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114TH CONGRESS
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H. R. 4084

To enable civilian research and development of advanced nuclear energy technologies by private and public institutions and to expand theoretical and practical knowledge of nuclear physics, chemistry, and materials science.

IN THE HOUSE OF REPRESENTATIVES

NOVEMBER 19, 2015

Mr. WEBER of Texas (for himself, Ms. EDDIE BERNICE JOHNSON of Texas, Mr. SMITH of Texas, Mr. LIPINSKI, Mr. LOUDERMILK, Mr. PERLMUTTER, Mrs. COMSTOCK, Mr. TONKO, Mr. BRIDENSTINE, Mr. ROHRABACHER, Mr. HULTGREN, Mr. WESTERMAN, Mr. SCHWEIKERT, Mr. BABIN, Mr. CULBERSON, Mr. BRADY of Texas, Mr. SESSIONS, Mr. CARTER of Texas, Mr. CONAWAY, Mr. MARCHANT, and Mr. FARENTHOLD) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

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A BILL

To enable civilian research and development of advanced nuclear energy technologies by private and public institutions and to expand theoretical and practical knowledge of nuclear physics, chemistry, and materials science.

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 Innovation Capabilities Act''.

SEC. 2. DEFINITIONS.

In this Act:

(1) ADVANCED FISSION REACTOR.—The term ''advanced fission reactor'' means a nuclear fission reactor with significant improvements over the most recent generation of nuclear reactors, which may include inherent safety features, lower waste yields, greater fuel utilization, superior reliability, resistance to proliferation, and increased thermal efficiency.

(2) DEPARTMENT.—The term ''Department'' means the Department of Energy.

(3) FAST NEUTRON.—The term ''fast neutron'' means a neutron with kinetic energy above 100 kiloelectron volts.

(4) NATIONAL LABORATORY.—The term ''National Laboratory'' has the meaning given that term in paragraph (3) of section 2 of the Energy Policy Act of 2005 (42 U.S.C. 15801(3)), except that with respect to subparagraphs (G), (H), and (N) of such paragraph, for purposes of this Act the term includes only the civilian activities thereof.

(5) NEUTRON FLUX.—The term ''neutron flux'' means the intensity of neutron radiation measured as a rate of flow of neutrons applied over an area.

(6) NEUTRON SOURCE.—The term ''neutron source'' means a research machine that provides neutron irradiation services for research on materials sciences and nuclear physics as well as testing of advanced materials, nuclear fuels, and other related components for reactor systems.

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

SEC. 3. MISSION.

Section 951(a) of the Energy Policy Act of 2005 (42 U.S.C. 16271(a)) is amended to read as follows:

''(a) IN GENERAL.—The Secretary shall conduct programs of civilian nuclear research, development, demonstration, and commercial application, including activities in this subtitle. Such programs shall take into consideration the following objectives:

''(1) Providing research infrastructure to promote scientific progress and enable users from academia, the National Laboratories, and the private sector to make scientific discoveries relevant for nuclear, chemical, and materials science engineering.

''(2) Maintaining National Laboratory and university nuclear energy research and development programs, including their infrastructure.

"(3) Providing the technical means to reduce the likelihood of nuclear weapons proliferation and increasing confidence margins for public safety of nuclear energy systems.

"(4) Reducing the environmental impact of nuclear energy related activities.

"(5) Supporting technology transfer from the National Laboratories to the private sector.

"(6) Enabling the private sector to partner with the National Laboratories to demonstrate novel reactor concepts for the purpose of resolving technical uncertainty associated with the aforementioned objectives in this section.".

SEC. 4. SENSE OF CONGRESS.

It is the sense of the Congress that nuclear energy, through fission or fusion, represents the highest energy density of any known attainable source and yields zero air emissions. This energy source is of national importance to scientific progress, national security, electricity generation, heat generation for industrial applications, and space exploration. Considering the inherent complexity and regulatory burden associated with this area of science, the Department should focus its civilian nuclear research and development activities towards programs that enable the private sector, National Laboratories, and universities to

carry out such experiments as are necessary to promote scientific progress and enhance practical knowledge of nuclear engineering.

SEC. 5. HIGH-PERFORMANCE COMPUTATION AND SUPPORTIVE RESEARCH.

(a) MODELING AND SIMULATION.—The Secretary shall carry out a program to enhance the Nation's capabilities to develop new reactor technologies through high-performance computation modeling and simulation techniques. This program shall coordinate with relevant Federal agencies through the National Strategic Computing Initiative created under Executive Order 13702 (July 29, 2015) while taking into account the following objectives:

(1) Utilizing expertise from the private sector, universities, and National Laboratories to develop computational software and capabilities that prospective users may access to accelerate research and development of advanced fission reactor systems, nuclear fusion systems, and reactor systems for space exploration.

