

**Calendar No. 353**116TH CONGRESS  
1ST SESSION**S. 2368**

To amend the Atomic Energy Act of 1954 and the Energy Policy Act of 2005 to support licensing and relicensing of certain nuclear facilities and nuclear energy research, demonstration, and development, and for other purposes.

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**IN THE SENATE OF THE UNITED STATES**

JULY 31, 2019

Mr. COONS (for himself and Ms. MCSALLY) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

DECEMBER 17, 2019

Reported by Ms. MURKOWSKI, with an amendment and an amendment to the title

[Strike out all after the enacting clause and insert the part printed in *italic*]

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**A BILL**

To amend the Atomic Energy Act of 1954 and the Energy Policy Act of 2005 to support licensing and relicensing of certain nuclear facilities and nuclear energy research, demonstration, and development, 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 “Nuclear Energy Re-  
3 newal Act of 2019”.

4 **SEC. 2. LIGHT WATER REACTOR SUSTAINABILITY PRO-**  
5 **GRAM.**

6 Section 621 of the Energy Policy Act of 2005 (Public  
7 Law 109–58; 119 Stat. 782) is amended—

8 (1) by striking “Section” and inserting the fol-  
9 lowing:

10 “(a) AMENDMENT TO ATOMIC ENERGY ACT OF  
11 1954.—Section”; and

12 (2) by adding at the end the following:

13 “(b) LIGHT WATER REACTOR SUSTAINABILITY PRO-  
14 GRAM.—

15 “(1) IN GENERAL.—Notwithstanding any other  
16 provision of law, the Secretary shall expand the light  
17 water reactor sustainability program of the Depart-  
18 ment, to the maximum extent practicable—

19 “(A) to ensure the achievement of max-  
20 imum benefits from existing nuclear generation;

21 “(B) to accommodate the increase in appli-  
22 cations for nuclear power plant license renewals  
23 expected as of the date of enactment of this  
24 subsection;

1           “(C) to enable the continued operation of  
2 existing nuclear power plants through tech-  
3 nology development;

4           “(D) to improve the performance and re-  
5 duce the operation and maintenance costs of  
6 nuclear power plants; and

7           “(E) to promote the use of high-perform-  
8 ance computing to simulate nuclear reactor  
9 processes.

10          “(2) AUTHORIZATION OF APPROPRIATIONS.—

11          There is authorized to be appropriated to the Sec-  
12 retary to carry out the program under this sub-  
13 section \$60,000,000 for each of fiscal years 2020  
14 through 2029.”.

15 **SEC. 3. INCREASING SUPPORT FOR ADVANCED NUCLEAR**  
16 **TECHNOLOGIES.**

17          (a) LICENSING BY NUCLEAR REGULATORY COMMIS-  
18 SION.—Section 103 of the Atomic Energy Act of 1954 (42  
19 U.S.C. 2133) is amended—

20           (1) in subsection d., in the second sentence, by  
21 striking “any any” and inserting “any”; and

22           (2) by inserting after subsection d. the fol-  
23 lowing:

24          “e. ADVANCED NUCLEAR FACILITIES AND TECH-  
25 NOLOGIES.—

1           “(1) DEFINITION OF ADVANCED NUCLEAR.—

2                   “(A) IN GENERAL.—In this subsection, the  
3 term ‘advanced nuclear’ means, with respect to  
4 a production facility, utilization facility, or tech-  
5 nology, the use of a nuclear fission reactor, in-  
6 cluding a prototype plant (as defined in section  
7 50.2 of title 10, Code of Federal Regulations  
8 (or successor regulations)), that represents sig-  
9 nificant improvements compared to the most re-  
10 cent generation of nuclear fission reactors, in-  
11 cluding improvements such as—

12                   “(i) additional inherent safety fea-  
13                   tures;

14                   “(ii) lower waste yields;

15                   “(iii) improved fuel performance;

16                   “(iv) increased tolerance to loss of  
17 fuel cooling;

18                   “(v) enhanced reliability;

19                   “(vi) increased proliferation resist-  
20                   ance;

21                   “(vii) increased thermal efficiency;

22                   “(viii) reduced consumption of cooling  
23 water;

1           “(ix) the ability to integrate into elec-  
2           tric applications and nonelectric applica-  
3           tions;

4           “(x) modular sizes to allow for deploy-  
5           ment that corresponds with the demand  
6           for electricity; and

7           “(xi) operational flexibility to respond  
8           to changes in demand for electricity and to  
9           complement integration with intermittent  
10          renewable energy.

11          “(B) INCLUSION.—In this subsection, the  
12          term ‘advanced nuclear’ includes, with respect  
13          to a production facility, utilization facility, or  
14          technology, the use of a nuclear fusion reactor.

15          “(2) ESTABLISHMENT OF PROGRAM.—The Sec-  
16          retary of Energy, in coordination with the Commis-  
17          sion, shall establish and carry out a program—

18               “(A) to develop certification and licensing  
19               criteria with respect to advanced nuclear pro-  
20               duction facilities and utilization facilities, in-  
21               cluding for international licensing harmoni-  
22               zation;

23               “(B) to provide assistance to eligible appli-  
24               cants with respect to the certification and li-

1           censing of advanced nuclear production facili-  
2           ties and utilization facilities; and

3           “(C) to establish such procedures as the  
4           Secretary of Energy and the Commission deter-  
5           mine to be appropriate for general public out-  
6           reach relating to advanced nuclear technologies,  
7           production facilities, and utilization facilities.

