AMENDMENT TO RULES COMMITTEE PRINT

116–63

OFFERED BY M__. _____

Strike the item in the table of contents relating to subtitle B of title IV and insert the following:

Beginning on page 400, strike subtitle B and insert the following:

Subtitle B—Nuclear Energy Leadership Act

SEC. 4201. NUCLEAR ENERGY RESEARCH AND DEVELOPMENT.

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 RESEARCH AND DEVELOPMENT PROGRAM.—

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

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

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

''(B) be carried out in consultation with the Nuclear Regulatory Commission to ensure identification of any relevant concerns.

''(3) PUBLIC-PRIVATE PARTNERSHIPS.—

''(A) IN GENERAL.—In carrying out the program under this subsection, the Secretary shall, to the maximum extent practicable and consistent with national security, make available nuclear energy research infrastructure to industry partners in order to achieve faster and cost-effective development of advanced nuclear energy technologies toward commercial readiness. The Secretary shall make available—

''(i) experimental capabilities and testing facilities;

"(ii) computational capabilities, modeling, and simulation tools;

"(iii) access to existing datasets and data validation tools; and

"(iv) land use and site information for demonstration facilities.

"(B) SELECTION.—

"(i) IN GENERAL.—The Secretary shall select industry partners for awards on a competitive merit-reviewed basis.

"(ii) CONSIDERATIONS.—In selecting industry partners under clause (i), the Secretary shall consider—

"(I) the information disclosed by the Department as described in subparagraph (A); and

"(II) any existing facilities the Department will provide for public-private partnership activities.

"(C) TERM.—An award made to an industry partner under this subsection shall be for a period of not more than 5 years, subject to the availability of appropriations, after which the award may be renewed, subject to a rigorous merit review.

''(4) DEFINITION OF ADVANCED NUCLEAR ENERGY.—In this subsection, the term 'advanced nuclear energy' means energy provided by—

''(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 the most recent generation of 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; or

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

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

SEC. 4202. VERSATILE NEUTRON SOURCE.

Section 955(c) of the Energy Policy Act of 2005 (42 U.S.C. 16275(c)) is amended to read as follows:

''(c) VERSATILE NEUTRON SOURCE.—

''(1) IN GENERAL.—In order to advance the research and development of domestic advanced, affordable, secure, and clean nuclear energy, the Secretary shall construct a versatile reactor-based fast neutron source, which shall operate as a national user facility. The Secretary shall consult with the private sector, universities, National Laboratories, and relevant Federal agencies to ensure that such facility is capable of meeting Federal research needs for neutron irradiation services.

''(2) FACILITY CAPABILITIES.—

''(A) CAPABILITIES.—The Secretary shall ensure that the facility described in paragraph

(1) will provide, at a minimum, the following capabilities:

''(i) Fast neutron spectrum irradiation capability.

''(ii) Capacity for upgrades to accommodate new or expanded research needs.

''(B) CONSIDERATIONS.—In carrying out subparagraph (A), the Secretary shall consider the following:

''(i) Capabilities that support experimental high-temperature testing.

''(ii) Providing a source of fast neutrons, at a neutron flux higher than that at which existing research facilities operate, sufficient to enable research for an optimal base of prospective users.

''(iii) Maximizing irradiation flexibility and irradiation volume to accommodate as many concurrent users as possible.

''(iv) Capabilities for irradiation with neutrons of a lower energy spectrum.

''(v) Multiple loops for fuels and materials testing of different coolants.

''(vi) Additional pre-irradiation and post-irradiation examination capabilities.

''(vii) Lifetime operating costs and lifecycle costs.

''(3) START OF OPERATIONS.—The Secretary shall, to the maximum extent practicable, ensure that the start of full operations of the facility described in paragraph (1) occurs before December 31, 2026.

''(4) REPORTING.—The Secretary shall include in the annual budget request of the Department an explanation for any delay in the process of the Department in completing the facility described in paragraph (1) by the deadline described in paragraph (3).

