

103<sup>D</sup> CONGRESS  
2<sup>D</sup> SESSION

# H. R. 4553

To authorize the fusion energy research, development, and demonstration program at the Department of Energy, to direct the participation of the United States in the International Thermonuclear Experimental Reactor, and for other purposes.

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## IN THE HOUSE OF REPRESENTATIVES

JUNE 9, 1994

Mr. BROWN of California introduced the following bill; which was referred to the Committee on Science, Space, and Technology

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## A BILL

To authorize the fusion energy research, development, and demonstration program at the Department of Energy, to direct the participation of the United States in the International Thermonuclear Experimental Reactor, 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,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Fusion Energy Re-  
5 search Authorization Act of 1994”.

6 **SEC. 2. FINDINGS.**

7 The Congress finds that—

1           (1) by the year 2050, the world will need to  
2 supply between 2 and 3 times as much energy as is  
3 presently produced to meet minimum requirements  
4 for food, shelter, transportation, and economic secu-  
5 rity;

6           (2) meeting the increased energy demands of  
7 the year 2050 cannot be achieved without substan-  
8 tial environmental degradation unless there is a  
9 massive shift from dependence on the fossil fuels  
10 which today provide more than three-quarters of all  
11 energy supply;

12           (3) a wide variety of nonfossil fuel energy tech-  
13 nologies must be developed to meet the expected de-  
14 mand of the year 2050;

15           (4) the Federal Government has a responsibility  
16 to fund research in energy technologies to help meet  
17 future expected energy demand where the technical  
18 or economic risks of developing such technologies are  
19 too high to be borne solely by the private sector;

20           (5) despite the urgent need to develop a wide  
21 variety of nonfossil fuel energy technologies, the  
22 Federal Government's investment in all energy sup-  
23 ply research and development (including fossil fuels)  
24 has declined in real terms by more than two-thirds  
25 in the last 14 years;

1           (6) fusion energy is one of the nonfossil fuel  
2 technologies which could potentially provide safe,  
3 abundant, environmentally sound, secure, and af-  
4 fordable energy supplies in the future;

5           (7) in the last 16 years, fusion energy research-  
6 ers have made significant progress toward realizing  
7 magnetic fusion as a viable source of energy, in-  
8 creasing power production from test reactors more  
9 than a million-fold over that time period;

10          (8) while significant engineering, technical, and  
11 scientific challenges remain to make fusion energy  
12 commercially viable, limited funding remains the pri-  
13 mary constraint to more rapid progress;

14          (9) the technical risks and the long time scale  
15 needed to demonstrate the commercial viability of  
16 fusion energy will likely require a stable, predictable,  
17 and sustained investment of government funding for  
18 decades to come;

19          (10) while magnetic fusion is the leading fusion  
20 technology, research on alternative fusion concepts  
21 should continue to be supported;

22          (11) opportunities to participate in inter-  
23 national fusion experiments can dramatically lower  
24 the cost to the Federal Government of fusion energy  
25 research;

1           (12) the United States must demonstrate that  
2           it is a credible partner in international scientific pro-  
3           grams by being able to make and keep long-term  
4           commitments to funding and participation; and

5           (13) the United States should commit to par-  
6           ticipating in the siting, construction, and operation  
7           of ITER as soon as practicable.

8 **SEC. 3. PURPOSES.**

9           The purposes of this Act are to—

10           (1) provide direction and authorize appropria-  
11           tions for a broadly based fusion energy research pro-  
12           gram at the Department of Energy which includes  
13           development of the magnetic fusion program and re-  
14           search on alternative fusion concepts;

15           (2) provide an accelerated commitment to  
16           United States participation in ITER and provide au-  
17           thorization of appropriations for such activity con-  
18           tingent on meeting program milestones;

19           (3) provide for the selection of a host country  
20           and establish a site selection process for ITER; and

21           (4) provide a stable basis of funding for multi-  
22           year fusion energy research facility construction  
23           commitments through the establishment of a trust  
24           fund.