8           “(3) AUTHORIZATION OF APPROPRIATIONS.—

9           There is authorized to be appropriated to carry out  
10          the program under this subsection \$15,000,000 for  
11          the period of fiscal years 2020 through 2029.”.

12 **SEC. 4. NUCLEAR ENERGY RESEARCH, DEMONSTRATION,**  
13 **AND DEVELOPMENT.**

14          (a) IN GENERAL.—Section 952 of the Energy Policy  
15          Act of 2005 (42 U.S.C. 16272) is amended by adding at  
16          the end the following:

17          “(e) ADVANCED REACTOR TECHNOLOGIES DEVEL-  
18          OPMENT PROGRAM.—

19                 “(1) IN GENERAL.—The Secretary shall carry  
20                 out a program under which the Secretary shall con-  
21                 duct research relating to the development of innova-  
22                 tive nuclear reactor technologies that may offer im-  
23                 proved safety, functionality, and affordability by en-  
24                 hancing existing nuclear technologies.

1           “(2) REQUIREMENTS.—The program under this  
2 subsection shall—

3           “(A) support efforts to reduce long-term  
4 technical barriers for advanced nuclear energy  
5 systems;

6           “(B) identify potential regulatory issues  
7 relating to advanced nuclear reactors;

8           “(C) be carried out in consultation with  
9 the Nuclear Regulatory Commission to ensure  
10 identification of any relevant concerns;

11           “(D) support international activities ear-  
12 ried out pursuant to—

13           “(i) the Generation IV International  
14 Forum; or

15           “(ii) any other international collabo-  
16 rative effort with respect to advanced nu-  
17 clear reactor operations and safety;

18           “(E) support research and development re-  
19 lating to enhancing the proliferation resistance  
20 of nuclear technologies; and

21           “(F) support research and development  
22 projects carried out by National Laboratories,  
23 institutions of higher education, and other in-  
24 dustry entities relating to nuclear technology,  
25 including the development of—

- 1                   “(i) codes and standards;  
2                   “(ii) sensors and instrumentation;  
3                   “(iii) probabilistic risk assessments  
4                   methods; and  
5                   “(iv) other technologies to support the  
6                   development of advanced nuclear reactor  
7                   systems.

8                   “(3) AREAS OF FOCUS AND INCLUSIONS.—The  
9                   program under this subsection shall—

10                   “(A) focus on research and development  
11                   activities relating to—

- 12                   “(i) fast reactors;  
13                   “(ii) high-temperature, gas-cooled nu-  
14                   clear reactors; and  
15                   “(iii) molten salt reactors; and

16                   “(B) with respect to the activities de-  
17                   scribed in clauses (ii) and (iii) of subparagraph  
18                   (A), include research and development relating  
19                   to advanced fuels.

20                   “(4) SUPERCRITICAL TRANSFORMATIONAL  
21                   ELECTRIC POWER RESEARCH AND DEVELOPMENT.—

22                   “(A) IN GENERAL.—In carrying out the  
23                   program under this subsection, the Secretary  
24                   shall develop and implement a public-private  
25                   cost-shared supercritical carbon dioxide (com-



1 monly known as ‘sCO<sub>2</sub>’) Brayton cycle subpro-  
2 gram, including research and development of  
3 supercritical carbon dioxide technologies.

4 “(B) REQUIREMENT.—In carrying out the  
5 subprogram under this paragraph, the Sec-  
6 retary shall solicit and evaluate plans to encour-  
7 age innovation, support technology advances,  
8 and enhance the safety and performance of ad-  
9 vanced nuclear reactor systems.

10 “(C) TECHNICAL REVIEW PANEL.—The  
11 Secretary shall establish a technical review  
12 panel for the subprogram under this paragraph,  
13 which shall carry out consultation and collabo-  
14 ration with appropriate industry entities—

15 “(i) to evaluate advanced nuclear re-  
16 actor technologies;

17 “(ii) to identify research and develop-  
18 ment opportunities; and

19 “(iii) to publish information regarding  
20 cost-shared research and development in-  
21 vestment decisions to facilitate commer-  
22 cialization.

23 “(5) AUTHORIZATION OF APPROPRIATIONS.—

24 There is authorized to be appropriated to the Sec-  
25 retary to carry out the program under this sub-

1 section \$120,000,000 for each of fiscal years 2020  
2 through 2029.

3 “(f) FUEL CYCLE RESEARCH AND DEVELOPMENT  
4 PROGRAM.—

5 “(1) IN GENERAL.—The Secretary shall carry  
6 out a program under which the Secretary shall con-  
7 duct research relating to—

8 “(A) consent-based interim storage;

9 “(B) transportation of nuclear waste;

10 “(C) potential alternative disposal options  
11 for Department-managed—

12 “(i) spent nuclear fuel; and

13 “(ii) high-level radioactive waste; and

14 “(D) disposition alternatives for defense-  
15 related nuclear waste.

16 “(2) AREAS OF FOCUS.—In carrying out this  
17 subsection, the Secretary shall focus on activities re-  
18 lating to—

19 “(A) relevant research and development;  
20 and

21 “(B) integrated waste management, includ-  
22 ing by conducting research and development ac-  
23 tivities relating to the storage, transportation,  
24 and disposal of used nuclear fuel and wastes  
25 generated by existing and future fuel cycles.

