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(Original Signature of Member)

116TH CONGRESS
2D SESSION

H. R. 6097

To provide for a program of nuclear energy research, development, demonstration, and commercialization, and for other purposes.

M__. _____ introduced the following bill; which was referred to the Committee on _____

A BILL

To provide for a program of nuclear energy research, development, demonstration, and commercialization, 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 Research and Development Act''.

SEC. 2. DEFINITIONS.

Section 951(b) of the Energy Policy Act of 2005 (42 U.S.C. 16271(b)) is amended—

(1) by amending paragraph (1) to read as follows:

''(1) ADVANCED NUCLEAR REACTOR.—The term 'advanced nuclear reactor' means—

''(A) a nuclear fission reactor, including a prototype plant (as defined in sections 50.2 and 52.1 of title 10, Code of Federal Regulations (or successor regulations)), with significant improvements compared to reactors operating on the date of enactment of the Nuclear Energy Research and Development Act, 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 and other environmental impacts;

''(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;

''(xi) operational flexibility to respond to changes in demand for electricity and to complement integration with intermittent renewable energy; or

''(xii) improved resilience; and

''(B) a fusion reactor.'';

(2) by adding at the end the following:

''(7) INSTITUTION OF HIGHER EDUCATION.—The term 'institution of higher education' has the meaning given the term in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)).''.

SEC. 3. NUCLEAR ENERGY RESEARCH, DEVELOPMENT, DEMONSTRATION, AND COMMERCIAL APPLICATION PROGRAMS.

(a) REACTOR CONCEPTS RESEARCH, DEVELOPMENT, AND DEMONSTRATION.—Section 952 of the Energy Policy

Act of 2005 (42 U.S.C. 16272) is amended to read as follows:

"SEC. 952. REACTOR CONCEPTS RESEARCH, DEVELOPMENT, DEMONSTRATION, AND COMMERCIAL APPLICATION.

"(a) SUSTAINABILITY PROGRAM FOR LIGHT WATER REACTORS.—

"(1) IN GENERAL.—The Secretary shall carry out a program of research, development, demonstration, and commercial application to support existing operating nuclear power plants which shall address technologies to modernize and improve, with respect to such plants—

"(A) reliability;

"(B) capacity;

"(C) component aging;

"(D) safety;

"(E) physical security and security costs;

"(F) plant lifetime;

"(G) operations and maintenance costs, including by utilizing risk-informed systems analysis;

"(H) the ability for plants to operate flexibly;

''(I) nuclear hybrid energy system applications described in subsection (c);

''(J) efficiency;

''(K) environmental impacts; and

''(L) resilience.

''(2) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out the program under this subsection—

''(A) $55,000,000 for fiscal year 2021;

''(B) $57,750,000 for fiscal year 2022;

''(C) $60,637,500 for fiscal year 2023;

''(D) $63,669,375 for fiscal year 2024; and

''(E) $66,852,844 for fiscal year 2025.

''(b) ADVANCED REACTOR TECHNOLOGIES.—

''(1) IN GENERAL.—The Secretary shall carry out a program of research, development, demonstration, and commercial application to support advanced reactor technologies.

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

''(A) prioritize designs for advanced nuclear reactors that are proliferation resistant and passively safe, including designs that, com-

pared to reactors operating on the date of enactment of the Nuclear Energy Research and Development Act—

''(i) are economically competitive with other electric power generation plants;

''(ii) have higher efficiency, lower cost, less environmental impacts, increased resilience, and improved safety;

''(iii) use fuels that are proliferation-resistant and have reduced production of high-level waste per unit of output; and

''(iv) use advanced instrumentation and monitoring systems;

''(B) consult with the Nuclear Regulatory Commission on appropriate metrics to consider for the criteria specified in subparagraph (A);

''(C) support research and development to resolve materials challenges relating to extreme environments, including environments that contain high levels of—

''(i) radiation fluence;

''(ii) temperature;

''(iii) pressure; and

''(iv) corrosion;

''(D) support research and development to aid in the qualification of advanced fuels, including fabrication techniques;

''(E) support activities that address near-term challenges in modeling and simulation to enable accelerated design of and licensing of advanced nuclear reactors, including the identification of tools and methodologies for validating such modeling and simulation efforts;

''(F) develop technologies, including technologies to manage, reduce, or reuse nuclear waste;

''(G) ensure that nuclear research infrastructure is maintained or constructed, including—

