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.

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

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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.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Nuclear Energy Renewal Act of 2019''.

SEC. 2. LIGHT WATER REACTOR SUSTAINABILITY PROGRAM.

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

(1) by striking ''Section'' and inserting the following:

''(a) AMENDMENT TO ATOMIC ENERGY ACT OF 1954.—Section''; and

(2) by adding at the end the following:

''(b) LIGHT WATER REACTOR SUSTAINABILITY PROGRAM.—

''(1) IN GENERAL.—Notwithstanding any other provision of law, the Secretary shall expand the light water reactor sustainability program of the Department, to the maximum extent practicable—

''(A) to ensure the achievement of maximum benefits from existing nuclear generation;

''(B) to accommodate the increase in applications for nuclear power plant license renewals expected as of the date of enactment of this subsection;

''(C) to enable the continued operation of existing nuclear power plants through technology development;

''(D) to improve the performance and reduce the operation and maintenance costs of nuclear power plants; and

''(E) to promote the use of high-performance computing to simulate nuclear reactor processes.

''(2) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out the program under this subsection $60,000,000 for each of fiscal years 2020 through 2029.''.

SEC. 3. INCREASING SUPPORT FOR ADVANCED NUCLEAR TECHNOLOGIES.

(a) LICENSING BY NUCLEAR REGULATORY COMMISSION.—Section 103 of the Atomic Energy Act of 1954 (42 U.S.C. 2133) is amended—

(1) in subsection d., in the second sentence, by striking ''any any'' and inserting ''any''; and

(2) by inserting after subsection d. the following:

''e. ADVANCED NUCLEAR FACILITIES AND TECHNOLOGIES.—

''(1) DEFINITION OF ADVANCED NUCLEAR.—

''(A) IN GENERAL.—In this subsection, the term 'advanced nuclear' means, with respect to

a production facility, utilization facility, or technology, the use of a nuclear fission reactor, including a prototype plant (as defined in section 50.2 of title 10, Code of Federal Regulations (or successor regulations)), that represents significant improvements compared to the most recent generation of nuclear fission reactors, including improvements such as—

''(i) additional inherent safety features;

''(ii) lower waste yields;

''(iii) improved fuel performance;

''(iv) increased tolerance to loss of fuel cooling;

''(v) enhanced reliability;

''(vi) increased proliferation resistance;

''(vii) increased thermal efficiency;

''(viii) reduced consumption of cooling water;

''(ix) the ability to integrate into electric applications and nonelectric applications;

"(x) modular sizes to allow for deployment that corresponds with the demand for electricity; and

"(xi) operational flexibility to respond to changes in demand for electricity and to complement integration with intermittent renewable energy.

"(B) INCLUSION.—In this subsection, the term 'advanced nuclear' includes, with respect to a production facility, utilization facility, or technology, the use of a nuclear fusion reactor.

"(2) ESTABLISHMENT OF PROGRAM.—The Secretary of Energy, in coordination with the Commission, shall establish and carry out a program—

"(A) to develop certification and licensing criteria with respect to advanced nuclear production facilities and utilization facilities, including for international licensing harmonization;

"(B) to provide assistance to eligible applicants with respect to the certification and licensing of advanced nuclear production facilities and utilization facilities; and

"(C) to establish such procedures as the Secretary of Energy and the Commission deter-

mine to be appropriate for general public outreach relating to advanced nuclear technologies, production facilities, and utilization facilities.

''(3) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to carry out the program under this subsection $15,000,000 for the period of fiscal years 2020 through 2029.''.

SEC. 4. NUCLEAR ENERGY RESEARCH, DEMONSTRATION, AND DEVELOPMENT.

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

''(e) ADVANCED REACTOR TECHNOLOGIES DEVELOPMENT PROGRAM.—

''(1) IN GENERAL.—The Secretary shall carry out a program under which the Secretary shall conduct research relating to the development of innovative nuclear reactor technologies that may offer improved safety, functionality, and affordability by enhancing existing nuclear technologies.

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

''(A) support efforts to reduce long-term technical barriers for advanced nuclear energy systems;

"(B) identify potential regulatory issues relating to advanced nuclear reactors;

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

"(D) support international activities carried out pursuant to—

"(i) the Generation IV International Forum; or

"(ii) any other international collaborative effort with respect to advanced nuclear reactor operations and safety;

"(E) support research and development relating to enhancing the proliferation resistance of nuclear technologies; and

"(F) support research and development projects carried out by National Laboratories, institutions of higher education, and other industry entities relating to nuclear technology, including the development of—

"(i) codes and standards;

"(ii) sensors and instrumentation;

"(iii) probabilistic risk assessments methods; and

''(iv) other technologies to support the development of advanced nuclear reactor systems.