1           ~~“(3) AUTHORIZATION OF APPROPRIATIONS.—~~

2           There is authorized to be appropriated to the Sec-  
3           retary to carry out the program under this sub-  
4           section \$200,000,000 for each of fiscal years 2020  
5           through 2029.

6           ~~“(g) MATERIAL RECOVERY AND WASTE FORM DE-~~  
7           ~~VELOPMENT.—~~

8           ~~“(1) IN GENERAL.—~~The Secretary shall carry  
9           out a program under which the Secretary shall—

10                   ~~“(A) conduct research relating to advanced~~  
11                   nuclear material recovery and advanced nuclear  
12                   waste form development technologies to improve  
13                   fuel cycle performance with reductions in proc-  
14                   essing; waste generation; and potential for ma-  
15                   terial diversion; and

16                   ~~“(B) to the maximum extent practicable,~~  
17                   apply the technical expertise achieved through  
18                   that research to a broad range of programs and  
19                   activities; including activities relating to—

20                           ~~“(i) environmental remediation;~~

21                           ~~“(ii) national security; and~~

22                           ~~“(iii) subject to paragraph (2), civilian~~  
23                   nuclear applications.

24           ~~“(2) CIVILIAN NUCLEAR APPLICATIONS.—~~Any  
25           research carried out under this subsection relating

1 to civilian nuclear applications shall include research  
 2 relating to improving the economics and non-  
 3 proliferation attributes of recycling light water reac-  
 4 tor fuels and advanced reactor fuels.

5 “(3) AUTHORIZATION OF APPROPRIATIONS.—

6 There is authorized to be appropriated to the Sec-  
 7 retary to carry out the program under this sub-  
 8 section \$50,000,000 for each of fiscal years 2020  
 9 through 2029.

10 “(h) ADVANCED FUELS.—

11 “(1) IN GENERAL.—The Secretary shall carry  
 12 out a program under which the Secretary shall con-  
 13 duct research relating to—

14 “(A) next-generation light water reactor  
 15 fuels that demonstrate enhanced—

16 “(i) performance; and

17 “(ii) accident tolerance; and

18 “(B) fuels that demonstrate enhanced—

19 “(i) proliferation resistance; and

20 “(ii) use of resources.

21 “(2) REQUIREMENTS.—In carrying out the pro-  
 22 gram under this subsection, the Secretary shall—

23 “(A) focus on the development of accident-  
 24 tolerant fuel and cladding concepts that are ca-

1 pable of achieving the objective of initiating  
2 core reloads by calendar year 2025;

3 “(B)(i) develop modeling capabilities for  
4 new fuel concepts;

5 “(ii) conduct studies regarding the means  
6 by which those concepts would impact reactor  
7 economics, the fuel cycle, operations, safety,  
8 and the environment; and

9 “(iii) subject to paragraph (3), publish the  
10 studies conducted under clause (ii); and

11 “(C) cooperate with institutions of higher  
12 education through the Nuclear Energy Univer-  
13 sity and Integrated Research Projects programs  
14 of the Department.

15 “(3) SENSITIVE INFORMATION.—The Secretary  
16 shall not publish any information under paragraph  
17 (2)(B)(iii) that is detrimental to national security,  
18 as determined by the Secretary.

19 “(4) AUTHORIZATION OF APPROPRIATIONS.—  
20 There is authorized to be appropriated to the Sec-  
21 retary to carry out the program under this sub-  
22 section \$120,000,000 for each of fiscal years 2020  
23 through 2029.

24 “(i) NUCLEAR ENERGY ENABLING TECH-  
25 NOLOGIES.—

1           “(1) IN GENERAL.—The Secretary shall carry  
2           out a program under which the Secretary shall—

3                   “(A) conduct research relating to modeling  
4                   and simulation tools;

5                   “(B) provide access to unique nuclear en-  
6                   ergy research capabilities through the Nuclear  
7                   Science User Facilities of the Department; and

8                   “(C) address workforce needs in critical,  
9                   focused nuclear energy-related fields.

10           “(2) SUPPORT FOR NUCLEAR INITIATIVES.—  
11           The program under this subsection shall support the  
12           goals, objectives, and activities of the National Reac-  
13           tor Innovation Center and the Gateway for Acceler-  
14           ated Innovation in Nuclear initiative of the Depart-  
15           ment to make nuclear energy research capabilities  
16           accessible to industry engineers and scientists  
17           through a public-private partnership.

18           “(3) CROSSCUTTING TECHNOLOGY DEVELOP-  
19           MENT SUBPROGRAM.—

20                   “(A) IN GENERAL.—In carrying out the  
21                   program under this subsection, the Secretary  
22                   shall establish a crosscutting technology subpro-  
23                   gram, under which the Secretary shall provide  
24                   assistance for high-priority research and devel-  
25                   opment activities relating to innovative solu-

1 tions to nuclear energy challenges carried out  
2 by—

3 “(i) institutions of higher education;

4 “(ii) National Laboratories; and

5 “(iii) industry entities.

