115TH CONGRESS
1ST SESSION

H. R. 589

AN ACT

To establish Department of Energy policy for science and energy research and development programs, and reform National Laboratory management and technology transfer programs, 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; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the ''Department of Energy Research and Innovation Act''.

(b) TABLE OF CONTENTS.—The table of contents of this Act is as follows:

SEC. 2. DEFINITIONS.

In this Act:

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

(2) DIRECTOR.—The term ''Director'' means the Director of the Office of Science of the Department, except as otherwise indicated.

(3) NATIONAL LABORATORY.—The term ''National Laboratory'' has the meaning given that term in section 2 of the Energy Policy Act of 2005 (42 U.S.C. 15801).

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

TITLE I—LABORATORY MODERNIZATION AND TECHNOLOGY TRANSFER

SEC. 101. SHORT TITLE.

This title may be cited as the ''Laboratory Modernization and Technology Transfer Act''.

SEC. 102. INCLUSION OF EARLY STAGE TECHNOLOGY DEMONSTRATION IN AUTHORIZED TECHNOLOGY TRANSFER ACTIVITIES.

Section 1001 of the Energy Policy Act of 2005 (42 U.S.C. 16391) is amended—

(1) by redesignating subsection (g) as subsection (h); and

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

''(g) EARLY STAGE TECHNOLOGY DEMONSTRATION.—The Secretary shall permit the directors of the National Laboratories to use funds authorized to support technology transfer within the Department to carry out early stage and precommercial technology demonstration activities to remove technology barriers that limit private sector interest and demonstrate potential commercial applications of any research and technologies arising from National Laboratory activities.''.

SEC. 103. SENSE OF CONGRESS ON ACCELERATING ENERGY INNOVATION.

It is the sense of Congress that—

(1) although important progress has been made in cost reduction and deployment of clean energy technologies, accelerating clean energy innovation will help meet critical competitiveness, energy security, and environmental goals;

(2) accelerating the pace of clean energy innovation in the United States calls for—

(A) supporting existing research and development programs at the Department and the world-class National Laboratories;

(B) exploring and developing new pathways for innovators, investors, and decision-makers to leverage the resources of the Department for addressing the challenges and comparative strengths of geographic regions; and

(C) recognizing the financial constraints of the Department, regularly reviewing clean energy programs to ensure that taxpayer investments are maximized;

(3) the energy supply, demand, policies, markets, and resource options of the United States vary by geographic region;

(4) a regional approach to innovation can bridge the gaps between local talent, institutions, and industries to identify opportunities and convert United States investment into domestic companies; and

(5) Congress, the Secretary, and energy industry participants should advance efforts that promote international, domestic, and regional cooperation on the research and development of energy innovations that—

(A) provide clean, affordable, and reliable energy for everyone;

(B) promote economic growth;

(C) are critical for energy security; and

(D) are sustainable without government support.

SEC. 104. RESTORATION OF LABORATORY DIRECTED RESEARCH AND DEVELOPMENT PROGRAM.

(a) IN GENERAL.—Except as provided in subsection (b), the Secretary shall ensure that laboratory operating contractors do not allocate costs of general and administrative overhead to laboratory directed research and development.

(b) EXCEPTION FOR NATIONAL SECURITY LABORATORIES.—This section shall not apply to the national security laboratories with respect to which section 3119 of the National Defense Authorization Act for Fiscal Year 2017 (Public Law 114–328) applies.

SEC. 105. RESEARCH GRANTS DATABASE.

(a) IN GENERAL.—The Secretary shall establish and maintain a public database, accessible on the website of the Department, that contains a searchable listing of each unclassified research and development project contract, grant, cooperative agreement, task order for a federally funded research and development center, or other transaction administered by the Department.

(b) REQUIREMENTS.—Each listing described in subsection (a) shall include, at a minimum, for each listed

project, the Department office carrying out the project, the project name, an abstract or summary of the project, funding levels, project duration, contractor or grantee name (including the names of any subcontractors), and expected objectives and milestones.

(c) RELEVANT LITERATURE AND PATENTS.—The Secretary shall provide information through the public database established under subsection (a) on relevant literature and patents that are associated with each research and development project contract, grant, or cooperative agreement, or other transaction, of the Department.

SEC. 106. TECHNOLOGY TRANSFER AND TRANSITIONS ASSESSMENT.

Not later than 1 year after the date of enactment of this Act, and as often as the Secretary determines to be necessary thereafter, the Secretary shall transmit to the appropriate committees of Congress a report that includes recommended changes to the policy of the Department and legislative changes to section 1001 of the Energy Policy Act of 2005 (42 U.S.C. 16391) to improve the ability of the Department to successfully transfer new energy technologies to the private sector.

SEC. 107. AGREEMENTS FOR COMMERCIALIZING TECHNOLOGY PILOT PROGRAM.

(a) IN GENERAL.—The Secretary shall carry out the Agreements for Commercializing Technology pilot program of the Department, as announced by the Secretary on December 8, 2011, in accordance with this section.

(b) TERMS.—Each agreement entered into pursuant to the pilot program referred to in subsection (a) shall provide to the contractor of the applicable National Laboratory, to the maximum extent determined to be appropriate by the Secretary, increased authority to negotiate contract terms, such as intellectual property rights, payment structures, performance guarantees, and multiparty collaborations.

(c) ELIGIBILITY.—

(1) IN GENERAL.—Any director of a National Laboratory may enter into an agreement pursuant to the pilot program referred to in subsection (a).

(2) AGREEMENTS WITH NON-FEDERAL ENTITIES.—To carry out paragraph (1) and subject to paragraph (3), the Secretary shall permit the directors of the National Laboratories to execute agreements with a non-Federal entity, including a non-Federal entity already receiving Federal funding that will be used to support activities under agreements executed pursuant to paragraph (1), provided

that such funding is solely used to carry out the purposes of the Federal award.

(3) RESTRICTION.—The requirements of chapter 18 of title 35, United States Code (commonly known as the ''Bayh-Dole Act'') shall apply if—

(A) the agreement is a funding agreement (as that term is defined in section 201 of that title); and

(B) at least one of the parties to the funding agreement is eligible to receive rights under that chapter.

(d) SUBMISSION TO SECRETARY.—Each affected director of a National Laboratory shall submit to the Secretary, with respect to each agreement entered into under this section—

(1) a summary of information relating to the relevant project;

(2) the total estimated costs of the project;

(3) estimated commencement and completion dates of the project; and

(4) other documentation determined to be appropriate by the Secretary.