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

''(A) focus on research and development activities relating to—

''(i) fast reactors;

''(ii) high-temperature, gas-cooled nuclear reactors; and

''(iii) molten salt reactors; and

''(B) with respect to the activities described in clauses (ii) and (iii) of subparagraph (A), include research and development relating to advanced fuels.

''(4) SUPERCRITICAL TRANSFORMATIONAL ELECTRIC POWER RESEARCH AND DEVELOPMENT.—

''(A) IN GENERAL.—In carrying out the program under this subsection, the Secretary shall develop and implement a public-private cost-shared supercritical carbon dioxide (commonly known as 'sCO_2') Brayton cycle subprogram, including research and development of supercritical carbon dioxide technologies.

''(B) REQUIREMENT.—In carrying out the subprogram under this paragraph, the Secretary shall solicit and evaluate plans to encourage innovation, support technology advances, and enhance the safety and performance of advanced nuclear reactor systems.

''(C) TECHNICAL REVIEW PANEL.—The Secretary shall establish a technical review panel for the subprogram under this paragraph, which shall carry out consultation and collaboration with appropriate industry entities—

''(i) to evaluate advanced nuclear reactor technologies;

''(ii) to identify research and development opportunities; and

''(iii) to publish information regarding cost-shared research and development investment decisions to facilitate commercialization.

''(5) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out the program under this subsection $120,000,000 for each of fiscal years 2020 through 2029.

''(f) FUEL CYCLE RESEARCH AND DEVELOPMENT PROGRAM.—

''(1) IN GENERAL.—The Secretary shall carry out a program under which the Secretary shall conduct research relating to—

''(A) consent-based interim storage;

''(B) transportation of nuclear waste;

''(C) potential alternative disposal options for Department-managed—

''(i) spent nuclear fuel; and

''(ii) high-level radioactive waste; and

''(D) disposition alternatives for defense-related nuclear waste.

''(2) AREAS OF FOCUS.—In carrying out this subsection, the Secretary shall focus on activities relating to—

''(A) relevant research and development; and

''(B) integrated waste management, including by conducting research and development activities relating to the storage, transportation, and disposal of used nuclear fuel and wastes generated by existing and future fuel cycles.

''(3) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Sec-

retary to carry out the program under this subsection $200,000,000 for each of fiscal years 2020 through 2029.

''(g) MATERIAL RECOVERY AND WASTE FORM DEVELOPMENT.—

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

''(A) conduct research relating to advanced nuclear material recovery and advanced nuclear waste from development technologies to improve fuel cycle performance with reductions in processing, waste generation, and potential for material diversion; and

''(B) to the maximum extent practicable, apply the technical expertise achieved through that research to a broad range of programs and activities, including activities relating to—

''(i) environmental remediation;

''(ii) national security; and

''(iii) subject to paragraph (2), civilian nuclear applications.

''(2) CIVILIAN NUCLEAR APPLICATIONS.—Any research carried out under this subsection relating to civilian nuclear applications shall include research relating to improving the economics and non-

proliferation attributes of recycling light water reactor fuels and advanced reactor fuels.

''(3) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out the program under this subsection $50,000,000 for each of fiscal years 2020 through 2029.

''(h) ADVANCED FUELS.—

''(1) IN GENERAL.—The Secretary shall carry out a program under which the Secretary shall conduct research relating to—

''(A) next-generation light water reactor fuels that demonstrate enhanced—

''(i) performance; and

''(ii) accident tolerance; and

''(B) fuels that demonstrate enhanced—

''(i) proliferation resistance; and

''(ii) use of resources.

''(2) REQUIREMENTS.—In carrying out the program under this subsection, the Secretary shall—

''(A) focus on the development of accident-tolerant fuel and cladding concepts that are capable of achieving the objective of initiating core reloads by calendar year 2025;

''(B)(i) develop modeling capabilities for new fuel concepts;

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

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

''(C) cooperate with institutions of higher education through the Nuclear Energy University and Integrated Research Projects programs of the Department.