6 “(B) REQUIREMENTS.—In carrying out  
7 the subprogram established under subparagraph  
8 (A), the Secretary shall—

9 “(i) invest in competitive, nuclear en-  
10 ergy-related infrastructure enhancement  
11 activities carried out at National Labora-  
12 tories to ensure researchers have access to  
13 state-of-the-art research and development  
14 resources;

15 “(ii) coordinate with other research  
16 and development programs of the Office of  
17 Nuclear Energy to ensure that developed  
18 technologies and capabilities are part of an  
19 integrated investment strategy, the overall  
20 focus of which is improving safety, secu-  
21 rity, reliability, and economics of operating  
22 nuclear power plants; and

23 “(iii) focus on—

1           “(I) new capabilities relating to  
2           nuclear energy research and develop-  
3           ment;

4           “(II) enabling technologies be-  
5           yond individual programs;

6           “(III) coordinating capabilities  
7           among research and development pro-  
8           grams of the Office of Nuclear En-  
9           ergy;

10          “(IV) examining new classes of  
11          materials not considered for nuclear  
12          applications;

13          “(V) high-risk research, which  
14          could potentially overcome techno-  
15          logical limitations; and

16          “(VI) the potential for industry  
17          partnerships to develop technologies  
18          relating to storage, hydrogen produc-  
19          tion, high-temperature process heat,  
20          and other relevant areas.

21                 “(4) NUCLEAR ENERGY ADVANCED MODELING  
22                 AND SIMULATION SUBPROGRAM.—In carrying out  
23                 the program under this subsection, the Secretary  
24                 shall establish a nuclear energy advanced modeling  
25                 and simulation subprogram, under which the Sec-



1       retary shall develop advanced modeling and simula-  
2       tion tools to support programs carried out by the  
3       Office of Nuclear Energy, including multiscale mod-  
4       els of physics and chemistry that support advanced  
5       computational methods for simulations of nuclear  
6       energy systems.

7               “(5) NUCLEAR SCIENCE USER FACILITIES SUB-  
8       PROGRAM.—

9               “(A) IN GENERAL.—In carrying out the  
10       program under this subsection, the Secretary  
11       shall establish a Nuclear Science User Facilities  
12       subprogram under which the Secretary shall  
13       provide assistance—

14               “(i) to promote the use of nuclear re-  
15       search facilities; and

16               “(ii) to encourage engagement across  
17       institutions of higher education, industry  
18       entities, and National Laboratories relat-  
19       ing to relevant nuclear science research.

20               “(B) REQUIREMENTS.—

21               “(i) IN GENERAL.—The Secretary  
22       shall provide assistance under this para-  
23       graph, and solicit applications under clause  
24       (ii), on an annual basis.

1           “(ii) APPLICATIONS.—To be eligible  
2           to receive assistance under this paragraph  
3           for a fiscal year, an individual or entity  
4           conducting nuclear research shall submit  
5           to the Secretary an application that de-  
6           scribes—

7                   “(I) the research project pro-  
8                   posed to be carried out at a nuclear  
9                   research facility;

10                   “(II) timelines for the proposed  
11                   research; and

12                   “(III) the Nuclear Science User  
13                   Facility at which the project is pro-  
14                   posed to be carried out.

15           “(iii) USE OF FUNDS.—Assistance  
16           provided under this paragraph may be  
17           used—

18                   “(I) for experiment support and  
19                   laboratory services costs; and

20                   “(II) only at a Nuclear Science  
21                   User Facility.

22           “(C) ACCESS.—In carrying out the subpro-  
23           gram under this paragraph, the Secretary shall  
24           provide to recipients of assistance under the  
25           subprogram no-cost access to—

1           “(i) the advanced test reactor of the  
2 Idaho National Laboratory;

3           “(ii) post-irradiation examination fa-  
4 cilities at the Materials and Fuels Com-  
5 plex;

6           “(iii) research reactors at—

7                 “(I) Oak Ridge National Labora-  
8 tory;

9                 “(II) Massachusetts Institute of  
10 Technology; and

11                 “(III) North Carolina State Uni-  
12 versity;

13           “(iv) beam line capabilities at the Ad-  
14 vanced Photon Source, in coordination  
15 with the Illinois Institute of Technology;

16           “(v) irradiation experiment design and  
17 fabrication capabilities at Pacific North-  
18 west National Laboratory;

19           “(vi) hot cells and fabrication capa-  
20 bilities at Westinghouse Electric Company;  
21 and

22           “(vii) examination facilities at—

23                 “(I) the University of California—  
24 Berkeley;

25                 “(II) the University of Michigan;

1                   “(III) the University of Nevada—  
2                   Las Vegas;

3                   “(IV) Purdue University;

4                   “(V) the University at Wisconsin;  
5                   and

6                   “(VI) to the maximum extent  
7                   practicable; any other facilities needed  
8                   to support the Nuclear Science User  
9                   Facility.

10                   “(6) NUCLEAR ENERGY TRAINEESHIPS SUBPRO-  
11                   GRAM.—

12                   “(A) ESTABLISHMENT.—In carrying out  
13                   the program under this subsection, the Sec-  
14                   retary shall establish a nuclear energy  
15                   traineeships subprogram under which the Sec-  
16                   retary shall establish competitively awarded  
17                   traineeships and apprenticeships in industries  
18                   that are represented by skilled labor unions and  
19                   with institutions of higher education to provide  
20                   focused, graduate-level training to meet highly  
21                   focused needs through a tailored academic  
22                   graduate program that delivers a curriculum  
23                   with a rigorous thesis or dissertation research  
24                   requirement aligned with the critical needs of

1 the Department with respect to mission-driven  
2 workforce.