1 **SEC. 4. DEFINITIONS.**

2 For purposes of this Act—

3 (1) the term “alternative fusion concepts”  
4 means any concepts for the production of energy  
5 based on the fusing of atomic nuclei other than to-  
6 roidal magnetic fusion concepts, including heavy ion  
7 inertial fusion, aneutronic fusion, and electrostatic  
8 fusion;

9 (2) the term “Department” means the Depart-  
10 ment of Energy;

11 (3) the term “Fusion Energy Research Pro-  
12 gram” means the program described in section 5;

13 (4) the term “international partners” means  
14 the United States, the European Atomic Energy  
15 Community, Japan, and the Russian Federation;

16 (5) the term “ITER” means the International  
17 Thermonuclear Experimental Reactor;

18 (6) the term “magnetic fusion” means fusion  
19 based on toroidal confinement concepts;

20 (7) the term “Secretary” means the Secretary  
21 of Energy; and

22 (8) the term “Tokamak Physics Experiment”  
23 means a facility to replace the Tokamak Fusion Test  
24 Reactor which is designed to be capable of conduct-  
25 ing experiments on reactions with a pulse length of

1 at least 15 minutes and demonstrating a more com-  
2 pact and efficient magnetic fusion reactor design.

3 **SEC. 5. FUSION ENERGY RESEARCH PROGRAM.**

4 (a) FUSION PROGRAM.—The Secretary shall carry  
5 out in accordance with the provisions of this Act a Fusion  
6 Energy Research Program, including research, develop-  
7 ment, and demonstration to demonstrate the technical and  
8 economic feasibility of producing safe, environmentally  
9 sound, and affordable energy from fusion.

10 (b) PROGRAM GOALS.—The goal of the Fusion En-  
11 ergy Research Program is to demonstrate by the year  
12 2010 the practicability of commercial electric power pro-  
13 duction and to lead to commercial production of fusion  
14 energy by the year 2040.

15 (c) PROGRAM ELEMENTS.—The Fusion Energy Re-  
16 search Program shall consist of the following elements:

17 (1) Research, development, and demonstration  
18 on magnetic fusion energy technology, including—

19 (A) research on plasma physics and con-  
20 trol, confinement, ignition, and burning;

21 (B) the design, construction, and operation  
22 of experimental fusion reactors, including the  
23 Tokamak Physics Experiment, and the develop-  
24 ment of special materials for such reactors, the  
25 facilities to develop such materials, and the de-

1           velopment of components which support the op-  
2           eration of such reactors, such as diagnostic and  
3           remote maintenance equipment; and

4                   (C) participation by the United States in-  
5           dustrial sector in the design and construction of  
6           fusion reactors, and cooperation with utilities.

7           (2) Research, development, and demonstration  
8           of alternative fusion concepts, to be administered  
9           through an Assistant Director for Alternative Fusion  
10          Research, including research and development need-  
11          ed to build and test an Induction Linac Systems Ex-  
12          periment for the purpose of developing heavy ion in-  
13          ertial fusion energy.

14                  (3) Participation in the design, construction,  
15          and operation of ITER with the goal of ITER be-  
16          coming operational by the year 2005.

17 **SEC. 6. INDEPENDENT REVIEW OF FUSION TECHNOLOGIES.**

18          Within 6 months after the date of enactment of this  
19          Act, the Secretary shall contract with the National Acad-  
20          emy of Sciences to conduct a study which examines the  
21          various magnetic fusion technologies and alternative fu-  
22          sion concepts to assess their current state of development,  
23          evaluates the potential of such technologies and concepts  
24          to become commercially viable sources of energy in the fu-  
25          ture, and identifies the research and development goals

1 and priorities, and the range of probable costs and time  
2 scales, needed to achieve commercial viability.