(e) CERTIFICATION.—The Secretary shall require the contractor of the affected National Laboratory to certify

that each activity carried out under a project for which an agreement is entered into under this section—

(1) is not in direct competition with the private sector; and

(2) does not present, or minimizes, any apparent conflict of interest, and avoids or neutralizes any actual conflict of interest, as a result of the agreement under this section.

(f) EXTENSION.—The pilot program referred to in subsection (a) shall be extended until September 30, 2019.

(g) REPORTS.—

(1) OVERALL ASSESSMENT.—Not later than 60 days after the date described in subsection (f), the Secretary, in coordination with directors of the National Laboratories, shall submit to the appropriate committees of Congress a report that—

(A) assesses the overall effectiveness of the pilot program referred to in subsection (a);

(B) identifies opportunities to improve the effectiveness of the pilot program;

(C) assesses the potential for program activities to interfere with the responsibilities of the National Laboratories to the Department; and

(D) provides a recommendation regarding the future of the pilot program.

(2) TRANSPARENCY.—The Secretary, in coordination with directors of the National Laboratories, shall submit to the appropriate committees of Congress an annual report that accounts for all incidences of, and provides a justification for, non-Federal entities using funds derived from a Federal contract or award to carry out agreements pursuant to this section.

SEC. 108. SHORT-TERM COST-SHARE PILOT PROGRAM.

(a) IN GENERAL.—Section 988(b) of the Energy Policy Act of 2005 (42 U.S.C. 16352(b)) is amended—

(1) in paragraph (1), by striking ''Except as provided in paragraphs (2) and (3)'' and inserting ''Except as provided in paragraphs (2), (3), and (4)''; and

(2) by adding at the end the following:

''(4) EXEMPTION FOR INSTITUTIONS OF HIGHER EDUCATION AND OTHER NONPROFIT INSTITUTIONS.—

''(A) IN GENERAL.—Paragraph (1) shall not apply to a research or development activity performed by an institution of higher education or nonprofit institution (as defined in section 4

of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703)).

''(B) TERMINATION DATE.—The exemption under subparagraph (A) shall apply during the 2-year period beginning on the date of enactment of this paragraph.''.

(b) REPORTS.—

(1) INITIAL REPORT.—As soon as practicable after the date of enactment of this Act, the Secretary shall submit to the appropriate committees of Congress a report that describes the use of cost-sharing waivers by the Department under section 988(b) of the Energy Policy Act of 2005 (42 U.S.C. 16352(b)) during the 2-year period ending on the date of enactment of this Act.

(2) ANNUAL REPORTS.—Annually during the 2-year period beginning on the date of enactment of this Act, the Secretary shall submit to the appropriate committees of Congress a report that describes the use of cost-sharing waivers by the Department under section 988(b) of the Energy Policy Act of 2005 (42 U.S.C. 16352(b)) during the period covered by the report.

TITLE II—DEPARTMENT OF ENERGY RESEARCH COORDINATION

SEC. 201. SHORT TITLE.

This title may be cited as the ''Department of Energy Research Coordination Act''.

SEC. 202. PROTECTION OF INFORMATION.

Section 5012 of the America Competes Act (42 U.S.C. 16538) is amended—

(1) in subsection (a)(3), by striking ''subsection (n)(1)'' and inserting ''subsection (o)(1)'';

(2) by redesignating subsection (n) as subsection (o); and

(3) by inserting after subsection (m) the following:

''(n) PROTECTION OF INFORMATION.—The following types of information collected by ARPA–E from recipients of financial assistance awards shall be considered commercial and financial information obtained from a person and privileged or confidential and not subject to disclosure under section 552(b)(4) of title 5, United States Code:

''(1) Plans for commercialization of technologies developed under the award, including business plans, technology-to-market plans, market studies, and cost and performance models.

''(2) Investments provided to an awardee from third parties (such as venture capital firms, hedge funds, and private equity firms), including amounts and the percentage of ownership of the awardee provided in return for the investments.

''(3) Additional financial support that the awardee—

''(A) plans to or has invested into the technology developed under the award; or

''(B) is seeking from third parties.

''(4) Revenue from the licensing or sale of new products or services resulting from research conducted under the award.''.

SEC. 203. CROSSCUTTING RESEARCH AND DEVELOPMENT.

(a) IN GENERAL.—The Secretary shall use the capabilities of the Department to identify strategic opportunities for collaborative research, development, demonstration, and commercial application of innovative science and technologies.

(b) EXISTING PROGRAMS; COORDINATION OF ACTIVITIES.—To the maximum extent practicable, the Secretary shall seek—

(1) to leverage existing programs of the Department; and

(2) to consolidate and coordinate activities throughout the Department to promote collaboration and crosscutting approaches within programs of the Department.

(c) ADDITIONAL ACTIONS.—The Secretary shall—

(1) prioritize activities that use all affordable domestic resources;

(2) develop a planning, evaluation, and technical assessment framework for setting objective long-term strategic goals and evaluating progress that—

(A) ensures integrity and independence; and

(B) provides the flexibility to adapt to market dynamics;

(3) ensure that activities shall be undertaken in a manner that does not duplicate other activities within the Department or other Federal Government activities; and

(4) identify programs that may be more effectively left to the States, industry, nongovernmental organizations, institutions of higher education, or other stakeholders.

SEC. 204. STRATEGIC RESEARCH PORTFOLIO ANALYSIS AND COORDINATION PLAN.

The Energy Policy Act of 2005 is amended by striking section 994 (42 U.S.C. 16358) and inserting the following:

"SEC. 994. STRATEGIC RESEARCH PORTFOLIO ANALYSIS AND COORDINATION PLAN.

''(a) IN GENERAL.—The Secretary shall periodically review all of the science and technology activities of the Department in a strategic framework that takes into account—

''(1) the frontiers of science to which the Department can contribute;

''(2) the national needs relevant to the statutory missions of the Department; and

''(3) global energy dynamics.

''(b) COORDINATION ANALYSIS AND PLAN.—

''(1) IN GENERAL.—As part of the review under subsection (a), the Secretary shall develop a plan to improve coordination and collaboration in research, development, demonstration, and commercial application activities across organizational boundaries of the Department.