''(i) currently operational research reactors at the National Laboratories and institutions of higher education;

''(ii) hot cell research facilities;

''(iii) a versatile fast neutron source; and

''(iv) advanced coolant testing facilities, including coolants such as lead, sodium, gas, and molten salt;

''(H) improve scientific understanding of nonlight water coolant physics and chemistry;

''(I) develop advanced sensors and control systems, including the identification of tools and methodologies for validating such sensors and systems;

''(J) investigate advanced manufacturing and advanced construction techniques and materials to reduce the cost of advanced nuclear reactors, including the use of digital twins and of strategies to implement project and construction management best practices, and study the effects of radiation on materials created with these techniques;

''(K) consult with the Administrator of the National Nuclear Security Administration to integrate reactor safeguards and security into design;

''(L) support efforts to reduce any technical barriers that would prevent commercial application of advanced nuclear energy systems; and

''(M) develop various safety analyses and emergency preparedness and response methodologies.

''(3) COORDINATION.—The Secretary shall coordinate with individuals engaged in the private sector and individuals who are experts in nuclear nonproliferation, environmental and public health and safety, and economics to advance the development of various designs of advanced nuclear reactors.

''(4) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out the program under this subsection $55,000,000 for each of fiscal years 2021 through 2025.

''(c) NUCLEAR HYBRID ENERGY SYSTEMS RESEARCH, DEVELOPMENT, DEMONSTRATION, AND COMMERCIAL APPLICATION PROGRAM.—

''(1) IN GENERAL.—The Secretary shall carry out a program of research, development, demonstration, and commercial application to develop nuclear hybrid energy systems, composed of 2 or more colocated or jointly operated subsystems of energy generation, energy storage, or other technologies and in which not in which not less than 1 such subsystem is a nuclear energy system, to reduce greenhouse gas emissions in both the power and nonpower sectors.

''(2) COORDINATION.—In carrying out the program under paragraph (1), the Secretary shall co-

ordinate with relevant program offices within the Department of Energy.

''(3) FOCUS AREAS.—The program under paragraph (1) may include research, development, demonstration, or commercial application of nuclear hybrid energy systems with respect to—

''(A) desalination of water;

''(B) hydrogen or other fuel production;

''(C) heat for industrial processes;

''(D) district heating;

''(E) heat storage;

''(F) carbon capture, use, utilization, and storage;

''(G) microgrid or island applications;

''(H) integrated systems modeling, analysis, and optimization, inclusive of different configurations of hybrid energy systems; and

''(I) integrated design, planning, and operation of systems with existing infrastructure, including interconnection requirements with the electric grid, as appropriate.

''(4) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out the program under this subsection—

''(A) $52,500,000 for fiscal year 2021;

''(B) $55,125,000 for fiscal year 2022;

''(C) $57,881,250 for fiscal year 2023;

''(D) $60,775,313 for fiscal year 2024; and

''(E) $63,814,078 for fiscal year 2025.''.

(b) FUEL CYCLE RESEARCH AND DEVELOPMENT.—Section 953 of the Energy Policy Act of 2005 (42 U.S.C. 16273) is amended to read as follows:

''SEC. 953. FUEL CYCLE RESEARCH, DEVELOPMENT, DEMONSTRATION, AND COMMERCIAL APPLICATION.

''(a) HIGH-ASSAY, LOW-ENRICHED URANIUM RESEARCH, DEVELOPMENT, DEMONSTRATION, AND COMMERCIAL APPLICATION FOR ADVANCED NUCLEAR REACTORS.—

''(1) DEFINITIONS.—In this section:

''(A) HIGH-ASSAY, LOW-ENRICHED URANIUM.—The term 'high-assay, low-enriched uranium' means uranium with an assay greater than 5 weight percent, but less than 20 weight percent, of the uranium-235 isotope.

''(B) HIGH-ENRICHED URANIUM.—The term 'high-enriched uranium' means uranium

with an assay of 20 weight percent or more of the uranium-235 isotope.

''(2) PROGRAM.—

''(A) ESTABLISHMENT.—Not later than 1 year after the date of enactment of this section, the Secretary shall establish a program of research, development, demonstration, and commercial application to make available high-assay, low-enriched uranium for use in civilian advanced nuclear reactors.

