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(1) IN GENERAL.--There are authorized to be appropriated to carry out activities under this section, \$10,000,000 in fiscal year 2002, \$12,000,000 in fiscal year 2003, and \$15,000,000 in fiscal year 2004.

(2) LIMIT ON USE OF FUNDS.--Not less than 20 percent of any funds appropriated in a given fiscal year under this subsection shall be dedicated to research carried out at institutions of higher education.

**SEC. 1433. RESEARCH AND DEVELOPMENT FOR NEW NATURAL GAS TECHNOLOGIES.**

The Secretary of Energy shall conduct a comprehensive five-year program for research, development and demonstration to improve the reliability, efficiency, safety and integrity of the natural gas transportation and distribution infrastructure and for distributed energy resources (including microturbines, fuel cells, advanced engine-generators gas turbines reciprocating engines, hybrid power generation systems, and all ancillary equipment for dispatch, control and maintenance).

**SEC. 1434. AUTHORIZATION OF APPROPRIATIONS FOR OFFICE OF ARCTIC ENERGY.**

There are authorized to be appropriated to the Secretary for the Office of Arctic Energy under section 3197 of the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (P.L. 106-398) such sums as may be necessary, but not to exceed \$25,000,000 for each of fiscal years 2002 through 2011.

***Subtitle D--Nuclear Energy***

**SEC. 1440. ENHANCED NUCLEAR ENERGY RESEARCH AND DEVELOPMENT.**

(a) PROGRAM DIRECTION.--The Secretary shall conduct a energy research, development,

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demonstration, and technology deployment program to enhance nuclear energy.

(b) PROGRAM GOALS.--The program shall--

(1) support research related to existing United States nuclear power reactors to extend their lifetimes and increase their reliability while optimizing their current operations for greater efficiencies;

(2) address examine advanced proliferation-resistant and passively safe reactor designs, new reactor designs with higher efficiency, lower cost, and improved safety, proliferation-resistant and high burn-up nuclear fuels, minimization of generation of radioactive materials, improved nuclear waste management technologies, and improved instrumentation science;

(3) attract new students and faculty to the nuclear sciences and nuclear engineering and related fields (including health physics and nuclear and radiochemistry) through--

(A) university-based fundamental research for existing faculty and new junior faculty;

(B) support for the re-licensing of existing training reactors at universities in conjunction with industry; and

(C) completing the conversion of existing training reactors with proliferation resistant fuels that are low enriched and to adapt those reactors to new investigative uses;

(4) maintain a national capability and infrastructure to produce medical isotopes and ensure a well trained cadre of nuclear medicine specialists in partnership with industry;

(5) ensure that our nation has adequate capability for power future satellite and space missions; and

(6) maintain, where appropriate through a prioritization process, a balanced research infrastructure so that future research programs can use these facilities.

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(c) AUTHORIZATION OF APPROPRIATIONS.--

2 (1) CORE NUCLEAR RESEARCH PROGRAMS.--There are authorized to be appropriated  
3 to the Secretary for carrying out research, development, demonstration, and technology deployment  
4 activities under subsection (b)(1) through (3)--

5 (A) \$85,000,000 for fiscal year 2002;

6 (B) \$102,000,000 for fiscal year 2003;

7 (C) \$110,000,000 for fiscal year 2004;

8 (D) \$120,000,000 for fiscal year 2005; and

9 (E) \$130,000,000 for fiscal year 2006.

10 (2) SUPPORTING NUCLEAR ACTIVITIES.--There are authorized to be appropriated to  
11 the Secretary for carrying out activities under subsection (b)(4) through (6), as well as nuclear  
12 facilities management and program direction--

13 (A) \$191,000,000 for fiscal year 2002;

14 (B) \$198,000,000 for fiscal year 2003;

15 (C) \$202,000,000 for fiscal year 2004;

16 (D) \$207,000,000 for fiscal year 2005; and

17 (E) \$212,000,000 for fiscal year 2006.

18 **SEC. 1441. UNIVERSITY NUCLEAR SCIENCE AND ENGINEERING SUPPORT.**

19 (a) ESTABLISHMENT.-- The Secretary shall support a program to maintain the nation's  
20 human resource investment and infrastructure in the nuclear sciences and engineering and related  
21 fields (including health physics and nuclear and radiochemistry), consistent with departmental  
22 missions related to civilian nuclear research and development.