''(2) PLAN CONTENTS.—The plan developed under paragraph (1) shall describe—

''(A) crosscutting scientific and technical issues and research questions that span more than one program or major office of the Department;

''(B) ways in which the applied technology programs of the Department are coordinating activities and addressing the questions referred to in subparagraph (A);

''(C) ways in which the technical interchange within the Department, particularly between the Office of Science and the applied technology programs, could be enhanced, including ways in which the research agendas of the Office of Science and the applied programs could better interact and assist each other;

''(D) ways in which the Secretary would ensure that the overall research agenda of the Department includes, in addition to fundamental, curiosity-driven research, fundamental research related to topics of concern to the applied programs, and applications in Departmental technology programs of research results generated by fundamental, curiosity-driven research;

''(E) critical assessments of any ongoing programs that have experienced subpar performance or cost overruns of 10 percent or more over 1 or more years;

''(F) any activities that may be more effectively left to the States, industry, nongovernmental organizations, institutions of higher education, or other stakeholders; and

''(G) detailed evaluations and proposals for innovation hubs, institutes, and research centers of the Department, including—

''(i) an affirmation that the hubs, institutes, and research centers will—

''(I) advance the mission of the Department; and

''(II) prioritize research, development, and demonstration; and

''(ii) an affirmation that any hubs, institutes, or research centers that are established or renewed within the Office of Science are consistent with the mission of the Office of Science described in subsection (c) of section 209 of the Department of Energy Organization Act (42 U.S.C. 7139).

''(c) SUBMISSION TO CONGRESS.—Every 4 years, the Secretary shall submit to Congress—

''(1) the results of the review under subsection (a); and

''(2) the coordination plan under subsection (b).''.

SEC. 205. STRATEGY FOR FACILITIES AND INFRASTRUCTURE.

(a) AMENDMENTS.—Section 993 of the Energy Policy Act of 2005 (42 U.S.C. 16357) is amended—

(1) by striking the section heading and inserting the following: ''**STRATEGY FOR FACILITIES AND INFRASTRUCTURE**''; and

(2) in subsection (b)(1), by striking ''2008'' and inserting ''2018''.

(b) CLERICAL AMENDMENT.—The table of contents in section 1(b) of the Energy Policy Act of 2005 is amended by striking the item relating to section 993 and inserting the following:

''Sec. 993. Strategy for facilities and infrastructure.''.

SEC. 206. ENERGY INNOVATION HUBS.

(a) DEFINITIONS.—In this section:

(1) ADVANCED ENERGY TECHNOLOGY.—The term ''advanced energy technology'' means—

(A) an innovative technology—

(i) that produces energy from solar, wind, geothermal, biomass, tidal, wave, ocean, or other renewable energy resources;

(ii) that produces nuclear energy;

(iii) for carbon capture and sequestration;

(iv) that enables advanced vehicles, vehicle components, and related technologies that result in significant energy savings;

(v) that generates, transmits, distributes, uses, or stores energy more efficiently than conventional technologies, including through Smart Grid technologies; or

(vi) that enhances the energy independence and security of the United States by enabling improved or expanded supply and production of domestic energy resources, including coal, oil, and natural gas;

(B) a research, development, demonstration, or commercial application activity necessary to ensure the long-term, secure, and sustainable supply of an energy-critical element; or

(C) any other innovative energy technology area identified by the Secretary.

(2) HUB.—

(A) IN GENERAL.—The term ''Hub'' means an Energy Innovation Hub established under this section.

(B) INCLUSION.—The term ''Hub'' includes any Energy Innovation Hub in existence on the date of enactment of this Act.

(3) QUALIFYING ENTITY.—The term ''qualifying entity'' means—

(A) an institution of higher education;

(B) an appropriate State or Federal entity, including a federally funded research and development center of the Department;

(C) a nongovernmental organization with expertise in advanced energy technology research, development, demonstration, or commercial application; or

(D) any other relevant entity the Secretary determines appropriate.

(b) AUTHORIZATION OF PROGRAM.—

(1) IN GENERAL.—The Secretary shall carry out a program to enhance the economic, environmental, and energy security of the United States by

making awards to consortia for establishing and operating hubs, to be known as ''Energy Innovation Hubs'', to conduct and support, at, if practicable, one centralized location, multidisciplinary, collaborative research, development, demonstration, and commercial application of advanced energy technologies.

(2) TECHNOLOGY DEVELOPMENT FOCUS.—The Secretary shall designate for each Hub a unique advanced energy technology or basic research focus.

(3) COORDINATION.—The Secretary shall ensure the coordination of, and avoid unnecessary duplication of, the activities of each Hub with the activities of—

(A) other research entities of the Department, including the National Laboratories, the Advanced Research Projects Agency—Energy, and Energy Frontier Research Centers; and

(B) industry.

(c) APPLICATION PROCESS.—

(1) ELIGIBILITY.—To be eligible to receive an award for the establishment and operation of a Hub under subsection (b)(1), a consortium shall—

(A) be composed of not fewer than two qualifying entities;

(B) operate subject to a binding agreement, entered into by each member of the consortium, that documents—

(i) the proposed partnership agreement, including the governance and management structure of the Hub;

(ii) measures the consortium will undertake to enable cost-effective implementation of activities under the program described in subsection (b)(1); and

(iii) a proposed budget, including financial contributions from non-Federal sources; and

(C) operate as a nonprofit organization.

(2) APPLICATION.—

(A) IN GENERAL.—A consortium seeking to establish and operate a Hub under subsection (b)(1) shall submit to the Secretary an application at such time, in such manner, and containing such information as the Secretary may require, including a detailed description of each element of the consortium agreement required under paragraph (1)(B).

(B) REQUIREMENT.—If the consortium members will not be located at one centralized

location, the application under subparagraph (A) shall include a communications plan that ensures close coordination and integration of Hub activities.

(3) SELECTION.—

(A) IN GENERAL.—The Secretary shall select consortia for awards for the establishment and operation of Hubs through a competitive selection process.

(B) CONSIDERATIONS.—In selecting consortia under subparagraph (A), the Secretary shall consider—

(i) the information disclosed by the consortium under this subsection; and

(ii) any existing facilities a consortium will provide for Hub activities.

(d) TERM.—

(1) IN GENERAL.—An award made to a Hub under this section 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.

(2) EXISTING HUBS.—A Hub already in existence on, or undergoing a renewal process on, the date of enactment of this Act—

(A) may continue to receive support during the 5-year period beginning on the date of establishment of that Hub; and

(B) shall be eligible for renewal of that support at the end of that 5-year period.

(e) HUB OPERATIONS.—

(1) IN GENERAL.—Each Hub shall conduct or provide for multidisciplinary, collaborative research, development, demonstration, and commercial application of advanced energy technologies within the technology development focus designated under subsection (b)(2).

(2) ACTIVITIES.—Each Hub shall—

(A) encourage collaboration and communication among the member qualifying entities of the consortium and awardees;

(B) develop and publish proposed plans and programs on a publicly accessible website;

(C) submit an annual report to the Department summarizing the activities of the Hub, including—

(i) detailing organizational expenditures; and

(ii) describing each project undertaken by the Hub; and

(D) monitor project implementation and coordination.