(2) Developing computational tools to simulate and predict nuclear phenomena that may be validated through physical experimentation.

(3) Increasing the utility of the Department's research infrastructure by coordinating with the Ad-

vanced Scientific Computing Research program within the Office of Science.

(4) Leveraging experience from the Energy Innovation Hub for Modeling and Simulation.

(5) Ensuring that new experimental and computational tools are accessible to relevant research communities.

(b) SUPPORTIVE RESEARCH ACTIVITIES.—The Secretary shall consider support for additional research activities to maximize the utility of its research facilities, including physical processes to simulate degradation of materials and behavior of fuel forms and for validation of computational tools.

SEC. 6. VERSATILE NEUTRON SOURCE.

(a) MISSION NEED.—Not later than December 31, 2016, the Secretary shall determine the mission need for a versatile reactor-based fast neutron source, which shall operate as a national user facility. During this process, the Secretary shall consult with the private sector, universities, National Laboratories, and relevant Federal agencies to ensure that this user facility will meet the research needs of the largest possible majority of prospective users.

(b) ESTABLISHMENT.—Upon the determination of mission need made under subsection (a), the Secretary shall, as expeditiously as possible, provide to the Com-

mittee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a detailed plan for the establishment of the user facility.

(c) FACILITY REQUIREMENTS.—

(1) CAPABILITIES.—The Secretary shall ensure that this user facility will provide, at a minimum, the following capabilities:

(A) Fast neutron spectrum irradiation capability.

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

(2) CONSIDERATIONS.—In carrying out the plan provided under subsection (b), the Secretary shall consider the following:

(A) Capabilities that support experimental high-temperature testing.

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

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

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

(E) Multiple loops for fuels and materials testing in different coolants.

(F) Additional pre-irradiation and post-irradiation examination capabilities.

(d) REPORTING PROGRESS.—The Department shall, in its annual budget requests, provide an explanation for any delay in its progress and otherwise make every effort to complete construction and approve the start of operations for this facility by December 31, 2025.

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

SEC. 7. ENABLING NUCLEAR ENERGY INNOVATION.

(a) NATIONAL REACTOR INNOVATION CENTER.—The Secretary shall carry out a program to enable the testing and demonstration of reactor concepts to be proposed and funded by the private sector. The Secretary shall leverage the technical expertise of relevant Federal agencies and National Laboratories in order to minimize the time required to enable construction and operation of privately funded experimental reactors at National Laboratories or other Department-owned sites while ensuring reasonable

safety for persons working within these sites. Such reactors shall operate to meet the following objectives:

(1) Enabling physical validation of novel reactor concepts.

(2) Resolving technical uncertainty and increasing practical knowledge relevant to safety, resilience, security, and functionality of first-of-a-kind reactor concepts.

(3) General research and development to improve nascent technologies.

(b) REPORTING REQUIREMENT.—Not later than 180 days after the date of enactment of this Act, the Secretary, in consultation with the National Laboratories, relevant Federal agencies, and other stakeholders, shall transmit 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 assessing the Department's capabilities to authorize, host, and oversee privately funded fusion and advanced fission experimental reactors as described under subsection (a). The report shall address the following:

(1) The Department's safety review and oversight capabilities, including options to leverage expertise from the Nuclear Regulatory Commission and National Laboratories.

(2) Potential sites capable of hosting activities described under subsection (a).

(3) The efficacy of the Department's available contractual mechanisms to partner with the private sector and Federal agencies, including cooperative research and development agreements, strategic partnership projects, and agreements for commercializing technology.

(4) Potential cost structures related to physical security, decommissioning, liability, and other long-term project costs.

(5) Other challenges or considerations identified by the Secretary.

SEC. 8. BUDGET PLAN.

Not later than 12 months after the date of enactment of this Act, the Department shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate 3 alternative 10-year budget plans for civilian nuclear energy research and development by the Department. The first shall assume constant annual funding for 10 years at the appropriated level for the Department's civilian nuclear energy research and development for fiscal year 2016. The second shall assume 2 percent annual increases to the appropriated level for

the Department's nuclear energy research and development for fiscal year 2016. The third shall be an unconstrained budget. The 3 plans shall include—

(1) a prioritized list of the Department's programs, projects, and activities to best support the development of next generation nuclear energy technology;

(2) realistic budget requirements for the Department to implement sections 5, 6, and 7 of this Act; and

(3) the Department's justification for continuing or terminating existing civilian nuclear energy research and development programs.

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