3 **SEC. 7. ITER SITE SELECTION PROCESS.**

4 (a) ITER STUDY AND REPORT.—Within 120 days  
5 after the date of enactment of this Act, the Secretary shall  
6 submit to Congress a study which compares the technical  
7 and scientific advantages and disadvantages and the eco-  
8 nomic costs and benefits to the United States of siting  
9 ITER in the United States with siting ITER outside of  
10 the United States. Such study shall include the consider-  
11 ation of the impact on employment of constructing ITER  
12 in the United States, the effect of manufacturing major  
13 ITER subsystems (such as superconducting magnets) in  
14 the United States, and the effect of siting ITER in the  
15 United States on United States funding requirements for  
16 participation in ITER.

17 (b) HOST-COUNTRY SELECTION.—The Secretary  
18 shall seek to reach an agreement with the international  
19 partners which provides for—

20 (1) the selection of a host country in which to  
21 site ITER by October, 1995;

22 (2) the equitable distribution of economic and  
23 technological benefits among the international part-  
24 ners, including the construction of ITER and related

1 facilities and the manufacture of major ITER sub-  
2 systems;

3 (3) substantial United States industry and util-  
4 ity involvement in the design, construction, and op-  
5 eration of ITER to ensure United States industry  
6 and utility expertise in the technologies developed;  
7 and

8 (4) a schedule to complete site-specific design  
9 activities by 1998.

10 (c) UNITED STATES SITE SELECTION.—The Sec-  
11 retary shall—

12 (1) immediately initiate a process for identify-  
13 ing candidate sites within the United States which  
14 meet the site requirements for the construction and  
15 operation of ITER; and

16 (2) propose within 90 days after the date of en-  
17 actment of this Act a process for selection of a site  
18 within the United States by June, 1996, if the Unit-  
19 ed States is selected as the host country for ITER  
20 pursuant to the international agreement described in  
21 subsection (b).

22 (d) FINAL COST ESTIMATE.—The Secretary shall  
23 provide to Congress within 90 days following the comple-  
24 tion of site-specific design activities a detailed estimate of  
25 the final projected total cost and cost to the United States

1 of the construction and operation of ITER based on final  
2 site-specific engineering and construction designs.

3 **SEC. 8. REPORTS AND MISCELLANEOUS PROVISIONS.**

4 (a) CONTINGENCY PLAN.—Within 120 days after the  
5 date of enactment of this Act, the Secretary shall submit  
6 to Congress a report on the feasibility of conducting a par-  
7 allel design effort on the Tokamak Physics Experiment to  
8 augment the capabilities of the Tokamak Physics Experi-  
9 ment in the event that an international agreement cannot  
10 be reached on the site selection or construction of ITER.

11 (b) PROGRAM REPORT.—Within 180 days after the  
12 date of enactment of this Act, and biennially thereafter,  
13 the Secretary shall prepare and submit to the Congress  
14 a report on the Fusion Energy Research Program and the  
15 progress it has made in meeting the goals and require-  
16 ments of this Act.

17 (c) COORDINATION WITH DEFENSE FUSION RE-  
18 SEARCH PROGRAMS.—(1) The Secretary shall, to the max-  
19 imum extent practicable, coordinate the research and de-  
20 velopment activities of the civilian Inertial Fusion Energy  
21 Program and the defense Inertial Confinement Fusion  
22 Program to maximize the benefits to both programs.

23 (2) Within 120 days after the enactment of this Act,  
24 the Secretary, in conjunction with the Secretary of De-  
25 fense, shall submit a report to Congress with recommenda-

1 tions for sharing budget and other resources in order to  
2 enhance the civilian energy applications of the defense In-  
3 ertial Confinement Fusion Program.

4 (d) REPEAL.—Section 2114 of the Energy Policy Act  
5 of 1992 (Public Law 102–486) is repealed.