(3) CONFLICTS OF INTEREST.—Each Hub shall maintain conflict of interest procedures, consistent with the conflict of interest procedures of the Department.

(4) PROHIBITION ON CONSTRUCTION.—

(A) IN GENERAL.—Except as provided in subparagraph (B)—

(i) no funds provided under this section may be used for construction of new buildings or facilities for Hubs; and

(ii) construction of new buildings or facilities shall not be considered as part of the non-Federal share of a Hub cost-sharing agreement.

(B) TEST BED AND RENOVATION EXCEPTION.—Nothing in this paragraph prohibits the use of funds provided under this section or non-Federal cost share funds for the construction of a test bed or renovations to existing buildings or facilities for the purposes of research if the Secretary determines that the test bed or renovations are limited to a scope and scale necessary for the research to be conducted.

TITLE III—DEPARTMENT OF ENERGY OFFICE OF SCIENCE POLICY

SEC. 301. SHORT TITLE.

This title may be cited as the ''Department of Energy Office of Science Policy Act''.

SEC. 302. MISSION.

Section 209 of the Department of Energy Organization Act (42 U.S.C. 7139) is amended by adding at the end the following:

''(c) MISSION.—The mission of the Office of Science shall be the delivery of scientific discoveries, capabilities, and major scientific tools to transform the understanding of nature and to advance the energy, economic, and national security of the United States.''.

SEC. 303. BASIC ENERGY SCIENCES.

(a) ENERGY FRONTIER RESEARCH CENTERS.—

(1) IN GENERAL.—The Director shall carry out a program to provide awards, on a competitive, merit-reviewed basis, to multi-institutional collaborations or other appropriate entities to conduct fundamental and use-inspired energy research to accelerate scientific breakthroughs.

(2) COLLABORATIONS.—A collaboration receiving an award under this subsection may include multiple types of institutions and private sector entities.

(3) SELECTION AND DURATION.—

(A) IN GENERAL.—A collaboration under this subsection shall be selected for a period of 4 years.

(B) EXISTING CENTERS.—An Energy Frontier Research Center in existence and supported by the Director on the date of enactment of this Act may continue to receive support for a period of 4 years beginning on the date of establishment of that center.

(C) REAPPLICATION.—After the end of the period described in subparagraph (A) or (B), as applicable, a recipient of an award may reapply for selection on a competitive, merit-reviewed basis.

(D) TERMINATION.—Consistent with the existing authorities of the Department, the Director may terminate an underperforming center for cause during the performance period.

(4) NO FUNDING FOR CONSTRUCTION.—No funding provided pursuant to this subsection may be

used for the construction of new buildings or facilities.

(b) BASIC ENERGY SCIENCES USER FACILITIES.—

(1) IN GENERAL.—The Director shall carry out a program for the development, construction, operation, and maintenance of national user facilities.

(2) REQUIREMENTS.—To the maximum extent practicable, the national user facilities developed, constructed, operated, or maintained under paragraph (1) shall serve the needs of the Department, industry, the academic community, and other relevant entities to create and examine materials and chemical processes for the purpose of improving the competitiveness of the United States.

(3) INCLUDED FACILITIES.—The national user facilities developed, constructed, operated, or maintained under paragraph (1) shall include—

(A) x-ray light sources;

(B) neutron sources;

(C) nanoscale science research centers; and

(D) such other facilities as the Director considers appropriate, consistent with section 209 of the Department of Energy Organization Act (42 U.S.C. 7139).

(c) ACCELERATOR RESEARCH AND DEVELOPMENT.—The Director shall carry out research and development on advanced accelerator and storage ring technologies relevant to the development of basic energy sciences user facilities, in consultation with the High Energy Physics and Nuclear Physics programs of the Office of Science.

(d) SOLAR FUELS RESEARCH INITIATIVE.—

(1) IN GENERAL.—Section 973 of the Energy Policy Act of 2005 (42 U.S.C. 16313) is amended to read as follows:

"SEC. 973. SOLAR FUELS RESEARCH INITIATIVE.

''(a) INITIATIVE.—

''(1) IN GENERAL.—The Secretary shall carry out a research initiative, to be known as the 'Solar Fuels Research Initiative' (referred to in this section as the 'Initiative') to expand theoretical and fundamental knowledge of photochemistry, electrochemistry, biochemistry, and materials science useful for the practical development of experimental systems to convert solar energy to chemical energy.

''(2) LEVERAGING.—In carrying out programs and activities under the Initiative, the Secretary shall leverage expertise and resources from—

''(A) the Basic Energy Sciences Program and the Biological and Environmental Research Program of the Office of Science; and

''(B) the Office of Energy Efficiency and Renewable Energy.

''(3) TEAMS.—

''(A) IN GENERAL.—In carrying out the Initiative, the Secretary shall organize activities among multidisciplinary teams to leverage, to the maximum extent practicable, expertise from the National Laboratories, institutions of higher education, and the private sector.

''(B) GOALS.—The multidisciplinary teams described in subparagraph (A) shall pursue aggressive, milestone-driven, basic research goals.

''(C) RESOURCES.—The Secretary shall provide sufficient resources to the multidisciplinary teams described in subparagraph (A) to achieve the goals described in subparagraph (B) over a period of time to be determined by the Secretary.

''(4) ADDITIONAL ACTIVITIES.—The Secretary may organize additional activities under this subsection through Energy Frontier Research Centers,

Energy Innovation Hubs, or other organizational structures.

''(b) ARTIFICIAL PHOTOSYNTHESIS.—

''(1) IN GENERAL.—The Secretary shall carry out under the Initiative a program to support research needed to bridge scientific barriers to, and discover knowledge relevant to, artificial photosynthetic systems.

''(2) ACTIVITIES.—As part of the program described in paragraph (1)—

''(A) the Director of the Office of Basic Energy Sciences shall support basic research to pursue distinct lines of scientific inquiry, including—

''(i) photoinduced production of hydrogen and oxygen from water; and

''(ii) the sustainable photoinduced reduction of carbon dioxide to fuel products including hydrocarbons, alcohols, carbon monoxide, and natural gas; and

''(B) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support translational research, development, and validation of physical concepts developed under the program.

''(3) STANDARD OF REVIEW.—The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

''(4) PROHIBITION.—No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.

''(c) BIOCHEMISTRY, REPLICATION OF NATURAL PHOTOSYNTHESIS, AND RELATED PROCESSES.—

''(1) IN GENERAL.—The Secretary shall carry out under the Initiative a program to support research needed to replicate natural photosynthetic processes by use of artificial photosynthetic components and materials.

