotechnology and focus the educational activities on curriculum development, teacher professional development, and student enrichment (including access by student to nanotechnology facilities and equipment) in areas related to nanotechnology.

- Requires the Program to include within the Education and Societal Dimensions program component area activities to support nanotechnology undergraduate education, including support for course development, faculty professional development, and acquisition of equipment and instrumentation. To carry out these activities, the bill authorizes an additional $5M per year for FY 2009 and FY 2010 for the NSF Course, Curriculum, and Laboratory Improvement program (undergraduate STEM education program open to all institutions of higher education) and an additional $5M per year for FY 2009 and FY 2010 for the NSF Advanced Technological Education program (open only to two-year institutions).
- Requires formation of an Education Working Group to coordinate, prioritize, and plan the educational activities funded under NNI.

SEC. 4. Technology Transfer:

- Requires agencies supporting nanotechnology research facilities under NNI to allow, and encourage, use of these facilities to assist companies in developing prototype products, devices, or processes for determining proof of concept. The agencies are required to publicize the availability of these facilities and provide descriptions of the capabilities of the facilities and the procedures and rules for their use. For cases in which full cost recovery for use of facilities is not required, the agencies must develop criteria for access, including the significance of the project for meeting national needs, readiness of the project for demonstration, and the prospects for commercial follow-on development of a successfully demonstrated concept.
- Requires agencies to encourage applications for support of nanotechnology projects under SBIR and STTR programs, requires publication of the plan to encourage this within six months (plan originally required under the 2003 Act), and requires a report that will track the success of the programs in attracting and supporting nanotechnology projects.
- Requires NIST to encourage submission of proposals under the Technology Innovation Program (TIP) for support of nanotechnology related projects and to report to Congress on how this is to be accomplished and on the outcome of the effort over time. Requires the TIP Advisory Board to provide advice to the program on ways to increase the number of nanotechnology related proposals and to assess the adequacy of funding provided for such proposals.
- Encourages the creation of industry liaison groups in all relevant industry sectors (four currently exist) to foster technology transfer and to help guide the NNI research agenda.
- Adds to the activities enumerated by the 2003 Act that are required to be carried out under the NNI the coordination and leveraging of federal investments with nanotechnology research, development, and technology transition initiatives supported by the States.

SEC. 5. Research in Areas of National Importance:

- Requires the NNI to include support for large-scale research and development activities in application areas with potential for significant contributions to economic competitiveness or other important societal benefits. The activities, which must involve collaborations among universities and industry (and federal labs and non-profit research organizations, as appropriate), are to be designed to advance the development of promising nanotechnology research discoveries by demonstrating technical solutions to important problems in areas of national importance, such as nano-electronics, energy efficiency, health care, and water remediation.
- Requires that the competitive, merit based selection process for awards and the funding of these awards be carried out through a collaboration between at least two agencies, that the award selection process take into favorable consideration the availability of cost sharing from non-federal sources, and that federal funds be leveraged by collaborations with relevant State initiatives.

- The research and development activities may be carried out through awards for support of interdisciplinary research centers, and all activities supported must include a plan for fostering the transfer of research discoveries and technology demonstration activities to industry for commercial development.
- Requires the NNI annual report to include a description of the activities supported in accordance with this section at the same level of budget detail as for NNI program component areas.

SEC. 6. Nanomanufacturing Research:

- Specifies inclusion of research under the Nanomanufacturing program component area to include projects to develop instrumentation/tools for rapid characterization and monitoring for nanoscale manufacturing and to develop techniques for scaling nanomaterial synthesis to industrial-level production rates.
- Requires that centers established under the NNI that focus on nanomanufacturing and on applications in areas of national importance (SEC. 5) include support for interdisciplinary research and education on methods and approaches to develop environmentally benign nanoscale products and nanoscale manufacturing processes. These centers must also develop their research and development agendas taking into consideration research findings and results from activities supported under the NNI's EHS program component area and must include activities to help transfer the results of the centers' research to industry.
- Requires a public meeting and subsequent review by the NNI Advisory Panel of the (1) adequacy of the funding level and the relevance to industry's needs of research under the Nanomanufacturing program component area and (2) adequacy of the capabilities of nanotechnology facilities for meeting the needs of the nanotechnology research and development community and the funding required to support instrumentation and equipment acquisition and facilities operations. The results of the review are to be submitted to Congress.