''(B) NUCLEAR FUEL OWNERSHIP.—Uranium made available under this subsection shall remain the property of the Department, which shall be responsible for the storage, use, and disposition of all radioactive waste created by the irradiation, processing, or purification of such uranium, and shall not be deemed to be a sale or transfer of uranium subject to sections 3112 and 3113 of the USEC Privatization Act (42 U.S.C. 2297h– 10 and 42 USC 2297h–11).

''(C) GOAL.—In carrying out the program under this subsection, the Secretary shall demonstrate the capability to produce high-assay, low-enriched uranium, with the goal of having

the capability of producing amounts needed to provide a reliable and available supply for advanced nuclear reactors by December 31, 2025.

''(D) FACTORS FOR CONSIDERATION.—In carrying out the program under this subsection, the Secretary shall take into consideration options for providing high-assay, low-enriched uranium for use in civilian advanced nuclear reactors under this subsection from a stockpile of uranium owned by the Department or using enrichment technology, prioritizing methods that would produce useable material the quickest, including—

''(i) fuel that—

''(I) directly meets the needs of an end user; and

''(II) has been previously used or fabricated for another purpose;

''(ii) fuel that can meet the needs of an end user after removing radioactive or other contaminants that resulted from a previous use or fabrication of the fuel for research, development, demonstration, or deployment activities of the Department; and

''(iii) fuel from a high-enriched uranium stockpile, which can be blended with lower assay uranium to become high-assay, low-enriched uranium to meet the needs of an end user.

''(E) SELECTION.—The Secretary shall determine awardees of uranium under this section through a merit-based, competitive selection process for use in advanced reactor demonstration projects.

''(F) LIMITATION.—The Secretary shall not barter or otherwise sell or transfer uranium in any form in exchange for services relating to the final disposition of radioactive waste from uranium that is made available under this subsection.

''(G) SUNSET.—The program under this subsection shall terminate on the earlier of—

''(i) January 1, 2035; or

''(ii) 90 days after the date on which uranium enriched up to, but not equal to, 20 weight percent is available to provide a reliable and adequate supply for domestic advanced nuclear reactors in the commercial market.

''(3) REPORT.—

''(A) IN GENERAL.—Not later than 180 days after the date of enactment of this section, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report that describes actions proposed to be carried out by the Secretary to enable the availability of high-assay, low-enriched uranium for research, development, demonstration or commercial application under the program under paragraph (2).

''(B) COORDINATION AND STAKEHOLDER INPUT.—In developing the report under this subsection, the Secretary shall consult with—

''(i) the Nuclear Regulatory Commission;

''(ii) the National Nuclear Security Administration;

''(iii) the National Laboratories;

''(iv) institutions of higher education;

''(v) a diverse group of entities from the nuclear energy industry;

''(vi) a diverse group of technology developers; and

''(vii) experts in nuclear non-proliferation, environmental and public health and safety, and economics.

''(C) COST AND SCHEDULE ESTIMATES.—The report under this subsection shall include estimated costs, budgets, and timeframes for enabling the availability of high-assay, low-enriched uranium for research, development, demonstration, or commercial application.

''(D) REQUIRED EVALUATIONS.—The report under this subsection shall evaluate—

''(i) the actions required to establish and carry out the program under paragraph (2) and the cost of such actions, including with respect to—

''(I) proposed preliminary terms for contracting between the Department and awardees (including guidelines defining the roles and responsibilities between the Department and the awardee); and

''(II) the potential to coordinate with awardees regarding—

''(aa) fuel fabrication; and

''(bb) fuel transport;

''(ii) the potential sources and fuel forms available to provide uranium for the program under paragraph (2);

''(iii) options to coordinate the program under paragraph (2) with the operation of the versatile, reactor-based fast neutron source under section 959A;

''(iv) the ability of uranium producers to provide materials for advanced nuclear reactor fuel;

''(v) any associated legal, regulatory, and policy issues that should be addressed to enable—

''(I) the program under paragraph (2); and

''(II) the establishment of an industry capable of providing high-assay, low-enriched uranium;

''(vi) industry needs for high-assay, low-enriched uranium predicted over a 10-year period, as determined by surveying industry stakeholders; and

''(vii) research and development plans to develop testing to provide criticality benchmark data for the validation of fuel use, transportation, and storage.

''(4) HIGH-ASSAY, LOW-ENRICHED URANIUM TRANSPORTATION PACKAGE RESEARCH PROGRAM.—

''(A) IN GENERAL.—The Secretary shall establish a program of research, development, demonstration, and commercial application under which the Secretary shall provide financial assistance to entities that the Secretary determines appropriate, on a competitive basis, to establish the capability to safely and securely transport gaseous or solid high-assay, low-enriched uranium.