''(2) ACTIVITIES.—As part of the program described in paragraph (1)—

''(A) the Director of the Office of Basic Energy Sciences shall support basic research to expand fundamental knowledge to replicate natural synthesis processes, including—

''(i) the photoinduced reduction of dinitrogen to ammonia;

''(ii) the absorption of carbon dioxide from ambient air;

''(iii) molecular-based charge separation and storage;

''(iv) photoinitiated electron transfer; and

''(v) catalysis in biological or biomimetic systems;

''(B) the Associate Director of Biological and Environmental Research shall support systems biology and genomics approaches to understand genetic and physiological pathways connected to photosynthetic mechanisms; and

''(C) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support translational research, development, and validation of physical concepts developed under the program.

''(3) STANDARD OF REVIEW.—The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

''(4) PROHIBITION.—No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.''.

(2) CONFORMING AMENDMENT.—The table of contents for the Energy Policy Act of 2005 is amended by striking the item relating to section 973 and inserting the following:

''Sec. 973. Solar fuels research initiative.''.

(e) ELECTRICITY STORAGE RESEARCH INITIATIVE.—

(1) IN GENERAL.—Section 975 of the Energy Policy Act of 2005 (42 U.S.C. 16315) is amended to read as follows:

''SEC. 975. ELECTRICITY STORAGE RESEARCH INITIATIVE.

''(a) INITIATIVE.—

''(1) IN GENERAL.—The Secretary shall carry out a research initiative, to be known as the 'Electricity Storage Research Initiative' (referred to in this section as the 'Initiative')—

''(A) to expand theoretical and fundamental knowledge to control, store, and convert—

''(i) electrical energy to chemical energy; and

''(ii) chemical energy to electrical energy; and

''(B) to support scientific inquiry into the practical understanding of chemical and physical processes that occur within systems involv-

ing crystalline and amorphous solids, polymers, and organic and aqueous liquids.

''(2) LEVERAGING.—In carrying out programs and activities under the Initiative, the Secretary shall leverage expertise and resources from—

''(A) the Basic Energy Sciences Program, the Advanced Scientific Computing Research Program, and the Biological and Environmental Research Program of the Office of Science; and

''(B) the Office of Energy Efficiency and Renewable Energy.

''(3) TEAMS.—

''(A) IN GENERAL.—In carrying out the Initiative, the Secretary shall organize activities among multidisciplinary teams to leverage, to the maximum extent practicable, expertise from the National Laboratories, institutions of higher education, and the private sector.

''(B) GOALS.—The multidisciplinary teams described in subparagraph (A) shall pursue aggressive, milestone-driven, basic research goals.

''(C) RESOURCES.—The Secretary shall provide sufficient resources to the multidisciplinary teams described in subparagraph (A) to achieve the goals described in subparagraph (B)

over a period of time to be determined by the Secretary.

''(4) ADDITIONAL ACTIVITIES.—The Secretary may organize additional activities under this subsection through Energy Frontier Research Centers, Energy Innovation Hubs, or other organizational structures.

''(b) MULTIVALENT SYSTEMS.—

''(1) IN GENERAL.—The Secretary shall carry out under the Initiative a program to support research needed to bridge scientific barriers to, and discover knowledge relevant to, multivalent ion materials in electric energy storage systems.

''(2) ACTIVITIES.—As part of the program described in paragraph (1)—

''(A) the Director of the Office of Basic Energy Sciences shall investigate electrochemical properties and the dynamics of materials, including charge transfer phenomena and mass transport in materials; and

''(B) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support translational research, development, and validation of physical concepts developed under the program.

''(3) STANDARD OF REVIEW.—The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

''(4) PROHIBITION.—No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.

''(c) ELECTROCHEMISTRY MODELING AND SIMULATION.—

''(1) IN GENERAL.—The Secretary shall carry out under the Initiative a program to support research to model and simulate organic electrolytes, including the static and dynamic electrochemical behavior and phenomena of organic electrolytes at the molecular and atomic level in monovalent and multivalent systems.

''(2) ACTIVITIES.—As part of the program described in paragraph (1)—

''(A) the Director of the Office of Basic Energy Sciences, in coordination with the Associate Director of Advanced Scientific Computing Research, shall support the development of high performance computational tools through a joint development process to maxi-

mize the effectiveness of current and projected high performance computing systems; and

''(B) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support translational research, development, and validation of physical concepts developed under the program.

''(3) STANDARD OF REVIEW.—The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

''(4) PROHIBITION.—No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.

''(d) MESOSCALE ELECTROCHEMISTRY.—

''(1) IN GENERAL.—The Secretary shall carry out under the Initiative a program to support research needed to reveal electrochemistry in confined mesoscale spaces, including scientific discoveries relevant to—

''(A) bio-electrochemistry and electrochemical energy conversion and storage in confined spaces; and

''(B) the dynamics of the phenomena described in subparagraph (A).

''(2) ACTIVITIES.—As part of the program described in paragraph (1)—

''(A) the Director of the Office of Basic Energy Sciences and the Associate Director of Biological and Environmental Research shall investigate phenomena of mesoscale electrochemical confinement for the purpose of replicating and controlling new electrochemical behavior; and

''(B) the Assistant Secretary for Energy Efficiency and Renewable Energy shall support translational research, development, and validation of physical concepts developed under the program.

''(3) STANDARD OF REVIEW.—The Secretary shall review activities carried out under the program described in paragraph (1) to determine the achievement of technical milestones.

''(4) PROHIBITION.—No funds allocated to the program described in paragraph (1) may be obligated or expended for commercial application of energy technology.''.

(2) CONFORMING AMENDMENT.—The table of contents for the Energy Policy Act of 2005 is amended by striking the item relating to section 975 and inserting the following:

''Sec. 975. Electricity storage research initiative.''.

SEC. 304. ADVANCED SCIENTIFIC COMPUTING RESEARCH.

(a) AMERICAN SUPER COMPUTING LEADERSHIP.—

(1) RENAMING OF ACT.—

(A) IN GENERAL.—Section 1 of the Department of Energy High-End Computing Revitalization Act of 2004 (15 U.S.C. 5501 note; Public Law 108–423) is amended by striking ''Department of Energy High-End Computing Revitalization Act of 2004'' and inserting ''American Super Computing Leadership Act of 2017''.

(B) CONFORMING AMENDMENT.—Section 976(a)(1) of the Energy Policy Act of 2005 (42 U.S.C. 16316(1)) is amended by striking ''Department of Energy High-End Computing Revitalization Act of 2004'' and inserting ''American Super Computing Leadership Act of 2017''.

