

108TH CONGRESS  
1ST SESSION

**H. R. 766**

---

---

**AN ACT**

To provide for a National Nanotechnology Research and Development Program, and for other purposes.



108TH CONGRESS  
1ST SESSION

# H. R. 766

---

## AN ACT

To provide for a National Nanotechnology Research and  
Development Program, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*  
2 *tives of the United States of America in Congress assembled,*

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the “Nanotechnology Re-  
3 search and Development Act of 2003”.

4 **SEC. 2. DEFINITIONS.**

5 In this Act—

6 (1) the term “advanced technology user facil-  
7 ity” means a nanotechnology research and develop-  
8 ment facility supported, in whole or in part, by Fed-  
9 eral funds that is open to all United States research-  
10 ers on a competitive, merit-reviewed basis;

11 (2) the term “Advisory Committee” means the  
12 advisory committee established or designated under  
13 section 5;

14 (3) the term “Director” means the Director of  
15 the Office of Science and Technology Policy;

16 (4) the term “Interagency Committee” means  
17 the interagency committee established under section  
18 3(c);

19 (5) the term “nanotechnology” means science  
20 and engineering aimed at creating materials, devices,  
21 and systems at the atomic and molecular level;

22 (6) the term “Program” means the National  
23 Nanotechnology Research and Development Pro-  
24 gram described in section 3; and

25 (7) the term “program component area” means  
26 a major subject area established under section



1 (i) network with each other to foster  
2 the exchange of technical information and  
3 best practices;

4 (ii) involve academic institutions or  
5 national laboratories and other partners,  
6 which may include States and industry;

7 (iii) make use of existing expertise in  
8 nanotechnology in their regions and na-  
9 tionally;

10 (iv) make use of ongoing research and  
11 development at the micrometer scale to  
12 support their work in nanotechnology; and

13 (v) be capable of accelerating the com-  
14 mercial application of nanotechnology inno-  
15 vations in the private sector;

16 (2) ensure that solicitation and evaluation of  
17 proposals under the Program encourage interdiscipli-  
18 nary research;

19 (3) expand education and training of under-  
20 graduate and graduate students in interdisciplinary  
21 nanotechnology science and engineering;

22 (4) accelerate the commercial application of  
23 nanotechnology innovations in the private sector;

24 (5) ensure that societal and ethical concerns,  
25 including environmental concerns and the potential

1 implications of human performance enhancement  
2 and the possible development of nonhuman intel-  
3 ligence, will be addressed as the technology is devel-  
4 oped by—

5 (A) establishing a research program to  
6 identify societal and ethical concerns related to  
7 nanotechnology, and ensuring that the results  
8 of such research are widely disseminated;

9 (B) insofar as possible, integrating re-  
10 search on societal and ethical concerns with  
11 nanotechnology research and development, and  
12 ensuring that advances in nanotechnology bring  
13 about improvements in quality of life for all  
14 Americans;

15 (C) requiring that interdisciplinary re-  
16 search centers under paragraph (1)(C) include  
17 activities that address societal and ethical con-  
18 cerns; and

19 (D) ensure through the National  
20 Nanotechnology Coordination Office established  
21 under section 6 and through the agencies and  
22 departments that participate in the Program,  
23 that public input and outreach to the public are  
24 both integrated into nanotechnology research  
25 and development and research on societal and

1 ethical concerns by the convening of regular  
2 and ongoing public discussions, through mecha-  
3 nisms such as citizens panels, consensus con-  
4 ferences, and educational events, as appro-  
5 priate; and

6 (6) include to the maximum extent practicable  
7 diverse institutions, including Historically Black Col-  
8 leges and Universities and those serving large pro-  
9 portions of Hispanics, Native Americans, Asian-Pa-  
10 cific Americans, or other underrepresented popu-  
11 lations.