''(B) REQUIREMENT.—The focus of the program under this subsection shall be to establish 1 or more high-assay, low-enriched uranium transportation packages for commercial application to transport high-assay, low-enriched uranium to the various facilities involved in producing or using nuclear fuel containing high-assay, low-enriched uranium, such as—

''(i) fuel processing facilities;

''(ii) fuel fabrication facilities; and

''(iii) nuclear reactors.

''(5) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out the program under this subsection—

''(A) $31,500,000 for fiscal year 2021;

''(B) $33,075,000 for fiscal year 2022;

''(C) $34,728,750 for fiscal year 2023;

''(D) $36,465,188 for fiscal year 2024; and

''(E) $38,288,447 for fiscal year 2025.

''(b) ALTERNATE FUELS REPORT.—Not later than 180 days after the date of enactment of this section, the Secretary shall, after consulting with relevant entities, including National Laboratories, institutions of higher education, and technology developers, submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report identifying any and all options for providing nuclear material, containing isotopes other than the uranium-235 isotope, such as uranium-233 and thorium-232 to be used as fuel for advanced nuclear reactor research, development, demonstration, or commercial application purposes.

''(c) USED NUCLEAR FUEL RESEARCH, DEVELOPMENT, DEMONSTRATION, AND COMMERCIAL APPLICATION.—

''(1) IN GENERAL.—The Secretary shall conduct an advanced fuel cycle research, development, demonstration, and commercial application program that improves fuel cycle performance and supports a variety of options for used nuclear fuel storage, use, and disposal, including advanced nuclear reactor concepts, while minimizing environmental and public health and safety impacts, including—

''(A) dry cask storage;

''(B) consolidated interim storage;

''(C) deep geological storage and disposal, including mined repository, and other technologies;

''(D) used nuclear fuel transportation;

''(E) integrated waste management systems;

''(F) vitrification;

''(G) fuel recycling and transmutation technologies, including advanced reprocessing technologies and plutonium uranium redox extraction technologies;

''(H) advanced materials to be used in subparagraphs (A) through (G); and

''(I) other areas as determined by the Secretary.

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

''(A) ensure all activities and designs incorporate state of the art safeguards technologies and techniques to reduce risk of proliferation;

''(B) consult with the Administrator of the National Nuclear Security Administration to integrate safeguards and security by design;

''(C) consider the potential benefits and other impacts of those activities for civilian nuclear applications, environmental health and safety, and national security, including consideration of public consent; and

''(D) consider the economic viability of all activities and designs.

''(3) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out the program under this section—

''(A) $91,875,000 for fiscal year 2021;

''(B) $96,468,750 for fiscal year 2022;

''(C) $101,292,188 for fiscal year 2023;

''(D) $106,356,797 for fiscal year 2024; and

''(E) $111,674,637 for fiscal year 2025.

''(d) ADVANCED FUELS.—

''(1) IN GENERAL.—The Secretary shall conduct an advanced fuels research, development, demonstration, and commercial application program on next-generation light water reactor and advanced reactor fuels that demonstrate the potential for improved—

''(A) performance;

''(B) accident tolerance;

''(C) proliferation resistance;

''(D) use of resources;

''(E) environmental impact; and

''(F) economics.

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

''(A) focus on the development of advanced technology fuels that offer improved accident-tolerance and economic performance with the goal of initial commercial application by December 31, 2025; and

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

''(3) REPORT.—Not later than 180 days after the date of enactment of this section, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report that describes how the technologies and concepts studied under this program would impact reactor economics, the fuel cycle, operations, safety, proliferation, and the environment.

''(4) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out the program under this section—

''(A) $131,880,000 for fiscal year 2021;

''(B) $138,474,000 for fiscal year 2022;

''(C) $145,397,700 for fiscal year 2023;

''(D) $152,667,585 for fiscal year 2024; and

''(E) $160,330,964 for fiscal year 2025.''.