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(b) DUTIES.— In carrying out the program under this section, the Secretary shall—

2 (1) develop a graduate and undergraduate fellowship program to attract new and talented  
3 students;

4 (2) assist universities in recruiting and retaining new faculty in the nuclear sciences and  
5 engineering through a Junior Faculty Research Initiation Grant Program;

6 (3) support fundamental nuclear sciences and engineering research through the Nuclear  
7 Engineering Education Research Program;

8 (4) encourage collaborative nuclear research between industry, national laboratories and  
9 universities through the Nuclear Energy Research Initiative; and

10 (5) support communication and outreach related to nuclear science and engineering.

11 (c) MAINTAINING UNIVERSITY RESEARCH AND TRAINING REACTORS AND  
12 ASSOCIATED INFRASTRUCTURE.—Activities under this section may include:

13 (1) converting research reactors to low-enrichment fuels, upgrading operational  
14 instrumentation, and sharing of reactors among universities;

15 (2) providing technical assistance, in collaboration with the U.S. nuclear industry, in re-  
16 licensing and upgrading training reactors as part of a student training program;

17 (3) providing funding for reactor improvements as part of a focused effort that emphasizes  
18 research, training, and education.

19 (d) UNIVERSITY-NATIONAL LABORATORY INTERACTIONS.—The Secretary shall  
20 develop—

21 (1) a sabbatical fellowship program for university professors to spend extended periods of  
22 time at National Laboratories in the areas of nuclear science and technology; and

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(2) a visiting scientist program in which National Laboratory staff can spend time in academic nuclear science and engineering departments. The Secretary may provide for fellowships for students to spend time at National Laboratories in the area of nuclear science with a member of the Laboratory staff acting as a mentor.

(e) OPERATING AND MAINTENANCE COSTS.—Funding for a research project provided under this section may be used to offset a portion of the operating and maintenance costs of a university research reactor used in the research project, on a cost-shared basis with the university.

(f) AUTHORIZATION OF APPROPRIATIONS.—From amounts authorized under section 1440(c)(1), the following amounts are authorized for activities under this section—

- (1) \$19,000,000 for fiscal year 2002;
- (2) \$33,000,000 for fiscal year 2003;
- (3) \$37,900,000 for fiscal year 2004;
- (4) \$43,600,000 for fiscal year 2005; and
- (5) \$50,100,000 for fiscal year 2006.

#### SEC. 1442. NUCLEAR ENERGY RESEARCH INITIATIVE.

(a) ESTABLISHMENT. — The Secretary shall support a Nuclear Energy Research Initiative for grants for research relating to nuclear energy.

(b) AUTHORIZATION OF APPROPRIATIONS. — From amounts authorized under section 1440(c), there are authorized to be appropriated to the Secretary for activities under this section \$38,000,000 for fiscal year 2002 and such sums as are necessary for each fiscal year thereafter.

#### SEC. 1443. NUCLEAR ENERGY PLANT OPTIMIZATION PROGRAM.

(a) ESTABLISHMENT. — The Secretary shall support a Nuclear Energy Plant Optimization

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Program for grants to improve nuclear energy plant reliability, availability and productivity.  
Notwithstanding section 1503, the program shall require industry cost-sharing of at least 50 percent  
and be subject to annual review by the Nuclear Energy Research Advisory Committee of the  
Department.

(b) AUTHORIZATION OF APPROPRIATIONS. – From amounts authorized under section  
1440(c), there are authorized to be appropriated to the Secretary for activities under this section  
\$10,000,000 for fiscal year 2002 and such sums as are necessary for each fiscal year thereafter.

**SEC. 1444. NUCLEAR ENERGY TECHNOLOGY DEVELOPMENT PROGRAM.**

(a) ESTABLISHMENT. – The Secretary shall support a Nuclear Energy Technology  
Development Program for grants to develop a technology roadmap to design and develop new  
nuclear energy powerplants in the United States.

(b) GENERATION IV REACTOR STUDY. – The Secretary shall, as part of the program  
under subsection (a), also conduct a study of Generation IV nuclear energy systems, including  
development of a technology roadmap and performance of research and development necessary to  
make an informed technical decision regarding the most promising candidates for commercial  
deployment.

(c) AUTHORIZATION OF APPROPRIATIONS. – From amounts authorized under section  
1440(c), there are authorized to be appropriated to the Secretary for activities under this section  
\$14,000,000 for fiscal year 2002 and such sums as are necessary for each fiscal year thereafter.

***Subtitle E—Fundamental Energy Science***

**SEC. 1450. ENHANCED PROGRAMS IN FUNDAMENTAL ENERGY SCIENCE.**

(a) PROGRAM DIRECTION.—The Secretary, acting through the Office of Science, shall—