''(5) COORDINATION.—The Secretary shall leverage the best practices for management, construction, and operation of national user facilities from the Office of Science.

''(6) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for the Office of Nuclear Energy to carry out to completion the construction of the facility under this subsection—

''(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.''.

SEC. 4203. HIGH-PERFORMANCE COMPUTATION COLLABORATIVE RESEARCH PROGRAM.

Section 957 of the Energy Policy Act of 2005 (42 U.S.C. 16277) is amended by adding at the end the following:

''(d) DUPLICATION.—The Secretary shall ensure the coordination of, and avoid unnecessary duplication of, the activities of the program under subsection (a) with the activities of—

''(1) other research entities of the Department, including the National Laboratories, the Advanced Research Projects Agency–Energy, and the Advanced Scientific Computing Research program; and

''(2) industry.''.

SEC. 4204. ADVANCED NUCLEAR REACTOR RESEARCH AND DEVELOPMENT GOALS.

(a) 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 AND DEVELOPMENT GOALS.

''(a) DEFINITIONS.—In this section:

''(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 the most recent generation of 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; or

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

''(B) a fusion reactor.

''(2) DEMONSTRATION PROJECT.—The term 'demonstration project' means—

''(A) an advanced nuclear reactor operated—

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

''(ii) in any other manner for the purpose of demonstrating the suitability for commercial application of the advanced nuclear reactor;

''(B) the demonstration of privately funded experimental 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; and

''(C) an advanced nuclear reactor demonstrated by the Secretary of Defense in cooperation with the Secretary of Energy.

''(b) PURPOSE.—The purpose of this section is to direct the Secretary, as soon as practicable after the date of enactment of this section, to advance the research and development of domestic advanced, affordable, and clean nuclear energy by—

''(1) demonstrating different advanced nuclear reactor technologies that could be used by the private sector to produce—

''(A) emission-free power at a levelized cost of electricity of $60 per megawatt- hour or less;

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

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

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

''(2) developing subgoals for nuclear energy research programs that would accomplish the goals of the demonstration projects carried out under subsection (c);

''(3) 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

''(4) 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.—The Secretary shall, to the maximum extent practicable—

''(A) enter into agreements to complete not fewer than 2 demonstration projects by not later than December 31, 2025; and

''(B) establish a program to enter into agreements to demonstrate not fewer than 2, and not more than 5, additional operational advanced reactor designs by not later than December 31, 2035.

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

''(A) include 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) seek to ensure that—

''(i) the long-term cost of electricity or heat for each design to be demonstrated under this subsection is cost-competitive in the applicable market;

''(ii) the selected projects can meet the deadline established in paragraph (1) to demonstrate first-of-a-kind advanced nuclear reactor technologies, for which additional information shall be considered, including—

''(I) the technology readiness level of a proposed advanced nuclear reactor technology;

''(II) the technical abilities and qualifications of teams desiring to demonstrate a proposed advanced nuclear reactor technology; and

''(III) the capacity to meet cost-share requirements of the Department;

''(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 of each of—

''(I) an electric utility; and

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

''(ii) include a review of cost-competitiveness and other value streams, together with the technology readiness level, of each design to be demonstrated under this subsection; and

''(iii) not be required for a demonstration project that is not federally funded;

''(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 demonstra-

tion of private-sector 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) align specific activities carried out under demonstration projects carried out under this subsection with priorities identified through direct consultations between—

''(i) the Department;

''(ii) relevant Federal agencies as determined by the Secretary;

''(iii) National Laboratories;

''(iv) institutions of higher education;

''(v) traditional end-users (such as electric utilities);

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

''(vii) developers of advanced nuclear reactor technology; and

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

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

''(A) identify candidate technologies that—

''(i) are not developed sufficiently for demonstration within the initial required timeframe described in paragraph (1)(A); but

''(ii) could be demonstrated within the timeframe described in paragraph (1)(B);

''(B) identify technical challenges to the candidate technologies identified in subparagraph (A);

''(C) 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 (B); and

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

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

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

''(d) GOALS.—

''(1) IN GENERAL.—The Secretary shall establish goals for research relating to advanced nuclear reactors facilitated by the Department that support the objectives of the program for demonstration projects established under subsection (c).