(c) NUCLEAR SCIENCE AND ENGINEERING SUPPORT.—

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

(A) in the section heading, by striking ''**UNIVERSITY NUCLEAR**'' and inserting ''**NUCLEAR**'';

(B) in subsection (b)—

(i) in the matter preceding paragraph (1), by striking ''this section'' and inserting ''this subsection''; and

(ii) by redesignating paragraphs (1) through (5) as subparagraphs (A) through (E), respectively, and indenting appropriately;

(C) in subsection (c), by redesignating paragraphs (1) and (2) as subparagraphs (A) and (B), respectively, and indenting appropriately;

(D) in subsection (d)—

(i) in the matter preceding paragraph (1), by striking ''this section'' and inserting ''this subsection''; and

(ii) by redesignating paragraphs (1) through (4) as subparagraphs (A) through (D), respectively, and indenting appropriately;

(E) in subsection (e), by striking ''this section'' and inserting ''this subsection'';

(F) in subsection (f)—

(i) by striking ''this section'' and inserting ''this subsection''; and

(ii) by striking ''subsection (b)(2)'' and inserting ''paragraph (2)(B)'';

(G) by redesignating subsections (a) through (d) as paragraphs (1) through (4), respectively, and indenting appropriately;

(H) by redesignating subsections (e) and (f) as paragraphs (7) and (8), respectively;

(I) by inserting after paragraph (4) (as so redesignated) the following:

''(5) RADIOLOGICAL FACILITIES MANAGEMENT.—

''(A) 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 handling support to research reactors located at universities.

''(B) AUTHORIZATION OF APPROPRIATIONS.—Of any amounts appropriated to carry out the program under this subsection, there

are authorized to be appropriated to the Secretary to carry out the program under this paragraph $20,000,000 for each of fiscal years 2021 through 2030.

''(6) NUCLEAR ENERGY UNIVERSITY PROGRAM.—In carrying out the programs under this section, the Department shall allocate 20 percent of funds appropriated to nuclear energy research and development programs annually to fund university-led research and university infrastructure projects through an open, competitive solicitation process.'';

(J) by inserting before paragraph (1) (as so redesignated) the following:

''(a) UNIVERSITY NUCLEAR SCIENCE AND ENGINEERING SUPPORT.—''; and

(K) by adding at the end the following:

''(b) NUCLEAR ENERGY APPRENTICESHIP SUBPROGRAM.—

''(1) ESTABLISHMENT.—In carrying out the program under subsection (a), the Secretary shall establish a nuclear energy apprenticeship subprogram under which the Secretary shall competitively award traineeships and apprenticeships in coordination with universities to provide focused, advanced training to meet critical mission needs of the De-

partment, including in industries that are represented by skilled labor unions.

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

''(A) encourage appropriate partnerships among National Laboratories, affected universities, and industry; and

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

''(3) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out the subprogram under this subsection $5,000,000 for each of fiscal years 2021 through 2030.''.

(d) CONFORMING AMENDMENT.—The table of contents of the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 600) is amended by striking the item relating to sections 952 through 954 and inserting the following:

''Sec. 952. Reactor concepts research, development, demonstration, and commercial application.
''Sec. 953. Fuel cycle research, development, demonstration, and commercial application
''Sec. 954. Nuclear science and engineering support.''.

(e) UNIVERSITY NUCLEAR LEADERSHIP PROGRAM.—Section 313 of the Omnibus Appropriations Act, 2009 (42 U.S.C. 16274a), is amended to read as follows:

"SEC. 313. UNIVERSITY NUCLEAR LEADERSHIP PROGRAM.

"(a) IN GENERAL.—In carrying out section 954 of the Energy Policy Act of 2005 (42 U.S.C. 16274), the Secretary of Energy shall support a program to be known as the University Nuclear Leadership Program (in this section referred to as the 'Program') .

"(b) USE OF FUNDS.—

"(1) IN GENERAL.—Except as provided in paragraph (2), amounts made available to carry out the Program shall be used to provide financial assistance for scholarships, fellowships, and research and development projects at institutions of higher education with respect to research, development, demonstration, and commercial application activities relevant to civilian advanced nuclear reactors including, but not limited to—

"(A) relevant fuel cycle technologies;

"(B) project management; and

"(C) advanced construction, manufacturing, and fabrication methods.

"(2) EXCEPTION.—Notwithstanding paragraph (1), amounts made available to carry out the Pro-

gram may be used to provide financial assistance for a scholarship, fellowship, or multiyear research and development project that does not align directly with a programmatic mission of the Department of Energy, if the activity for which assistance is provided would facilitate the maintenance of the discipline of nuclear science or nuclear engineering.

''(c) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated $15,000,000 to the Secretary of Energy to carry out the Program for fiscal year 2021 and each fiscal year thereafter.''.