3 “(B) REQUIREMENTS.—In carrying out  
4 the subprogram under this paragraph, the Sec-  
5 retary shall—

6 “(i) encourage appropriate partner-  
7 ships among National Laboratories, af-  
8 fected institutions of higher education, and  
9 industry; and

10 “(ii) on an annual basis, evaluate the  
11 needs of the nuclear energy community to  
12 implement traineeships for focused topical  
13 areas addressing mission-specific workforce  
14 needs.

15 “(7) AUTHORIZATION OF APPROPRIATIONS.—  
16 There is authorized to be appropriated to the Sec-  
17 retary to carry out the program under this sub-  
18 section \$150,000,000 for each of fiscal years 2020  
19 through 2029.

20 “(j) RADIOLOGICAL FACILITIES MANAGEMENT.—

21 “(1) IN GENERAL.—The Secretary shall carry  
22 out a program under which the Secretary shall pro-  
23 vide project management, technical support, quality  
24 engineering and inspection, and nuclear material

1 support to 25 research reactors located at 24 insti-  
 2 tutions of higher education.

3 ~~“(2) ELEMENTS.—The program under this sub-~~  
 4 ~~section shall include—~~

5 ~~“(A) delivery of plate fuel elements as re-~~  
 6 ~~quired annually by the recipient research reac-~~  
 7 ~~tors, as determined based on—~~

8 ~~“(i) need; and~~

9 ~~“(ii) fuel availability;~~

10 ~~“(B) delivery of Training, Research, Iso-~~  
 11 ~~topes, General Atomies (commonly known as~~  
 12 ~~‘TRIGA’) reactor fuel elements from recipient~~  
 13 ~~institutions of higher education to used fuel re-~~  
 14 ~~ceipt facilities of the Department; and~~

15 ~~“(C) funding for required safety upgrades~~  
 16 ~~to allow resumption of research reactor fuel~~  
 17 ~~fabrication operations at TRIGA International~~  
 18 ~~in Romans, France.~~

19 ~~“(3) AUTHORIZATION OF APPROPRIATIONS.—~~  
 20 ~~There is authorized to be appropriated to the Sec-~~  
 21 ~~retary to carry out the program under this sub-~~  
 22 ~~section \$30,000,000 for each of fiscal years 2020~~  
 23 ~~through 2029.~~

24 ~~“(k) INTERNATIONAL NUCLEAR ENERGY COOPERA-~~  
 25 ~~TION.—~~

1           “(1) IN GENERAL.—The Secretary shall carry  
2           out a program under which the Secretary shall de-  
3           velop bilateral collaboration initiatives with a variety  
4           of countries through—

5                   “(A) research and development agree-  
6                   ments;

7                   “(B) other relevant arrangements and ac-  
8                   tion plan updates; and

9                   “(C) maintaining existing multilateral co-  
10                  operation commitments of—

11                           “(i) the International Framework for  
12                           Nuclear Energy Cooperation; and

13                           “(ii) the International Atomic Energy  
14                           Agency.

15           “(2) TREATMENT.—The program under this  
16           subsection shall be considered to be the lead pro-  
17           gram of the Department with respect to inter-  
18           national activities relating to civil nuclear energy, in-  
19           cluding—

20                   “(A) analysis, development, coordination,  
21                   and implementation of international civil nu-  
22                   clear energy policy; and

23                   “(B) integration of international nuclear  
24                   technical activities.

1           “(3) SUBPROGRAM.—In carrying out the pro-  
2           gram under this subsection, the Secretary shall es-  
3           tablish a subprogram that shall—

4                   “(A) support diplomatic, nonproliferation,  
5                   climate, and international economic objectives  
6                   for the safe, secure, and peaceful use of nuclear  
7                   technology in countries developing nuclear en-  
8                   ergy programs; and

9                   “(B) shall be modeled after the Inter-  
10                  national Military Education and Training pro-  
11                  gram of the Department of State.

12           “(4) REQUIREMENTS.—The program under this  
13           subsection shall be carried out—

14                   “(A) to facilitate, to the maximum extent  
15                   practicable, workshops and expert-based ex-  
16                   changes to engage industry, stakeholders, and  
17                   foreign governments regarding international  
18                   civil nuclear issues, such as training, financing,  
19                   safety, and options for multinational coopera-  
20                   tion on used nuclear fuel disposal; and

21                   “(B) in coordination with—

22                           “(i) the National Security Council;

23                           “(ii) the Secretary of State;

24                           “(iii) the Secretary of Commerce; and



1                   “(iv) the Nuclear Regulatory Commis-  
2                   sion:

3                   “~~(5)~~ AUTHORIZATION OF APPROPRIATIONS.—

4                   There is authorized to be appropriated to the Sec-  
5                   retary to carry out the program under this sub-  
6                   section \$10,000,000 for each of fiscal years 2020  
7                   through 2029, of which \$5,500,000 shall be used  
8                   each fiscal year to carry out the subprogram under  
9                   paragraph ~~(3)~~.”.