12 (c) INTERAGENCY COMMITTEE.—The President shall  
13 establish or designate an interagency committee on  
14 nanotechnology research and development, which shall in-  
15 clude representatives from the Office of Science and Tech-  
16 nology Policy, the National Science Foundation, the De-  
17 partment of Energy, the National Aeronautics and Space  
18 Administration, the National Institute of Standards and  
19 Technology, the Environmental Protection Agency, and  
20 any other agency that the President may designate. The  
21 Director shall select a chairperson from among the mem-  
22 bers of the Interagency Committee. The Interagency Com-  
23 mittee, which shall also include a representative from the  
24 Office of Management and Budget, shall oversee the plan-

1 ning, management, and coordination of the Program. The  
2 Interagency Committee shall—

3 (1) establish goals and priorities for the Pro-  
4 gram;

5 (2) establish program component areas, with  
6 specific priorities and technical goals, that reflect the  
7 goals and priorities established for the Program;

8 (3) develop, within 6 months after the date of  
9 enactment of this Act, and update annually, a stra-  
10 tegic plan to meet the goals and priorities estab-  
11 lished under paragraph (1) and to guide the activi-  
12 ties of the program component areas established  
13 under paragraph (2);

14 (4) propose a coordinated interagency budget  
15 for the Program that will ensure the maintenance of  
16 a balanced nanotechnology research portfolio and en-  
17 sure that each agency and each program component  
18 area is allocated the level of funding required to  
19 meet the goals and priorities established for the Pro-  
20 gram;

21 (5) develop a plan to utilize Federal programs,  
22 such as the Small Business Innovation Research  
23 Program and the Small Business Technology Trans-  
24 fer Research Program, in support of the goal stated  
25 in subsection (b)(4); and

1           (6) in carrying out its responsibilities under  
2 paragraphs (1) through (5), take into consideration  
3 the recommendations of the Advisory Committee,  
4 suggestions or recommendations developed pursuant  
5 to section 3(b)(5)(D), and the views of academic,  
6 State, industry, and other appropriate groups con-  
7 ducting research on and using nanotechnology.

8 **SEC. 4. ANNUAL REPORT.**

9           The chairperson of the Interagency Committee shall  
10 prepare an annual report, to be submitted to the Com-  
11 mittee on Science of the House of Representatives and the  
12 Committee on Commerce, Science, and Transportation of  
13 the Senate at the time of the President's budget request  
14 to Congress, that includes—

15           (1) the Program budget, for the current fiscal  
16 year, for each agency that participates in the Pro-  
17 gram, including a breakout of spending for the de-  
18 velopment and acquisition of research facilities and  
19 instrumentation, for each program component area,  
20 and for all activities pursuant to section 3(b)(5);

21           (2) the proposed Program budget, for the next  
22 fiscal year, for each agency that participates in the  
23 Program, including a breakout of spending for the  
24 development and acquisition of research facilities  
25 and instrumentation, for each program component

1 area, and for all activities pursuant to section  
2 3(b)(5);

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

6 (4) an analysis of the extent to which the Pro-  
7 gram has incorporated the recommendations of the  
8 Advisory Committee; and

9 (5) an assessment of how Federal agencies are  
10 implementing the plan described in section 3(c)(5),  
11 and a description of the amount of Small Business  
12 Innovative Research and Small Business Technology  
13 Transfer Research funds supporting the plan.

14 **SEC. 5. ADVISORY COMMITTEE.**

15 (a) IN GENERAL.—The President shall establish or  
16 designate an advisory committee on nanotechnology con-  
17 sisting of non-Federal members, including representatives  
18 of research and academic institutions and industry, who  
19 are qualified to provide advice and information on  
20 nanotechnology research, development, demonstration,  
21 education, technology transfer, commercial application,  
22 and societal and ethical concerns. The recommendations  
23 of the Advisory Committee shall be considered by Federal  
24 agencies in implementing the Program.