(f) VERSATILE NEUTRON SOURCE.—Section 955(c) of the Energy Policy Act of 2005 (42 U.S.C. 16275(c)) is amended—

(1) in paragraph (1)—

(A) in the paragraph heading, by striking ''MISSION NEED'' and inserting ''AUTHORIZATION''; and

(B) in subparagraph (A), by striking ''determine the mission need'' and inserting ''provide''; and

(2) by adding at the end the following:

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

retary to carry out to completion the construction of the facility under this section—

''(A) $300,000,000 for fiscal year 2021;

''(B) $550,000,000 for fiscal year 2022;

''(C) $638,000,000 for fiscal year 2023;

''(D) $765,000,000 for fiscal year 2024; and

''(E) $763,000,000 for fiscal year 2025.''.

(g) ADVANCED NUCLEAR REACTOR RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.—

(1) IN GENERAL.—Subtitle E of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16271 et seq.) is amended by adding at the end the following:

''SEC. 959A. ADVANCED NUCLEAR REACTOR RESEARCH, DEVELOPMENT, DEMONSTRATION, AND COMMERCIAL APPLICATION PROGRAM.

''(a) DEMONSTRATION PROJECT DEFINED.—For the purposes of this section, the term 'demonstration project' means—

''(1) an advanced nuclear reactor operated for the purpose of demonstrating the suitability for commercial application of the advanced nuclear reactor—

''(A) as part of the power generation facilities of an electric utility system; or

''(B) in any other manner; or

''(2) the operation of one or more experimental advanced nuclear reactors, for the purpose of demonstrating the suitability for commercial application of such advanced nuclear reactors, funded in whole or in part by the private sector, at National Laboratories or other sites owned by the Department of Energy.

''(b) ESTABLISHMENT.—The Secretary shall establish a program to advance the research, development, demonstration, and commercial application of domestic advanced, affordable, nuclear energy technologies by—

''(1) demonstrating a variety of advanced nuclear reactor technologies that could be used to produce—

''(A) safer, emissions-free power at a lower cost compared to reactors operating on the date of enactment of the Nuclear Energy Research and Development Act;

''(B) heat for community heating, industrial purposes, heat storage, or synthetic fuel production;

''(C) remote or off-grid energy supply; or

''(D) backup or mission-critical power supplies;

''(2) identifying research areas that the private sector is unable or unwilling to undertake due to the cost of, or risks associated with, the research; and

''(3) facilitating the access of the private sector—

''(A) to Federal research facilities and personnel; and

''(B) to the results of research relating to civil nuclear technology funded by the Federal Government.

''(c) DEMONSTRATION PROJECTS.—

''(1) IN GENERAL.—In carrying out the program established under subsection (b), the Secretary shall, to the maximum extent practicable—

''(A) enter into agreements to build not fewer than 2 advanced nuclear reactors as demonstration projects to be completed not later than December 31, 2027; and

''(B) not later than December 31, 2035, to enter into not fewer than 2, and not more than 5, agreements, to build advanced nuclear reactors as additional operational demonstration projects.

''(2) REQUIREMENTS.—In carrying out demonstration projects under paragraph (1), the Secretary shall—

''(A) include, as an evaluation criterion, diversity in designs for the advanced nuclear reactors demonstrated under this section, including designs using various—

''(i) primary coolants;

''(ii) fuel types and compositions; and

''(iii) neutron spectra;

''(B) consider, as an evaluation criterion, the likelihood that the operating cost for future commercial units for each design implemented through a demonstration project under this subsection is cost-competitive in the applicable market, including those designs configured as hybrid energy systems as described in section 952(c);

''(C) ensure that each evaluation of candidate technologies for the demonstration projects is completed through an external review of proposed designs, which review shall—

''(i) be conducted by a panel that includes not fewer than 1 representative that

does not have a conflict of interest of each of—

''(I) an electric utility;

''(II) an entity that uses high-temperature process heat for manufacturing or industrial processing, such as a petrochemical or synthetic fuel company, a manufacturer of metals or chemicals, or a manufacturer of concrete;

''(III) an expert from the investment community;

''(IV) a project management practitioner; and

''(V) an environmental health and safety expert; and

''(ii) include a review of each demonstration project under this subsection which shall include consideration of cost-competitiveness and other value streams, together with the technology readiness level, the technical abilities and qualifications of teams desiring to demonstrate a proposed advanced nuclear reactor technology, the capacity to meet cost-share re-

quirements of the Department, if Federal funding is provided, and environmental impacts;