(2) DEFINITIONS.—Section 2 of the American Super Computing Leadership Act of 2017 (15 U.S.C. 5541) is amended—

(A) by redesignating paragraphs (2) through (5) as paragraphs (3) through (6), respectively;

(B) by striking paragraph (1) and inserting the following:

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

''(2) EXASCALE COMPUTING.—The term 'exascale computing' means computing through the use of a computing machine that performs near or above 10 to the 18th power operations per second.''; and

(C) in paragraph (6) (as redesignated by subparagraph (A)), by striking '', acting through the Director of the Office of Science of the Department of Energy''.

(3) DEPARTMENT OF ENERGY HIGH-END COMPUTING RESEARCH AND DEVELOPMENT PROGRAM.—Section 3 of the American Super Computing Leadership Act of 2017 (15 U.S.C. 5542) is amended—

(A) in subsection (a)(1), by striking ''program'' and inserting ''coordinated program across the Department'';

(B) in subsection (b)(2), by striking ", which may" and all that follows through "architectures"; and

(C) by striking subsection (d) and inserting the following:

"(d) EXASCALE COMPUTING PROGRAM.—

"(1) IN GENERAL.—The Secretary shall conduct a research program (referred to in this subsection as the 'Program') for exascale computing, including the development of two or more exascale computing machine architectures, to promote the missions of the Department.

"(2) EXECUTION.—

"(A) IN GENERAL.—In carrying out the Program, the Secretary shall—

"(i) establish two or more National Laboratory partnerships with industry partners and institutions of higher education for the research and development of two or more exascale computing architectures across all applicable organizations of the Department;

"(ii) conduct mission-related codesign activities in developing the exascale computing architectures under clause (i);

''(iii) develop such advancements in hardware and software technology as are required to fully realize the potential of an exascale production system in addressing Department target applications and solving scientific problems involving predictive modeling and simulation and large scale data analytics and management;

''(iv) explore the use of exascale computing technologies to advance a broad range of science and engineering; and

''(v) provide, as appropriate, on a competitive, merit-reviewed basis, access for researchers in industries in the United States, institutions of higher education, National Laboratories, and other Federal agencies to the exascale computing systems developed pursuant to clause (i).

''(B) SELECTION OF PARTNERS.—The Secretary shall select the partnerships with the computing facilities of the Department under subparagraph (A) through a competitive, peer-review process.

''(3) CODESIGN AND APPLICATION DEVELOPMENT.—

''(A) IN GENERAL.—The Secretary shall—

''(i) carry out the Program through an integration of applications, computer science, applied mathematics, and computer hardware architecture using the partnerships established pursuant to paragraph (2) to ensure that, to the maximum extent practicable, two or more exascale computing machine architectures are capable of solving Department target applications and broader scientific problems, including predictive modeling and simulation and large scale data analytics and management; and

''(ii) conduct outreach programs to increase the readiness for the use of such platforms by domestic industries, including manufacturers.

''(B) REPORT.—The Secretary shall submit to Congress a report describing—

''(i) how the integration under subparagraph (A) is furthering application science data and computational workloads across application interests, including national security, material science, physical

science, cybersecurity, biological science, the Materials Genome and BRAIN Initiatives of the President, advanced manufacturing, and the national electric grid; and

''(ii) the roles and responsibilities of National Laboratories and industry, including the definition of the roles and responsibilities within the Department to ensure an integrated program across the Department.

''(4) PROJECT REVIEW.—

''(A) IN GENERAL.—The exascale architectures developed pursuant to partnerships established pursuant to paragraph (2) shall be reviewed through a project review process.

''(B) REPORT.—Not later than 90 days after the date of enactment of this subsection, the Secretary shall submit to Congress a report on—

''(i) the results of the review conducted under subparagraph (A); and

''(ii) the coordination and management of the Program to ensure an integrated research program across the Department.

''(5) ANNUAL REPORTS.—At the time of the budget submission of the Department for each fiscal year, the Secretary, in consultation with the members of the partnerships established pursuant to paragraph (2), shall submit to Congress a report that describes funding for the Program as a whole by functional element of the Department and critical milestones.''.

(b) HIGH-PERFORMANCE COMPUTING AND NETWORKING RESEARCH.—The Director shall support research in high-performance computing and networking relevant to energy applications, including modeling, simulation, and advanced data analytics for basic and applied energy research programs carried out by the Secretary.

(c) APPLIED MATHEMATICS AND SOFTWARE DEVELOPMENT FOR HIGH-END COMPUTING SYSTEMS.—The Director shall carry out activities to develop, test, and support—

(1) mathematics, models, and algorithms for complex systems and programming environments; and

(2) tools, languages, and operating systems for high-end computing systems (as defined in section 2 of the American Super Computing Leadership Act of 2017 (15 U.S.C. 5541)).

SEC. 305. HIGH-ENERGY PHYSICS.

(a) SENSE OF CONGRESS.—It is the sense of Congress that—

(1) the Director should incorporate the findings and recommendations of the report of the Particle Physics Project Prioritization Panel entitled ''Building for Discovery: Strategic Plan for U.S. Particle Physics in the Global Context'' into the planning process of the Department; and

(2) the nations that lead in particle physics by hosting international teams dedicated to a common scientific goal attract the world's best talent and inspire future generations of physicists and technologists.

(b) INTERNATIONAL COLLABORATION.—The Director, as practicable and in coordination with other appropriate Federal agencies as necessary, shall ensure the access of United States researchers to the most advanced accelerator facilities and research capabilities in the world, including the Large Hadron Collider.

(c) NEUTRINO RESEARCH.—The Director shall carry out research activities on rare decay processes and the nature of the neutrino, which may include collaborations with the National Science Foundation or international collaborations.

(d) DARK ENERGY AND DARK MATTER RESEARCH.—The Director shall carry out research activities on the nature of dark energy and dark matter, which may include collaborations with the National Aeronautics and Space Administration or the National Science Foundation; or international collaborations.

SEC. 306. BIOLOGICAL AND ENVIRONMENTAL RESEARCH.

(a) BIOLOGICAL SYSTEMS.—The Director shall carry out research and development activities in fundamental, structural, computational, and systems biology to increase systems-level understanding of the complex biological systems, which may include activities—

(1) to accelerate breakthroughs and new knowledge that would enable the cost-effective, sustainable production of—

(A) biomass-based liquid transportation fuels;

(B) bioenergy; and

(C) biobased materials;

(2) to improve understanding of the global carbon cycle, including processes for removing carbon dioxide from the atmosphere, through photosynthesis and other biological processes, for sequestration and storage; and

(3) to understand the biological mechanisms used to transform, immobilize, or remove contaminants from subsurface environments.