1 (b) ASSESSMENT.—The Advisory Committee shall  
2 assess—

3 (1) trends and developments in nanotechnology  
4 science and engineering;

5 (2) progress made in implementing the Pro-  
6 gram;

7 (3) the need to revise the Program;

8 (4) the balance among the components of the  
9 Program, including funding levels for the program  
10 component areas;

11 (5) whether the program component areas, pri-  
12 orities, and technical goals developed by the Inter-  
13 agency Committee are helping to maintain United  
14 States leadership in nanotechnology;

15 (6) the management, coordination, implementa-  
16 tion, and activities of the Program; and

17 (7) whether societal and ethical concerns, in-  
18 cluding concerns identified pursuant to section  
19 3(b)(5)(D), are adequately addressed by the Pro-  
20 gram.

21 (c) REPORTS.—The Advisory Committee shall report  
22 not less frequently than once every 2 fiscal years to the  
23 President on its findings of the assessment carried out  
24 under subsection (b), its recommendations for ways to im-  
25 prove the Program, and the concerns assessed under sub-

1 section (b)(7). The first report shall be due within 1 year  
2 after the date of enactment of this Act.

3 (d) FEDERAL ADVISORY COMMITTEE ACT APPLICA-  
4 TION.—Section 14 of the Federal Advisory Committee Act  
5 shall not apply to the Advisory Committee.

6 **SEC. 6. NATIONAL NANOTECHNOLOGY COORDINATION OF-**  
7 **FICE.**

8 The President shall establish a National  
9 Nanotechnology Coordination Office, with full-time staff,  
10 which shall—

11 (1) provide technical and administrative support  
12 to the Interagency Committee and the Advisory  
13 Committee;

14 (2) serve as a point of contact on Federal  
15 nanotechnology activities for government organiza-  
16 tions, academia, industry, professional societies, and  
17 others to exchange technical and programmatic in-  
18 formation; and

19 (3) conduct public outreach, including dissemi-  
20 nation of findings and recommendations of the  
21 Interagency Committee and the Advisory Committee,  
22 as appropriate.

1 **SEC. 7. AUTHORIZATION OF APPROPRIATIONS.**

2 (a) NATIONAL SCIENCE FOUNDATION.—There are  
3 authorized to be appropriated to the National Science  
4 Foundation for carrying out this Act—

- 5 (1) \$350,000,000 for fiscal year 2004;  
6 (2) \$385,000,000 for fiscal year 2005; and  
7 (3) \$424,000,000 for fiscal year 2006.

8 (b) DEPARTMENT OF ENERGY.—There are author-  
9 ized to be appropriated to the Secretary of Energy for car-  
10 rying out this Act—

- 11 (1) \$265,000,000 for fiscal year 2004;  
12 (2) \$292,000,000 for fiscal year 2005; and  
13 (3) \$322,000,000 for fiscal year 2006.

14 (c) NATIONAL AERONAUTICS AND SPACE ADMINIS-  
15 TRATION.—There are authorized to be appropriated to the  
16 National Aeronautics and Space Administration for car-  
17 rying out this Act—

- 18 (1) \$31,000,000 for fiscal year 2004;  
19 (2) \$34,000,000 for fiscal year 2005; and  
20 (3) \$37,000,000 for fiscal year 2006.

21 (d) NATIONAL INSTITUTE OF STANDARDS AND  
22 TECHNOLOGY.—There are authorized to be appropriated  
23 to the National Institute of Standards and Technology for  
24 carrying out this Act—

- 25 (1) \$62,000,000 for fiscal year 2004;  
26 (2) \$68,000,000 for fiscal year 2005; and

1           (3) \$75,000,000 for fiscal year 2006.

2           (e) ENVIRONMENTAL PROTECTION AGENCY.—There  
3 are authorized to be appropriated to the Environmental  
4 Protection Agency for carrying out this Act—

5           (1) \$5,000,000 for fiscal year 2004;

6           (2) \$5,500,000 for fiscal year 2005; and

7           (3) \$6,000,000 for fiscal year 2006.