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

''(4) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out the program under this subsection $120,000,000 for each of fiscal years 2020 through 2029.

''(i) NUCLEAR ENERGY ENABLING TECHNOLOGIES.—

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

"(A) conduct research relating to modeling and simulation tools;

"(B) provide access to unique nuclear energy research capabilities through the Nuclear Science User Facilities of the Department; and

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

"(2) SUPPORT FOR NUCLEAR INITIATIVES.—The program under this subsection shall support the goals, objectives, and activities of the National Reactor Innovation Center and the Gateway for Accelerated Innovation in Nuclear initiative of the Department to make nuclear energy research capabilities accessible to industry engineers and scientists through a public-private partnership.

"(3) CROSSCUTTING TECHNOLOGY DEVELOPMENT SUBPROGRAM.—

"(A) IN GENERAL.—In carrying out the program under this subsection, the Secretary shall establish a crosscutting technology subprogram, under which the Secretary shall provide assistance for high-priority research and development activities relating to innovative solutions to nuclear energy challenges carried out by—

''(i) institutions of higher education;

''(ii) National Laboratories; and

''(iii) industry entities.

''(B) REQUIREMENTS.—In carrying out the subprogram established under subparagraph (A), the Secretary shall—

''(i) invest in competitive, nuclear energy-related infrastructure enhancement activities carried out at National Laboratories to ensure researchers have access to state-of-the-art research and development resources;

''(ii) coordinate with other research and development programs of the Office of Nuclear Energy to ensure that developed technologies and capabilities are part of an integrated investment strategy, the overall focus of which is improving safety, security, reliability, and economics of operating nuclear power plants; and

''(iii) focus on—

''(I) new capabilities relating to nuclear energy research and development;

''(II) enabling technologies beyond individual programs;

''(III) coordinating capabilities among research and development programs of the Office of Nuclear Energy;

''(IV) examining new classes of materials not considered for nuclear applications;

''(V) high-risk research, which could potentially overcome technological limitations; and

''(VI) the potential for industry partnerships to develop technologies relating to storage, hydrogen production, high-temperature process heat, and other relevant areas.

''(4) NUCLEAR ENERGY ADVANCED MODELING AND SIMULATION SUBPROGRAM.—In carrying out the program under this subsection, the Secretary shall establish a nuclear energy advanced modeling and simulation subprogram, under which the Secretary shall develop advanced modeling and simulation tools to support programs carried out by the Office of Nuclear Energy, including multiscale mod-

els of physics and chemistry that support advanced computational methods for simulations of nuclear energy systems.

''(5) NUCLEAR SCIENCE USER FACILITIES SUBPROGRAM.—

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

''(i) to promote the use of nuclear research facilities; and

''(ii) to encourage engagement across institutions of higher education, industry entities, and National Laboratories relating to relevant nuclear science research.

''(B) REQUIREMENTS.—

''(i) IN GENERAL.—The Secretary shall provide assistance under this paragraph, and solicit applications under clause (ii), on an annual basis.

''(ii) APPLICATIONS.—To be eligible to receive assistance under this paragraph for a fiscal year, an individual or entity conducting nuclear research shall submit

to the Secretary an application that describes—

"(I) the research project proposed to be carried out at a nuclear research facility;

"(II) timelines for the proposed research; and

"(III) the Nuclear Science User Facility at which the project is proposed to be carried out.

"(iii) USE OF FUNDS.—Assistance provided under this paragraph may be used—

"(I) for experiment support and laboratory services costs; and

"(II) only at a Nuclear Science User Facility.

"(C) ACCESS.—In carrying out the subprogram under this paragraph, the Secretary shall provide to recipients of assistance under the subprogram no-cost access to—

"(i) the advanced test reactor of the Idaho National Laboratory;

"(ii) post-irradiation examination facilities at the Materials and Fuels Complex;

"(iii) research reactors at—

"(I) Oak Ridge National Laboratory;

"(II) Massachusetts Institute of Technology; and

"(III) North Carolina State University;

"(iv) beam line capabilities at the Advanced Photon Source, in coordination with the Illinois Institute of Technology;

"(v) irradiation experiment design and fabrication capabilities at Pacific Northwest National Laboratory;

"(vi) hot cells and fabrication capabilities at Westinghouse Electric Company; and

"(vii) examination facilities at—

"(I) the University of California–Berkeley;

"(II) the University of Michigan;

"(III) the University of Nevada–Las Vegas;

"(IV) Purdue University;

"(V) the University at Wisconsin; and

"(VI) to the maximum extent practicable, any other facilities needed to support the Nuclear Science User Facility.