(b) LIMITATION FOR RESEARCH FUNDS.—The Director shall not approve new climate science-related initiatives without making a determination that such work is well-coordinated with any relevant work carried out by other Federal agencies.

(c) LOW-DOSE RADIATION RESEARCH PROGRAM.—

(1) IN GENERAL.—The Director shall carry out a research program on low-dose radiation.

(2) PURPOSE.—The purpose of the program is to enhance the scientific understanding of, and reduce uncertainties associated with, the effects of exposure to low-dose radiation to inform improved risk-management methods.

SEC. 307. FUSION ENERGY.

(a) FUSION MATERIALS RESEARCH AND DEVELOPMENT.—As part of the activities authorized in section 978 of the Energy Policy Act of 2005 (42 U.S.C. 16318)—

(1) the Director, in coordination with the Assistant Secretary for Nuclear Energy of the Department, shall carry out research and development activities to identify, characterize, and demonstrate

materials that can endure the neutron, plasma, and heat fluxes expected in a fusion power system; and

(2) the Director shall provide an assessment of—

(A) the need for one or more facilities that can examine and test potential fusion and next generation fission materials and other enabling technologies relevant to the development of fusion power; and

(B) whether a single new facility that substantially addresses magnetic fusion and next generation fission materials research needs is feasible, in conjunction with the expected capabilities of facilities operational as of the date of enactment of this Act.

(b) TOKAMAK RESEARCH AND DEVELOPMENT.—The Director shall support research and development activities and facility operations to optimize the tokamak approach to fusion energy.

(c) INERTIAL FUSION ENERGY RESEARCH AND DEVELOPMENT.—The Director shall support research and development activities for inertial fusion for energy applications.

(d) ALTERNATIVE AND ENABLING CONCEPTS.—The Director shall support research and development activities

and facility operations at institutions of higher education, National Laboratories, and private facilities in the United States for a portfolio of alternative and enabling fusion energy concepts that may provide solutions to significant challenges to the establishment of a commercial magnetic fusion power plant, prioritized based on the ability of the United States to play a leadership role in the international fusion research community.

(e) COORDINATION WITH ARPA–E.—The Director shall coordinate with the Director of the Advanced Research Projects Agency-Energy (referred to in this subsection as ''ARPA–E'') to—

(1) assess the potential for any fusion energy project supported by ARPA–E to represent a promising approach to a commercially viable fusion power plant;

(2) determine whether the results of any fusion energy project supported by ARPA–E merit the support of follow-on research activities carried out by the Office of Science; and

(3) avoid the unintentional duplication of activities.

(f) FAIRNESS IN COMPETITION FOR SOLICITATIONS FOR INTERNATIONAL PROJECT ACTIVITIES.—Section 33 of the Atomic Energy Act of 1954 (42 U.S.C. 2053) is

amended by inserting before the first sentence the following: ''In this section, with respect to international research projects, the term 'private facilities or laboratories' means facilities or laboratories located in the United States.''.

(g) IDENTIFICATION OF PRIORITIES.—

(1) REPORT.—

(A) IN GENERAL.—Not later than 2 years after the date of enactment of this Act, the Secretary shall submit to Congress a report on the fusion energy research and development activities that the Department proposes to carry out over the 10-year period following the date of the report under not fewer than 3 realistic budget scenarios, including a scenario based on 3-percent annual growth in the non-ITER portion of the budget for fusion energy research and development activities.

(B) INCLUSIONS.—The report required under subparagraph (A) shall—

(i) identify specific areas of fusion energy research and enabling technology development in which the United States can and should establish or solidify a lead in

the global fusion energy development effort;

(ii) identify priorities for initiation of facility construction and facility decommissioning under each of the three budget scenarios described in subparagraph (A); and

(iii) assess the ability of the fusion workforce of the United States to carry out the activities identified under clauses (i) and (ii), including the adequacy of programs at institutions of higher education in the United States to train the leaders and workers of the next generation of fusion energy researchers.

(2) PROCESS.—In order to develop the report required under paragraph (1)(A), the Secretary shall leverage best practices and lessons learned from the process used to develop the most recent report of the Particle Physics Project Prioritization Panel of the High Energy Physics Advisory Panel.

(3) REQUIREMENT.—No member of the Fusion Energy Sciences Advisory Committee shall be excluded from participating in developing or voting on final approval of the report required under paragraph (1)(A).

SEC. 308. NUCLEAR PHYSICS.

(a) ISOTOPE DEVELOPMENT AND PRODUCTION FOR RESEARCH APPLICATIONS.—The Director—

(1) may carry out a program for the production of isotopes, including the development of techniques to produce isotopes, that the Secretary determines are needed for research, medical, industrial, or related purposes; and

(2) shall ensure that isotope production activities carried out under the program under this paragraph do not compete with private industry unless the Director determines that critical national interests require the involvement of the Federal Government.

(b) RENAMING OF THE RARE ISOTOPE ACCELERATOR.—Section 981 of the Energy Policy Act of 2005 (42 U.S.C. 16321) is amended—

(1) in the section heading, by striking ''**RARE ISOTOPE ACCELERATOR**'' and inserting ''**FACILITY FOR RARE ISOTOPE BEAMS**''; and

(2) by striking ''Rare Isotope Accelerator'' each place it appears and inserting ''Facility for Rare Isotope Beams''.

SEC. 309. SCIENCE LABORATORIES INFRASTRUCTURE PROGRAM.

(a) IN GENERAL.—The Director shall carry out a program to improve the safety, efficiency, and mission readiness of infrastructure at laboratories of the Office of Science.

(b) INCLUSIONS.—The program under subsection (a) shall include projects—

(1) to renovate or replace space that does not meet research needs;

(2) to replace facilities that are no longer cost effective to renovate or operate;

(3) to modernize utility systems to prevent failures and ensure efficiency;

(4) to remove excess facilities to allow safe and efficient operations; and

(5) to construct modern facilities to conduct advanced research in controlled environmental conditions.

TITLE IV—NUCLEAR ENERGY INNOVATION CAPABILITIES

SEC. 401. SHORT TITLE.

This title may be cited as the ''Nuclear Energy Innovation Capabilities Act''.

SEC. 402. NUCLEAR ENERGY INNOVATION CAPABILITIES.

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

"SEC. 951. NUCLEAR ENERGY.