8 **SEC. 8. EXTERNAL REVIEW OF THE NATIONAL**  
9                                   **NANOTECHNOLOGY RESEARCH AND DEVEL-**  
10                                   **OPMENT PROGRAM.**

11           (a) IN GENERAL.—Not later than 6 months after the  
12 date of enactment of this Act, the Director shall enter into  
13 an agreement with the National Academy of Sciences to  
14 conduct periodic reviews of the Program. The reviews shall  
15 be conducted once every 3 years during the 10-year period  
16 following the enactment of this Act. The reviews shall  
17 include—

18           (1) an evaluation of the technical achievements  
19           of the Program;

20           (2) recommendations for changes in the Pro-  
21           gram;

22           (3) an evaluation of the relative position of the  
23           United States with respect to other nations in  
24           nanotechnology research and development;

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

3           (5) an evaluation of whether the Program has  
4           been successful in fostering interdisciplinary re-  
5           search and development; and

6           (6) an evaluation of the extent to which the  
7           Program has adequately considered societal and eth-  
8           ical concerns.

9           (b) STUDY ON MOLECULAR MANUFACTURING.—Not  
10          later than 3 years after the date of enactment of this Act  
11          a review shall be conducted in accordance with subsection  
12          (a) that includes a study to determine the technical feasi-  
13          bility of the manufacture of materials and devices at the  
14          molecular scale. The study shall—

15                 (1) examine the current state of the technology  
16                 for enabling molecular manufacturing;

17                 (2) determine the key scientific and technical  
18                 barriers to achieving molecular manufacturing;

19                 (3) review current and planned research activi-  
20                 ties that are relevant to advancing the prospects for  
21                 molecular manufacturing; and

22                 (4) develop, insofar as possible, a consensus on  
23                 whether molecular manufacturing is technically fea-  
24                 sible, and if found to be feasible—

1 (A) the estimated timeframe in which mo-  
2 lecular manufacturing may be possible on a  
3 commercial scale; and

4 (B) recommendations for a research agen-  
5 da necessary to achieve this result.

6 (c) STUDY ON SAFE NANOTECHNOLOGY.—Not later  
7 than 6 years after the date of enactment of this Act a  
8 review shall be conducted in accordance with subsection  
9 (a) that includes a study to assess the need for standards,  
10 guidelines, or strategies for ensuring the development of  
11 safe nanotechnology, including those applicable to—

12 (1) self-replicating nanoscale machines or de-  
13 vices;

14 (2) the release of such machines or devices in  
15 natural environments;

16 (3) distribution of molecular manufacturing de-  
17 velopment;

18 (4) encryption;

19 (5) the development of defensive technologies;

20 (6) the use of nanotechnology as human brain  
21 extenders; and

22 (7) the use of nanotechnology in developing ar-  
23 tificial intelligence.

1 **SEC. 9. SCIENCE AND TECHNOLOGY GRADUATE SCHOLAR-**  
2 **SHIP PROGRAMS.**

3 (a) ESTABLISHMENT OF PROGRAMS.—

4 (1) IN GENERAL.—The agency heads shall each  
5 establish within their respective departments and  
6 agencies a Science and Technology Graduate Schol-  
7 arship Program to award scholarships to individuals  
8 that is designed to recruit and prepare students for  
9 careers in the Federal Government that require en-  
10 gineering, scientific, and technical training.

11 (2) COMPETITIVE PROCESS.—Individuals shall  
12 be selected to receive scholarships under this section  
13 through a competitive process primarily on the basis  
14 of academic merit, with consideration given to finan-  
15 cial need and the goal of promoting the participation  
16 of individuals identified in section 33 or 34 of the  
17 Science and Engineering Equal Opportunities Act  
18 (42 U.S.C. 1885a or 1885b).