10                  (b) COST SHARING.—Section 988(b)(2) of the En-  
11                  ergy Policy Act of 2005 (42 U.S.C. 16352(b)(2)) is  
12                  amended—

13                   (1) in the paragraph heading, by striking “EX-  
14                   CLUSION” and inserting “EXCLUSIONS”;

15                   (2) by striking “apply to” and inserting the fol-  
16                   lowing: “apply—

17                                 “(A) to”;

18                   (3) in subparagraph (A) (as so designated), by  
19                   striking the period at the end and inserting “; or”;  
20                   and

21                   (4) by adding at the end the following:

22                                 “(B) to programs under subsections (e)  
23                   through (k) of section 952.”.

1 **SECTION 1. SHORT TITLE.**

2 *This Act may be cited as the “Nuclear Energy Renewal*  
3 *Act of 2019”.*

4 **SEC. 2. LIGHT WATER REACTOR SUSTAINABILITY PRO-**  
5 **GRAM.**

6 *Section 952 of the Energy Policy Act of 2005 (42*  
7 *U.S.C. 16272) is amended by striking subsection (b) and*  
8 *inserting the following:*

9 *“(b) LIGHT WATER REACTOR SUSTAINABILITY PRO-*  
10 *GRAM.—The Secretary shall carry out a light water reactor*  
11 *sustainability program—*

12 *“(1) to ensure the achievement of maximum ben-*  
13 *efits from existing nuclear generation;*

14 *“(2) to accommodate the increase in applications*  
15 *for nuclear power plant license renewals expected as*  
16 *of the date of enactment of this subsection;*

17 *“(3) to enable the continued operation of existing*  
18 *nuclear power plants through technology development;*

19 *“(4) to improve the performance and reduce the*  
20 *operation and maintenance costs of nuclear power*  
21 *plants;*

22 *“(5) to promote the use of high-performance com-*  
23 *puting to simulate nuclear reactor processes;*

24 *“(6) to coordinate with other research and devel-*  
25 *opment programs of the Office of Nuclear Energy to*  
26 *ensure that developed technologies and capabilities are*

1       *part of an integrated investment strategy, the overall*  
 2       *focus of which is improving the safety, security, reli-*  
 3       *ability, and economics of operating nuclear power*  
 4       *plants; and*

5               *“(7) to focus on—*

6                       *“(A) new capabilities relating to nuclear*  
 7                       *energy research and development;*

8                       *“(B) enabling technologies beyond indi-*  
 9                       *vidual programs;*

10                      *“(C) coordinating capabilities among the*  
 11                      *research and development programs of the Office*  
 12                      *of Nuclear Energy;*

13                      *“(D) examining new classes of materials*  
 14                      *not considered for nuclear applications;*

15                      *“(E) high-risk research, which could poten-*  
 16                      *tially overcome technological limitations; and*

17                      *“(F) the potential for industry partnerships*  
 18                      *to develop technologies relating to storage, hydro-*  
 19                      *gen production, high-temperature process heat,*  
 20                      *and other relevant areas.”.*

21   **SEC. 3. NUCLEAR ENERGY RESEARCH, DEVELOPMENT, AND**  
 22                                    **DEMONSTRATION.**

23        *Section 952 of the Energy Policy Act of 2005 (42*  
 24        *U.S.C. 16272) is amended by adding at the end the fol-*  
 25        *lowing:*

1       “(e) *ADVANCED REACTOR TECHNOLOGIES DEVELOP-*  
2 *MENT PROGRAM.*—

3               “(1) *IN GENERAL.*—*The Secretary shall carry*  
4 *out a program under which the Secretary shall con-*  
5 *duct research relating to the development of innova-*  
6 *tive nuclear reactor technologies that may offer im-*  
7 *proved safety, functionality, and affordability.*

8               “(2) *REQUIREMENTS.*—*The program under this*  
9 *subsection shall—*

10                       “(A) *support efforts to reduce long-term*  
11 *technical barriers for advanced nuclear energy*  
12 *systems; and*

13                       “(B) *be carried out in consultation with the*  
14 *Nuclear Regulatory Commission to ensure iden-*  
15 *tification of any relevant concerns.*”.

16 **SEC. 4. ADVANCED FUELS DEVELOPMENT.**

17       *Section 953 of the Energy Policy Act of 2005 (42*  
18 *U.S.C. 16273) is amended—*

19               (1) *by redesignating subsections (a) through (d)*  
20 *as paragraphs (1), (3), (4), and (5), respectively, and*  
21 *indenting appropriately;*

22               (2) *in paragraph (1) (as so redesignated)—*

23                       (A) *by striking “this section” and inserting*  
24 *“this subsection”;*

1           (B) by striking “minimize environmental”  
2           and inserting “improve fuel cycle performance  
3           while minimizing the cost and complexity of  
4           processing, environmental impacts,”; and

5           (C) by striking “the Generation IV”;

6           (3) by inserting after paragraph (1) (as so reded-  
7           ignated) the following:

8           “(2) *CONSIDERATIONS.*—In carrying out activi-  
9           ties under the program, the Secretary shall consider  
10          the potential benefits of those activities for civilian  
11          nuclear applications, environmental remediation, and  
12          national security.”;

13          (4) by inserting after paragraph (5) (as so reded-  
14          ignated) the following:

15          “(6) *AUTHORIZATION OF APPROPRIATIONS.*—  
16          There is authorized to be appropriated to the Sec-  
17          retary to carry out the program \$40,000,000 for each  
18          of fiscal years 2020 through 2024.”;