6 **SEC. 9. UNIVERSITY RADIATION SCIENCE AND TECH-**  
7 **NOLOGY PROGRAM.**

8 The Secretary shall combine the Nuclear Engineering  
9 Research and Education Program, the University Re-  
10 search Reactor Program, and the University Reactor Fuel  
11 Assistance Program to form a new University Radiation  
12 Science and Technology Program to be included as a sepa-  
13 rate and distinct part of the University and Science Edu-  
14 cation Program of the Department.

15 **SEC. 10. FUSION ENERGY FACILITY FUND.**

16 (a) ESTABLISHMENT OF FEES.—The Secretary shall  
17 establish a fee, payable by persons who sell electricity for  
18 ultimate consumption, at a rate of 0.1 mills per kilowatt  
19 hour.

20 (b) COLLECTION.—The Secretary shall establish pro-  
21 cedures for the collection of such fees. The Secretary may  
22 use the services of any Federal, State, or local agency or  
23 instrumentality to collect such fees, and may reimburse  
24 such agency or instrumentality a reasonable amount for  
25 such services.

1 (c) USE OF FUNDS.—Funds received under this sec-  
2 tion shall be deposited in a separate account in the Treas-  
3 ury, and shall be used, to the extent provided in advance  
4 in appropriation Acts, only for the design, engineering,  
5 and construction of ITER, facilities related to ITER (in-  
6 cluding a materials testing facility and a blanket testing  
7 facility) and the Tokamak Physics Experiment.

8 (d) TERMINATION OF FEES.—The authority to as-  
9 sess and collect fees under this section shall expire at the  
10 earlier of—

11 (1) the achievement of a balance in the account  
12 established under subsection (c) sufficient in the  
13 judgment of the Secretary to satisfy the obligations  
14 of the United States in the design, engineering, and  
15 construction described in subsection (c); or

16 (2) the completion of ITER construction.

17 **SEC. 11. AUTHORIZATION OF APPROPRIATIONS.**

18 (a) FUSION ENERGY RESEARCH PROGRAM.—There  
19 are authorized to be appropriated to the Secretary for car-  
20 rying out the Fusion Energy Research Program  
21 \$380,000,000 for fiscal 1995, \$425,000,000 for fiscal  
22 year 1996, \$475,000,000 for fiscal year 1997, and such  
23 sums as may be necessary thereafter.

24 (b) ALTERNATIVE FUSION RESEARCH.—From the  
25 sums authorized in subsection (a), there are authorized

1 to be appropriated to the Secretary for carrying out the  
2 Alternative Fusion Research Program under section  
3 5(c)(2), \$26,000,000 for fiscal year 1995, \$31,000,000 for  
4 fiscal year 1996, \$31,000,000 for fiscal year 1997, and  
5 such sums as may be necessary thereafter.

6 (c) TOKAMAK PHYSICS EXPERIMENT.—The total  
7 amount to be appropriated for the complete design, devel-  
8 opment, and construction of the Tokamak Physics Experi-  
9 ment shall not exceed \$700,000,000.

10 (d) UNIVERSITY RADIATION SCIENCE AND TECH-  
11 NOLOGY PROGRAM.—There are authorized to be appro-  
12 priated to the Secretary for carrying out the University  
13 Radiation Science and Technology Program \$25,000,000  
14 for fiscal year 1995, \$25,000,000 for fiscal year 1996,  
15 \$25,000,000 for fiscal year 1997, and such sums as may  
16 be necessary thereafter.

17 (e) CONSTRUCTION OF ITER.—No funds are author-  
18 ized for the construction of ITER until the Secretary cer-  
19 tifies to the Congress that there is an international agree-  
20 ment that meets the requirements of section 7(b), and  
21 until the report required under section 7(d) is provided  
22 to Congress.

23 (f) LIMITATION ON MAGNETIC FUSION FACILI-  
24 TIES.—No funds are authorized for the design, engineer-  
25 ing, or construction of any magnetic fusion facility other

- 1 than ITER, facilities related to ITER (including a mate-
- 2 rials testing facility and a blanket testing facility) and the
- 3 Tokamak Physics Experiment.