SEC. 7. Definitions

COMMITTEE ON SCIENCE AND TECHNOLOGY
FULL COMMITTEE MARKUP
MAY 7, 2008

AMENDMENT ROSTER

H.R. 5940, the National Nanotechnology Initiative Amendments Act of 2008

No.	Sponsor	Description	Results
1	Ms. Johnson	Amends Section 2 to require that there be at least one member of the NNI Advisory Panel who is employed by and representing a minority-serving institution.	Agreed to by voice vote.
2	Ms. Johnson	Amends Section 3 to require that informal, pre-college, or undergraduate nanotechnology education activities include environmental, health and safety, and other societal aspects of nanotechnology.	Agreed to by voice vote.
3	Mr. Baird	Amends Section 3 to require NNI-supported nanotechnology research facilities to allow web-based access to instruments and equipment by secondary school teachers and students for educational purposes and to provide technical support for such use. Agencies are given discretion to exempt particular facilities if they are no appropriate for such educational uses or if the costs to support access and use would be prohibitive.	Agreed to by voice vote.
4	Mr. Baird	Amends Section 6 to require the review of NNI-supported nanotechnology facilities under Section 6(c) include consideration of whether researchers at remote locations have adequate access to equipment and instruments at the facilities by means of networking technology and what the cost estimate would be for supporting remote access.	Agreed to by voice vote.

AMENDMENT TO H.R. 5940
OFFERED BY MS. EDDIE BERNICE JOHNSON OF TEXAS

Page 6, lines 24 and 25, amend paragraph (6) to read as follows:

1 (6) in section 4(b)—
2 (A) by striking ''or designated'' and ''or
3 designating''; and
4 (B) by adding at the end the following:
5 ''At least one member of the Advisory Panel
6 shall be an individual employed by and rep-
7 resenting a minority-serving institution.'';

AMENDMENT TO H.R. 5940
OFFERED BY MS. EDDIE BERNICE JOHNSON OF TEXAS

Page 17, after line 14, insert the following new subsection:

1 (f) SOCIETAL DIMENSIONS IN NANOTECHNOLOGY
2 EDUCATION ACTIVITIES.—Activities supported under the
3 Education and Societal Dimensions program component
4 area, or any successor program component area, that in-
5 volve informal, precollege, or undergraduate
6 nanotechnology education shall include education regard-
7 ing the environmental, health and safety, and other soci-
8 etal aspects of nanotechnology.

AMENDMENT TO H.R. 5940

OFFERED BY MR. BAIRD OF WASHINGTON

Page 17, after line 14, insert the following new subsection:

1 (f) REMOTE ACCESS TO NANOTECHNOLOGY FACILI-
2 TIES.—(1) Agencies supporting nanotechnology research
3 facilities as part of the Program shall require the entities
4 that operate such facilities to allow access via the Internet,
5 and support the costs associated with the provision of such
6 access, by secondary school students and teachers, to in-
7 struments and equipment within such facilities for edu-
8 cational purposes. The agencies may waive this require-
9 ment for cases when particular facilities would be inappro-
10 priate for educational purposes or the costs for providing
11 such access would be prohibitive.
12 (2) The agencies identified in paragraph (1) shall re-
13 quire the entities that operate such nanotechnology re-
14 search facilities to establish and publish procedures, guide-
15 lines, and conditions for the submission and approval of
16 applications for the use of the facilities for the purpose
17 identified in paragraph (1) and shall authorize personnel

1 who operate the facilities to provide necessary technical
2 support to students and teachers.

☒

AMENDMENT TO H.R. 5940

OFFERED BY MR. BAIRD OF WASHINGTON

Page 27, lines 11 through 16 amend clause (ii) to read as follows:

1 (ii) whether the capabilities of
2 nanotechnology research facilities sup-
3 ported under the Program are adequate—
4 (I) to meet current and near-
5 term requirements for the fabrication
6 and characterization of nanoscale de-
7 vices and systems; and
8 (II) to provide by means of net-
9 working technology to individuals, who
10 are at locations remote from the fa-
11 cilities, access to and use of instru-
12 mentation and equipment at the facili-
13 ties; and

Page 28, lines 19 through 24 amend subparagraph (C) to read as follows:

14 (C) whether the capabilities of
15 nanotechnology research facilities supported
16 under the Program are adequate—

(i) to meet current and near-term requirements for the fabrication and characterization of nanoscale devices and systems; and

(ii) to provide by means of networking technology to individuals, who are at locations remote from the facilities, access to and use of instrumentation and equipment at the facilities; and

Page 29, line 4, strike ''and equipment'' and insert '', equipment, and networking technology''.