''(D) for federally funded demonstration projects, enter into cost-sharing agreements with private sector partners in accordance with section 988 for the conduct of activities relating to the research, development, and demonstration of advanced nuclear reactor designs under the program;

''(E) work with private sector partners to identify potential sites, including Department-owned sites, for demonstrations, as appropriate;

''(F) consult with—

''(i) National Laboratories;

''(ii) institutions of higher education;

''(iii) traditional end users (such as electric utilities);

''(iv) potential end users of new technologies (such as users of high-temperature process heat for manufacturing processing, including petrochemical or synthetic fuel companies, manufacturers of metals or chemicals, or manufacturers of concrete);

''(v) developers of advanced nuclear reactor technology;

''(vi) environmental and public health and safety experts; and

''(vii) non-proliferation experts;

''(G) seek to ensure that the demonstration projects carried out under paragraph (1) do not cause any delay in the progress of an advanced reactor project by private industry and the Department of Energy that is underway as of the date of enactment of this section;

''(H) establish a streamlined approval process for expedited contracting between awardees and the Department;

''(I) identify technical challenges to candidate technologies;

''(J) support near-term research and development to address the highest risk technical challenges to the successful demonstration of a selected advanced reactor technology, in accordance with—

''(i) subparagraph (A);

''(ii) the research and development activities under section 952(b); and

''(iii) the research and development activities under section 958; and

''(K) establish such technology advisory working groups as the Secretary determines to be appropriate to advise the Secretary regarding the technical challenges identified under subparagraph (A) and the scope of research and development programs to address the challenges, in accordance with subparagraph (B), to be comprised of—

''(i) private sector advanced nuclear reactor technology developers;

''(ii) technical experts with respect to the relevant technologies at institutions of higher education;

''(iii) technical experts at the National Laboratories;

''(iv) environmental and public health and safety experts;

''(v) non-proliferation experts; and

''(vi) any other entities the Secretary determines appropriate.

''(d) MILESTONE-BASED DEMONSTRATION PROJECTS.—

''(1) IN GENERAL.—Using the authority of the Secretary under section 646(g) of the Department of Energy Organization Act (42 U.S.C. 7256(g)), notwithstanding paragraph (10) of such section, the Secretary may carry out not more than 3 demonstration projects under subsection (c) as a milestone-based demonstration project that requires particular technical and financial milestones to be met before a participant is awarded funds by the Department.

''(2) REQUIREMENTS.—In carrying out milestone-based demonstration projects under the authority in paragraph (1), the Secretary shall, for each relevant project,—

''(A) request proposals from eligible entities, as determined by the Secretary, that include—

''(i) a business plan;

''(ii) a plan for raising private sector investment; and

''(iii) proposed technical and financial milestones, including estimated project timelines and total costs, that are in accordance to the requirements specified in subsection (c); and

''(B) award funding of a predetermined amount to projects that successfully meet proposed milestones under subparagraph (A)(iii); and

''(C) require cost-sharing in accordance with Section 988 of the Energy Policy Act of 2005.

''(3) CONSULTATION.—In carrying out demonstration projects under this authority, the Secretary shall consult with experts from the investment community to assess project proposals and determine the commercial viability of project proposals.

''(4) FAILURE TO MEET MILESTONES.—Should an awardee not meet the milestones described in paragraph (2)(A)(iii), the Secretary may end the partnership with the awardee and use the remaining funds in the ended agreement for new or existing demonstration projects under this section.

''(e) NONDUPLICATION.—Entities may not receive funds under this program if receiving funds from another reactor demonstration program at the Department in the same fiscal year.

''(f) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out the program under this subsection—

''(1) $520,000,000 for fiscal year 2021;

''(2) $670,000,000 for fiscal year 2022;

''(3) $670,000,000 for fiscal year 2023;

''(4) $670,000,000 for fiscal year 2024; and

''(5) $670,000,000 for fiscal year 2025.''.

(2) TABLE OF CONTENTS.—The table of contents of the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 594) is amended—

(A) in the items relating to sections 957, 958, and 959, by inserting ''Sec.'' before ''9'' each place it appears; and

(B) by inserting after the item relating to section 959 the following:

''Sec. 959A. Advanced nuclear reactor research, development, demonstration, and commercial application program.''.