"(6) NUCLEAR ENERGY TRAINEESHIPS SUBPROGRAM.—

"(A) ESTABLISHMENT.—In carrying out the program under this subsection, the Secretary shall establish a nuclear energy traineeships subprogram under which the Secretary shall establish competitively awarded traineeships and apprenticeships in industries that are represented by skilled labor unions and with institutions of higher education to provide focused, graduate-level training to meet highly focused needs through a tailored academic graduate program that delivers a curriculum with a rigorous thesis or dissertation research requirement aligned with the critical needs of the Department with respect to mission-driven workforce.

"(B) REQUIREMENTS.—In carrying out the subprogram under this paragraph, the Secretary shall—

"(i) encourage appropriate partnerships among National Laboratories, affected institutions of higher education, and industry; and

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

"(7) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out the program under this subsection $150,000,000 for each of fiscal years 2020 through 2029.

"(j) RADIOLOGICAL FACILITIES MANAGEMENT.—

"(1) IN GENERAL.—The Secretary shall carry out a program under which the Secretary shall provide project management, technical support, quality engineering and inspection, and nuclear material support to 25 research reactors located at 24 institutions of higher education.

''(2) ELEMENTS.—The program under this subsection shall include—

''(A) delivery of plate fuel elements as required annually by the recipient research reactors, as determined based on—

''(i) need; and

''(ii) fuel availability;

''(B) delivery of Training, Research, Isotopes, General Atomics (commonly known as 'TRIGA') reactor fuel elements from recipient institutions of higher education to used fuel receipt facilities of the Department; and

''(C) funding for required safety upgrades to allow resumption of research reactor fuel fabrication operations at TRIGA International in Romans, France.

''(3) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out the program under this subsection $30,000,000 for each of fiscal years 2020 through 2029.

''(k) INTERNATIONAL NUCLEAR ENERGY COOPERATION.—

''(1) IN GENERAL.—The Secretary shall carry out a program under which the Secretary shall de-

velop bilateral collaboration initiatives with a variety of countries through—

"(A) research and development agreements;

"(B) other relevant arrangements and action plan updates; and

"(C) maintaining existing multilateral cooperation commitments of—

"(i) the International Framework for Nuclear Energy Cooperation; and

"(ii) the International Atomic Energy Agency.

"(2) TREATMENT.—The program under this subsection shall be considered to be the lead program of the Department with respect to international activities relating to civil nuclear energy, including—

"(A) analysis, development, coordination, and implementation of international civil nuclear energy policy; and

"(B) integration of international nuclear technical activities.

"(3) SUBPROGRAM.—In carrying out the program under this subsection, the Secretary shall establish a subprogram that shall—

''(A) support diplomatic, nonproliferation, climate, and international economic objectives for the safe, secure, and peaceful use of nuclear technology in countries developing nuclear energy programs; and

''(B) shall be modeled after the International Military Education and Training program of the Department of State.

''(4) REQUIREMENTS.—The program under this subsection shall be carried out—

''(A) to facilitate, to the maximum extent practicable, workshops and expert-based exchanges to engage industry, stakeholders, and foreign governments regarding international civil nuclear issues, such as training, financing, safety, and options for multinational cooperation on used nuclear fuel disposal; and

''(B) in coordination with—

''(i) the National Security Council;

''(ii) the Secretary of State;

''(iii) the Secretary of Commerce; and

''(iv) the Nuclear Regulatory Commission.

''(5) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Sec-

retary to carry out the program under this subsection $10,000,000 for each of fiscal years 2020 through 2029, of which $5,500,000 shall be used each fiscal year to carry out the subprogram under paragraph (3).''.

(b) COST SHARING.—Section 988(b)(2) of the Energy Policy Act of 2005 (42 U.S.C. 16352(b)(2)) is amended—

(1) in the paragraph heading, by striking ''EXCLUSION'' and inserting ''EXCLUSIONS'';

(2) by striking ''apply to'' and inserting the following: ''apply—

''(A) to'';

(3) in subparagraph (A) (as so designated), by striking the period at the end and inserting ''; or''; and

(4) by adding at the end the following:

''(B) to programs under subsections (e) through (k) of section 952.''.

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