19          (5) by inserting before paragraph (1) (as so re-  
20          designated) the following:

21          “(a) *MATERIAL RECOVERY AND WASTE FORM DEVEL-*  
22          *OPMENT.*—”; and

23          (6) by adding at the end the following:

24          “(b) *ADVANCED FUELS.*—

1           “(1) *IN GENERAL.*—*The Secretary shall carry*  
2           *out a program to conduct research relating to—*

3                   “(A) *next-generation light water reactor*  
4                   *fuels that demonstrate improved—*

5                           “(i) *performance; and*

6                           “(ii) *accident tolerance; and*

7                   “(B) *advanced reactor fuels that dem-*  
8                   *onstrate improved—*

9                           “(i) *proliferation resistance; and*

10                          “(ii) *use of resources.*

11           “(2) *REQUIREMENTS.*—*In carrying out the pro-*  
12           *gram under this subsection, the Secretary shall—*

13                   “(A) *focus on the development of accident-*  
14                   *tolerant fuel and cladding concepts that are ca-*  
15                   *pable of achieving initial commercialization by*  
16                   *December 31, 2025;*

17                   “(B) *conduct studies regarding the means*  
18                   *by which those concepts would impact reactor ec-*  
19                   *onomics, the fuel cycle, operations, safety, and*  
20                   *the environment;*

21                   “(C) *subject to paragraph (3), publish the*  
22                   *results of the studies conducted under subpara-*  
23                   *graph (B); and*

24                   “(D) *cooperate with institutions of higher*  
25                   *education through the Nuclear Energy Univer-*

1            *sity and Integrated Research Projects programs*  
2            *of the Department.*

3            “(3) *SENSITIVE INFORMATION.*—*The Secretary*  
4            *shall not publish any information under paragraph*  
5            *(2)(C) that is detrimental to national security, as de-*  
6            *termined by the Secretary.*

7            “(4) *AUTHORIZATION OF APPROPRIATIONS.*—  
8            *There is authorized to be appropriated to the Sec-*  
9            *retary to carry out the program under this subsection*  
10           *\$120,000,000 for each of fiscal years 2020 through*  
11           *2024.”.*

12 **SEC. 5. NUCLEAR SCIENCE AND ENGINEERING SUPPORT.**

13           (a) *IN GENERAL.*—*Section 954 of the Energy Policy*  
14 *Act of 2005 (42 U.S.C. 16274) is amended—*

15           (1) *in the section heading, by striking*  
16           **“UNIVERSITY NUCLEAR”** *and inserting*  
17           **“NUCLEAR”**;

18           (2) *in subsection (b)—*

19           (A) *in the matter preceding paragraph (1),*  
20           *by striking “this section” and inserting “this*  
21           *subsection”;* and

22           (B) *by redesignating paragraphs (1)*  
23           *through (5) as subparagraphs (A) through (E),*  
24           *respectively, and indenting appropriately;*

1           (3) *in subsection (c), by redesignating para-*  
2 *graphs (1) and (2) as subparagraphs (A) and (B), re-*  
3 *spectively, and indenting appropriately;*

4           (4) *in subsection (d)—*

5                 *(A) in the matter preceding paragraph (1),*  
6 *by striking “this section” and inserting “this*  
7 *subsection”;* and

8                 *(B) by redesignating paragraphs (1)*  
9 *through (4) as subparagraphs (A) through (D),*  
10 *respectively, and indenting appropriately;*

11           (5) *in subsection (e), by striking “this section”*  
12 *and inserting “this subsection”;*

13           (6) *in subsection (f)—*

14                 *(A) by striking “this section” and inserting*  
15 *“this subsection”;* and

16                 *(B) by striking “subsection (b)(2)” and in-*  
17 *serting “paragraph (2)(B)”;*

18           (7) *by redesignating subsections (a) through (f)*  
19 *as paragraphs (1), (2), (3), (4), (6), and (7), respec-*  
20 *tively, and indenting appropriately;*

21           (8) *by inserting after paragraph (4) (as so redес-*  
22 *ignated) the following:*

23                 “(5) *RADIOLOGICAL FACILITIES MANAGEMENT.—*

24                         “(A) *IN GENERAL.—The Secretary shall*  
25 *carry out a program under which the Secretary*



1           *shall provide project management, technical sup-*  
2           *port, quality engineering and inspection, and*  
3           *nuclear material support to research reactors lo-*  
4           *cated at universities.*

5           “(B) *AUTHORIZATION OF APPROPRIA-*  
6           *TIONS.—In addition to any amounts appro-*  
7           *priated to carry out the program under this sub-*  
8           *section, there is authorized to be appropriated to*  
9           *the Secretary to carry out the program under*  
10          *this paragraph \$15,000,000 for each of fiscal*  
11          *years 2020 through 2024.”;*

12          (9) *by inserting before paragraph (1) (as so re-*  
13          *designated) the following:*

14          “(a) *UNIVERSITY NUCLEAR SCIENCE AND ENGINEER-*  
15          *ING SUPPORT.—*”; *and*

16          (10) *by adding at the end the following:*

17          “(b) *NUCLEAR ENERGY APPRENTICESHIP SUBPRO-*  
18          *GRAM.—*

19          “(1) *ESTABLISHMENT.—In carrying out the pro-*  
20          *gram under subsection (a), the Secretary shall estab-*  
21          *lish a nuclear energy apprenticeship subprogram*  
22          *under which the Secretary shall establish competi-*  
23          *tively awarded traineeships and apprenticeships in*  
24          *industries that are represented by skilled labor unions*  
25          *and with universities to provide focused, graduate-*