19 (3) SERVICE AGREEMENTS.—To carry out the  
20 Programs the agency heads shall enter into contrac-  
21 tual agreements with individuals selected under  
22 paragraph (2) under which the individuals agree to  
23 serve as full-time employees of the Federal Govern-  
24 ment, for the period described in subsection (f)(1),  
25 in positions needed by the Federal Government and

1 for which the individuals are qualified, in exchange  
2 for receiving a scholarship.

3 (b) SCHOLARSHIP ELIGIBILITY.—In order to be eligi-  
4 ble to participate in a Program, an individual must—

5 (1) be enrolled or accepted for enrollment as a  
6 full-time student at an institution of higher edu-  
7 cation in an academic field or discipline described in  
8 a list made available under subsection (d);

9 (2) be a United States citizen or permanent  
10 resident; and

11 (3) at the time of the initial scholarship award,  
12 not be a Federal employee as defined in section  
13 2105 of title 5 of the United States Code.

14 (c) APPLICATION REQUIRED.—An individual seeking  
15 a scholarship under this section shall submit an applica-  
16 tion to an agency head at such time, in such manner, and  
17 containing such information, agreements, or assurances as  
18 the agency head may require.

19 (d) ELIGIBLE ACADEMIC PROGRAMS.—The agency  
20 heads shall each make publicly available a list of academic  
21 programs and fields of study for which scholarships under  
22 their department's or agency's Program may be utilized,  
23 and shall update the list as necessary.

24 (e) SCHOLARSHIP REQUIREMENT.—

1           (1) IN GENERAL.—Agency heads may provide  
2           scholarships under their department’s or agency’s  
3           Program for an academic year if the individual ap-  
4           plying for the scholarship has submitted to the agen-  
5           cy head, as part of the application required under  
6           subsection (c), a proposed academic program leading  
7           to a degree in a program or field of study on a list  
8           made available under subsection (d).

9           (2) DURATION OF ELIGIBILITY.—An individual  
10          may not receive a scholarship under this section for  
11          more than 4 academic years, unless an agency head  
12          grants a waiver.

13          (3) SCHOLARSHIP AMOUNT.—The dollar  
14          amount of a scholarship under this section for an  
15          academic year shall be determined under regulations  
16          issued by the agency heads, but shall in no case ex-  
17          ceed the cost of attendance.

18          (4) AUTHORIZED USES.—A scholarship pro-  
19          vided under this section may be expended for tuition,  
20          fees, and other authorized expenses as established by  
21          the agency heads by regulation.

22          (5) CONTRACTS REGARDING DIRECT PAYMENTS  
23          TO INSTITUTIONS.—Each agency head may enter  
24          into a contractual agreement with an institution of  
25          higher education under which the amounts provided

1 for a scholarship under this section for tuition, fees,  
2 and other authorized expenses are paid directly to  
3 the institution with respect to which the scholarship  
4 is provided.

5 (f) PERIOD OF OBLIGATED SERVICE.—

6 (1) DURATION OF SERVICE.—The period of  
7 service for which an individual shall be obligated to  
8 serve as an employee of the Federal Government is,  
9 except as provided in subsection (h)(2), 24 months  
10 for each academic year for which a scholarship  
11 under this section is provided.

12 (2) SCHEDULE FOR SERVICE.—(A) Except as  
13 provided in subparagraph (B), obligated service  
14 under paragraph (1) shall begin not later than 60  
15 days after the individual obtains the educational de-  
16 gree for which the scholarship was provided.

17 (B) An agency head may defer the obligation of  
18 an individual to provide a period of service under  
19 paragraph (1) if the agency head determines that  
20 such a deferral is appropriate. The agency head  
21 shall prescribe the terms and conditions under which  
22 a service obligation may be deferred through regula-  
23 tion.