''(2) COORDINATION.—In developing the goals under paragraph (1), the Secretary shall coordinate,

on an ongoing basis, with members of private industry to advance the demonstration of various designs of advanced nuclear reactors.

''(3) REQUIREMENTS.—In developing the goals under paragraph (1), the Secretary shall ensure that—

''(A) research activities facilitated by the Department to meet the goals developed under this subsection are focused on key areas of nuclear research and deployment ranging from basic science to full-design development, safety evaluation, and licensing;

''(B) research programs designed to meet the goals emphasize—

''(i) resolving materials challenges relating to extreme environments, including extremely high levels of—

''(I) radiation fluence;

''(II) temperature;

''(III) pressure; and

''(IV) corrosion; and

''(ii) qualification of advanced fuels;

''(C) activities are carried out that address near-term challenges in modeling and simulation to enable accelerated design and licensing;

''(D) related technologies, such as technologies to manage, reduce, or reuse nuclear waste, are developed;

''(E) nuclear research infrastructure is maintained or constructed, such as—

''(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) a molten salt testing facility;

''(F) basic knowledge of non-light water coolant physics and chemistry is improved;

''(G) advanced sensors and control systems are developed; and

''(H) advanced manufacturing and advanced construction techniques and materials are investigated to reduce the cost of advanced nuclear reactors.''.

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

(1) in the item relating to section 917, by striking ''Efficiency'';

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

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

''Sec. 959A. Advanced nuclear reactor research and development goals.''.

SEC. 4205. ADVANCED FUELS DEVELOPMENT.

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

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

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

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

(B) by striking ''minimize environmental'' and inserting ''improve fuel cycle performance while minimizing the cost and complexity of processing, environmental impacts,''; and

(C) by striking ''the Generation IV'';

(3) by inserting after paragraph (1) (as so redesignated) the following:

''(2) CONSIDERATIONS.—In carrying out activities under the program, the Secretary shall consider the potential benefits of those activities for civilian

nuclear applications, environmental remediation, and national security.'';

(4) by inserting after paragraph (5) (as so redesignated) the following:

''(6) AUTHORIZATION OF APPROPRIATIONS.—From within funds authorized to be appropriated to the Department of Energy's Office of Nuclear Energy, the Secretary may use to carry out the program under this subsection, $40,000,000 for each of fiscal years 2021 through 2025.'';

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

''(a) MATERIAL RECOVERY AND WASTE FORM DEVELOPMENT.—''; and

(6) by adding at the end the following:

''(b) ADVANCED FUELS.—

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

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

''(i) performance; and

''(ii) accident tolerance; and

''(B) innovative advanced reactor fuels that demonstrate improved—

''(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 initial commercialization by December 31, 2025;

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

''(C) support a healthy nuclear fuel cycle capable of providing higher levels of enriched uranium for domestic advanced nuclear development and for national security applications;

''(D) subject to paragraph (3), publish the results of the studies conducted under subparagraph (B); and

''(E) 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)(C) that is detrimental to national security, as determined by the Secretary.

''(4) AUTHORIZATION OF APPROPRIATIONS.—From within funds authorized to be appropriated to the Department of Energy's Office of Nuclear Energy, the Secretary may use to carry out the program under this subsection $120,000,000 for each of fiscal years 2021 through 2025.''.

SEC. 4206. INTEGRATED ENERGY SYSTEMS PROGRAM.

(a) DEFINITIONS.—In this section:

(1) PROGRAM.—The term ''program'' means the Integrated Energy Systems Program established under subsection (b)(1).