(h) INTERNATIONAL NUCLEAR ENERGY COOPERATION.—

(1) IN GENERAL.—Subtitle E of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16271 et seq.), as amended by subsection (g), is further amended by adding at the end the following:

''SEC. 959B. INTERNATIONAL NUCLEAR ENERGY COOPERATION.

''(a) IN GENERAL.—The Secretary, in consultation with international regulators, shall carry out a program—

''(1) to coordinate international efforts with respect to research, development, demonstration, and commercial application of nuclear technology that supports diplomatic, nonproliferation, climate, and international economic objectives for the safe, secure, and peaceful use of such technology; and

''(2) to develop collaboration initiatives with respect to such efforts with a variety of countries through—

''(A) research and development agreements;

''(B) the development of coordinated action plans; and

''(C) new or existing multilateral cooperation commitments including—

''(i) the International Framework for Nuclear Energy Cooperation;

''(ii) the Generation IV International Forum;

''(iii) the International Atomic Energy Agency;

''(iv) the Organization for Economic Co-operation and Development Nuclear Energy Agency; and

''(v) any other international collaborative effort with respect to advanced nuclear reactor operations and safety.

''(b) REQUIREMENTS.—The program under subsection (a) shall be carried out 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.''.

(2) TABLE OF CONTENTS.—The table of contents of the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 594), as amended by subsection (g), is further amended by inserting after the item relating to section 959A the following:

''Sec. 959B. International Nuclear Energy Cooperation.''.

SEC. 4. NUCLEAR ENERGY BUDGET PLAN.

Section 959 of the Energy Policy Act of 2005 (42 U.S.C. 16279) is amended—

(1) by amending subsection (b) to read as follows:

''(b) BUDGET PLAN ALTERNATIVE 1.—One of the budget plans submitted under subsection (a) shall assume constant annual funding for 10 years at the appropriated level for the current fiscal year for the civilian nuclear energy research and development of the Department.''; and

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

''(e) UPDATES.—Not less frequently than once every 2 years, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate updated 10-year budget plans which shall identify, and provide a justification for, any major deviation from a previous budget plan submitted under this section.''.

SEC. 5. ORGANIZATION AND ADMINISTRATION OF PROGRAMS.

(a) IN GENERAL.—Subtitle E of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16271 et seq.), as amended by section 3(h), is further amended by adding at the end of the following:

''SEC. 959C. ORGANIZATION AND ADMINISTRATION OF PROGRAMS.

''(a) COORDINATION.—In carrying out this subtitle, the Secretary shall coordinate activities, and effectively manage crosscutting research priorities across programs of the Department and other relevant Federal agencies, including the National Laboratories.

''(b) COLLABORATION.—

''(1) IN GENERAL.—In carrying out this subtitle, the Secretary shall collaborate with industry, National Laboratories, other relevant Federal agencies, institutions of higher education, including minority-serving institutions and research reactors, Tribal entities, including Alaska Native Corporations, and international bodies with relevant scientific and technical expertise.

''(2) PARTICIPATION.—To the extent practicable, the Secretary shall encourage research projects that promote collaboration between entities specified in paragraph (1).

''(c) DISSEMINATION OF RESULTS AND PUBLIC AVAILABILITY.—The Secretary shall, except to the extent protected from disclosure under section 552(b) of title 5, United States Code, publish the results of projects supported under this subtitle through Department websites, reports, databases, training materials, and industry conferences, including information discovered after the completion of such projects.

''(d) EDUCATION AND OUTREACH.—In carrying out the activities described in this subtitle, the Secretary shall support education and outreach activities to disseminate information and promote public understanding of nuclear energy.

''(e) TECHNICAL ASSISTANCE.—In carrying out this subtitle, for the purposes of supporting technical, non-hardware, and information-based advances in nuclear energy development and operations, the Secretary shall also conduct technical assistance and analysis activities, including activities that support commercial application of nuclear energy in rural, Tribal, and low-income communities.

''(f) PROGRAM REVIEW.—At least annually, all programs in this subtitle shall be subject to an annual review by the Nuclear Energy Advisory Committee of the Department or other independent entity, as appropriate.

''(g) SENSITIVE INFORMATION.—The Secretary shall not publish any information generated under this subtitle that is detrimental to national security, as determined by the Secretary.''.

(b) TABLE OF CONTENTS.—The table of contents of the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 594), as amended by section 3(h), is further amended by inserting after the item relating to section 959B the following:

''Sec. 959C. Organization and administration of programs.''.