24 (g) PENALTIES FOR BREACH OF SCHOLARSHIP  
25 AGREEMENT.—

1           (1) FAILURE TO COMPLETE ACADEMIC TRAIN-  
2           ING.—Scholarship recipients who fail to maintain a  
3           high level of academic standing, as defined by the  
4           appropriate agency head by regulation, who are dis-  
5           missed from their educational institutions for dis-  
6           ciplinary reasons, or who voluntarily terminate aca-  
7           demic training before graduation from the edu-  
8           cational program for which the scholarship was  
9           awarded, shall be in breach of their contractual  
10          agreement and, in lieu of any service obligation aris-  
11          ing under such agreement, shall be liable to the  
12          United States for repayment within 1 year after the  
13          date of default of all scholarship funds paid to them  
14          and to the institution of higher education on their  
15          behalf under the agreement, except as provided in  
16          subsection (h)(2). The repayment period may be ex-  
17          tended by the agency head when determined to be  
18          necessary, as established by regulation.

19          (2) FAILURE TO BEGIN OR COMPLETE THE  
20          SERVICE OBLIGATION OR MEET THE TERMS AND  
21          CONDITIONS OF DEFERMENT.—Scholarship recipi-  
22          ents who, for any reason, fail to begin or complete  
23          their service obligation after completion of academic  
24          training, or fail to comply with the terms and condi-  
25          tions of deferment established by the appropriate

1 agency head pursuant to subsection (f)(2)(B), shall  
2 be in breach of their contractual agreement. When  
3 recipients breach their agreements for the reasons  
4 stated in the preceding sentence, the recipient shall  
5 be liable to the United States for an amount equal  
6 to—

7 (A) the total amount of scholarships re-  
8 ceived by such individual under this section;  
9 plus

10 (B) the interest on the amounts of such  
11 awards which would be payable if at the time  
12 the awards were received they were loans bear-  
13 ing interest at the maximum legal prevailing  
14 rate, as determined by the Treasurer of the  
15 United States,

16 multiplied by 3.

17 (h) WAIVER OR SUSPENSION OF OBLIGATION.—

18 (1) DEATH OF INDIVIDUAL.—Any obligation of  
19 an individual incurred under a Program (or a con-  
20 tractual agreement thereunder) for service or pay-  
21 ment shall be canceled upon the death of the indi-  
22 vidual.

23 (2) IMPOSSIBILITY OR EXTREME HARDSHIP.—

24 The agency heads shall by regulation provide for the  
25 partial or total waiver or suspension of any obliga-

1       tion of service or payment incurred by an individual  
2       under their department's or agency's Program (or a  
3       contractual agreement thereunder) whenever compli-  
4       ance by the individual is impossible or would involve  
5       extreme hardship to the individual, or if enforcement  
6       of such obligation with respect to the individual  
7       would be contrary to the best interests of the Gov-  
8       ernment.

9       (i) DEFINITIONS.—In this section the following defi-  
10      nitions apply:

11           (1) AGENCY HEAD.—The term “agency head”  
12      means the Director of the National Science Founda-  
13      tion, the Secretary of Energy, the Administrator of  
14      the National Aeronautics and Space Administration,  
15      the Director of the National Institute of Standards  
16      and Technology, or the Administrator of the Envi-  
17      ronmental Protection Agency.

18           (2) COST OF ATTENDANCE.—The term “cost of  
19      attendance” has the meaning given that term in sec-  
20      tion 472 of the Higher Education Act of 1965 (20  
21      U.S.C. 1087ll).

22           (3) INSTITUTION OF HIGHER EDUCATION.—The  
23      term “institution of higher education” has the  
24      meaning given that term in section 101(a) of the  
25      Higher Education Act of 1965 (20 U.S.C. 1001(a)).

1           (4) PROGRAM.—The term “Program” means a  
2           Science and Technology Graduate Scholarship Pro-  
3           gram established under this section.

Passed the House of Representatives May 7, 2003.

Attest:

*Clerk.*