1 *level training to meet highly focused needs through a*  
2 *tailored academic graduate program that delivers a*  
3 *curriculum with a rigorous thesis or dissertation re-*  
4 *search requirement aligned with the critical needs of*  
5 *the Department with respect to mission-driven work-*  
6 *force.*

7 “(2) *REQUIREMENTS.*—*In carrying out the sub-*  
8 *program under this subsection, the Secretary shall—*

9 “(A) *encourage appropriate partnerships*  
10 *among National Laboratories, affected univer-*  
11 *sities, and industry; and*

12 “(B) *on an annual basis, evaluate the needs*  
13 *of the nuclear energy community to implement*  
14 *traineeships for focused topical areas addressing*  
15 *mission-specific workforce needs.*

16 “(3) *AUTHORIZATION OF APPROPRIATIONS.*—  
17 *There is authorized to be appropriated to the Sec-*  
18 *retary to carry out the subprogram under this sub-*  
19 *section \$5,000,000 for each of fiscal years 2020*  
20 *through 2024.”.*

21 (b) *CONFORMING AMENDMENT.*—*The table of contents*  
22 *of the Energy Policy Act of 2005 (Public Law 109–58; 119*  
23 *Stat. 600) is amended by striking the item relating to sec-*  
24 *tion 954 and inserting the following:*

*“Sec. 954. Nuclear science and engineering support.”.*

1 **SEC. 6. INTERNATIONAL NUCLEAR ENERGY COOPERATION.**

2       (a) *IN GENERAL.*—Subtitle H of Title IX of the En-  
3 *ergy Policy Act of 2005 (42 U.S.C. 16341 et seq.) is amend-*  
4 *ed by adding at the end the following:*

5 **“SEC. 986B. INTERNATIONAL NUCLEAR ENERGY COOPERA-**  
6 **TION. —**

7       “(a) *IN GENERAL.*—The Secretary shall carry out a  
8 *program to develop bilateral collaboration initiatives with*  
9 *a variety of countries through—*

10               “(1) *research and development agreements;*

11               “(2) *other relevant arrangements and action*  
12 *plan updates; and*

13               “(3) *maintaining existing multilateral coopera-*  
14 *tion commitments of—*

15                       “(A) *the International Framework for Nu-*  
16 *clear Energy Cooperation;*

17                       “(B) *the Generation IV International*  
18 *Forum;*

19                       “(C) *the International Atomic Energy*  
20 *Agency; and*

21                       “(D) *any other international collaborative*  
22 *effort with respect to advanced nuclear reactor*  
23 *operations and safety.*

24       “(b) *SUBPROGRAM.*—

1           “(1) *IN GENERAL.*—*In carrying out the program*  
2 *under subsection (a), the Secretary shall establish a*  
3 *subprogram that shall—*

4                   “(A) *support diplomatic, nonproliferation,*  
5 *climate, and international economic objectives*  
6 *for the safe, secure, and peaceful use of nuclear*  
7 *technology in countries developing nuclear en-*  
8 *ergy programs, with a focus on countries that*  
9 *have increased civil nuclear cooperation with*  
10 *Russia and China; and*

11                   “(B) *be modeled after the International*  
12 *Military Education and Training program of*  
13 *the Department of State.*

14           “(2) *AUTHORIZATION OF APPROPRIATIONS.*—  
15 *There is authorized to be appropriated to the Sec-*  
16 *retary to carry out the subprogram under this sub-*  
17 *section \$5,500,000 for each of fiscal years 2020*  
18 *through 2024.*

19           “(c) *REQUIREMENTS.*—*The program under subsection*  
20 *(a) shall be carried out—*

21                   “(1) *to facilitate, to the maximum extent prac-*  
22 *ticable, workshops and expert-based exchanges to en-*  
23 *gage industry, stakeholders, and foreign governments*  
24 *regarding international civil nuclear issues, such as*  
25 *training, financing, safety, and options for multi-*

1       *national cooperation on used nuclear fuel disposal;*  
2       *and*

3               “(2) *in coordination with—*

4                       “(A) *the National Security Council;*

5                       “(B) *the Secretary of State;*

6                       “(C) *the Secretary of Commerce; and*

7                       “(D) *the Nuclear Regulatory Commission.*”.

8       (b) *CONFORMING AMENDMENT.—The table of contents*  
9 *of the Energy Policy Act of 2005 (Public Law 109–58; 119*  
10 *Stat. 600) is amended by inserting after the item relating*  
11 *to section 986A the following:*

      “*Sec. 986B. International nuclear energy cooperation.*”.

      Amend the title so as to read: “A bill to amend the Energy Policy Act of 2005 to support nuclear energy research, development, and demonstration, and for other purposes.”.

**Calendar No. 353**

116<sup>TH</sup> CONGRESS  
1<sup>ST</sup> Session

**S. 2368**

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**A BILL**

To amend the Atomic Energy Act of 1954 and the Energy Policy Act of 2005 to support licensing and relicensing of certain nuclear facilities and nuclear energy research, demonstration, and development, and for other purposes.

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DECEMBER 17, 2019

Reported with an amendment and an amendment to the title