(2) SECRETARY.—The term ''Secretary'' means the Secretary of Energy.

(b) ESTABLISHMENT.—

(1) IN GENERAL.—The Secretary shall establish a program, to be known as the ''Integrated Energy Systems Program''—

(A) to maximize energy production and efficiency;

(B) to develop energy systems involving the integration of nuclear energy with renewable energy, fossil energy, and energy storage; and

(C) to expand the use of emissions-reducing energy technologies into nonelectric sectors to achieve significant reductions in environmental emissions.

(2) PROGRAM ADMINISTRATION; PARTNERS.—The program shall be carried out by the Undersecretary of Energy, in partnership with—

(A) relevant offices within the Department of Energy;

(B) National Laboratories;

(C) institutions of higher education; and

(D) the private sector.

(3) GOALS AND MILESTONES.—The Secretary shall establish quantitative goals and milestones for the program.

(c) RESEARCH AREAS.—Research areas under the program may include—

(1) technology innovation to further the expansion of emissions-reducing energy technologies to accommodate a modern, resilient grid system by—

(A) effectively leveraging multiple energy sources;

(B) enhancing and streamlining engineering design;

(C) carrying out process demonstrations to optimize performance; and

(D) streamlining regulatory review;

(2) advanced power cycles, energy extraction, and processing of complex hydrocarbons to produce high-value chemicals;

(3) efficient use of emissions-reducing energy technologies for hydrogen production to support transportation and industrial needs;

(4) enhancement and acceleration of domestic manufacturing and desalinization technologies and processes by optimally using clean energy sources;

(5) more effective thermal energy use, transport, and storage;

(6) the demonstration of nuclear energy delivery for—

(A) the production of chemicals, metals, and fuels;

(B) the capture, use, and storage of carbon;

(C) renewable integration with an integrated energy system; and

(D) conversion of carbon feedstock, such as coal, biomass, natural gas, and refuse waste, to higher value nonelectric commodities;

(7) the development of new analysis capabilities to identify the best ways—

(A) to leverage multiple energy sources in a given region; and

(B) to quantify the benefits of integrated energy systems; and

(8) any other area that, as determined by the Secretary, meets the purpose and goals of the program.

(d) GRANTS.—The Secretary may award grants under the program to support the goals of the program.

SEC. 4207. REPORT ON DUPLICATIVE PROGRAMS.

Not later than 1 year after the date of enactment of this Act, and annually thereafter, the Secretary shall submit to Congress a report identifying any program that is duplicative of the program established under section 4207(b)(1).

SEC. 4208. LIGHT WATER REACTOR SUSTAINABILITY PROGRAM.

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

''(b) LIGHT WATER REACTOR SUSTAINABILITY PROGRAM.—The Secretary shall carry out a light water reactor sustainability program—

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

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

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

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

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

''(6) to 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 the safety, security, reliability, and economics of operating nuclear power plants; and

''(7) to focus on—

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

''(B) enabling technologies beyond individual programs;

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

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

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

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

SEC. 4209. NUCLEAR ENERGY STRATEGIC PLAN.

(a) 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. NUCLEAR ENERGY STRATEGIC PLAN.

''(a) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to the Committee on Energy and Natural Resources of the Senate and the Committees on Energy and Commerce and Science, Space, and Technology of the House of Representatives a 10-year strategic plan for the Office of Nu-

clear Energy of the Department, in accordance with this section.

''(b) REQUIREMENTS.—In developing the strategic plan under this section, the Secretary shall specify expected timelines for, as applicable—

''(1) the accomplishment of relevant objectives under current programs of the Department; or

''(2) the commencement of new programs to accomplish those objectives.

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

(b) TABLE OF CONTENTS.—Section 1(b) of the Energy Policy Act of 2005 (42 U.S.C. 15801 note) is amended in the table of contents by inserting after the item relating to section 959 the following:

''Sec. 959A. Nuclear energy strategic plan.''.

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