"(a) MISSION.—

"(1) IN GENERAL.—The Secretary shall carry out programs of civilian nuclear research, development, demonstration, and commercial application, including activities under this subtitle.

"(2) CONSIDERATIONS.—The programs carried out under paragraph (1) shall take into consideration the following objectives:

"(A) 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.

"(B) Maintaining nuclear energy research and development programs at the National Laboratories and institutions of higher education, including infrastructure at the National Laboratories and institutions of higher education.

''(C) Providing the technical means to reduce the likelihood of nuclear proliferation.

''(D) Increasing confidence margins for public safety of nuclear energy systems.

''(E) Reducing the environmental impact of activities relating to nuclear energy.

''(F) Supporting technology transfer from the National Laboratories to the private sector.

''(G) 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 objectives described in subparagraphs (A) through (F).

''(b) DEFINITIONS.—In this subtitle:

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

''(A) a nuclear fission reactor with significant improvements over the most recent generation of nuclear fission reactors, which may include—

''(i) inherent safety features;

''(ii) lower waste yields;

''(iii) greater fuel utilization;

''(iv) superior reliability;

''(v) resistance to proliferation;

''(vi) increased thermal efficiency; and

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

''(B) a nuclear fusion reactor.

''(2) COMMISSION.—The term 'Commission' means the Nuclear Regulatory Commission.

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

''(4) NATIONAL LABORATORY.—

''(A) IN GENERAL.—Except as provided in subparagraph (B), the term 'National Laboratory' has the meaning given the term in section 2.

''(B) LIMITATION.—With respect to the Lawrence Livermore National Laboratory, the Los Alamos National Laboratory, and the Sandia National Laboratories, the term 'National Laboratory' means only the civilian activities of the laboratory.

''(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—

''(A) research on materials sciences and nuclear physics; and

''(B) testing of advanced materials, nuclear fuels, and other related components for reactor systems.''.

(b) NUCLEAR ENERGY RESEARCH PROGRAMS.—

(1) IN GENERAL.—Section 952 of the Energy Policy Act of 2005 (42 U.S.C. 16272) is amended—

(A) by striking subsection (c); and

(B) by redesignating subsections (d) and (e) as subsections (c) and (d), respectively.

(2) CONFORMING AMENDMENT.—Section 641(b)(1) of the Energy Policy Act of 2005 (42 U.S.C. 16021(b)(1)) is amended by striking ''section 942(d)'' and inserting ''section 952(c)''.

(c) ADVANCED FUEL CYCLE INITIATIVE.—Section 953(a) of the Energy Policy Act of 2005 (42 U.S.C. 16273(a)) is amended by striking '', acting through the Director of the Office of Nuclear Energy, Science and Technology,''.

(d) UNIVERSITY NUCLEAR SCIENCE AND ENGINEERING SUPPORT.—Section 954(d)(4) of the Energy Policy

Act of 2005 (42 U.S.C. 16274(d)(4)) is amended by striking ''as part of a taking into consideration effort that emphasizes'' and inserting ''that emphasize''.

(e) DEPARTMENT OF ENERGY CIVILIAN NUCLEAR INFRASTRUCTURE AND FACILITIES.—Section 955 of the Energy Policy Act of 2005 (42 U.S.C. 16275) is amended—

(1) by striking subsections (c) and (d); and

(2) by adding at the end the following:

''(c) VERSATILE NEUTRON SOURCE.—

''(1) MISSION NEED.—

''(A) IN GENERAL.—Not later than December 31, 2017, the Secretary shall determine the mission need for a versatile reactor-based fast neutron source, which shall operate as a national user facility.

''(B) CONSULTATIONS REQUIRED.—In carrying out subparagraph (A), the Secretary shall consult with the private sector, institutions of higher education, the National Laboratories, and relevant Federal agencies to ensure that the user facility described in subparagraph (A) will meet the research needs of the largest practicable majority of prospective users.

''(2) ESTABLISHMENT.—As soon as practicable after determining the mission need under paragraph (1)(A), the Secretary shall submit to the appropriate committees of Congress a detailed plan for the establishment of the user facility.

''(3) FACILITY REQUIREMENTS.—

''(A) CAPABILITIES.—The Secretary shall ensure that the user facility 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 the plan submitted under paragraph (2), 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 current 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 in different coolants.

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

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

''(4) DEADLINE FOR ESTABLISHMENT.—The Secretary shall, to the maximum extent practicable, complete construction of, and approve the start of operations for, the user facility by not later than December 31, 2025.

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

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

(f) SECURITY OF NUCLEAR FACILITIES.—Section 956 of the Energy Policy Act of 2005 (42 U.S.C. 16276) is amended by striking '', acting through the Director of the Office of Nuclear Energy, Science and Technology,''.

(g) HIGH-PERFORMANCE COMPUTATION AND SUPPORTIVE RESEARCH.—Section 957 of the Energy Policy Act of 2005 (42 U.S.C. 16277) is amended to read as follows:

''SEC. 957. HIGH-PERFORMANCE COMPUTATION AND SUPPORTIVE RESEARCH.

''(a) MODELING AND SIMULATION.—The Secretary shall carry out a program to enhance the capabilities of the United States to develop new reactor technologies through high-performance computation modeling and simulation techniques.

''(b) COORDINATION.—In carrying out the program under subsection (a), the Secretary shall coordinate with relevant Federal agencies as described by the National Strategic Computing Initiative established by Executive Order No. 13702 (80 Fed. Reg. 46177 (July 29, 2015)), while taking into account the following objectives:

''(1) Using expertise from the private sector, institutions of higher education, and the National Laboratories to develop computational software and capabilities that prospective users may access to ac-

celerate research and development of advanced nuclear reactor 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 research infrastructure of the Department by coordinating with the Advanced 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, including private sector entities engaged in nuclear energy technology development.

''(c) SUPPORTIVE RESEARCH ACTIVITIES.—The Secretary shall consider support for additional research activities to maximize the utility of the research facilities of the Department, including physical processes—

''(1) to simulate degradation of materials and behavior of fuel forms; and

''(2) for validation of computational tools.''.

(h) ENABLING NUCLEAR ENERGY INNOVATION.—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. 958. ENABLING NUCLEAR ENERGY INNOVATION.

''(a) NATIONAL REACTOR INNOVATION CENTER.—

''(1) IN GENERAL.—There is authorized a program to enable the testing and demonstration of reactor concepts to be proposed and funded by the private sector.

''(2) PARTICIPATION.—Nothing in this section shall prevent a private sector entity that has received Federal grants from participating in this program.

''(b) TECHNICAL EXPERTISE.—In carrying out the program under subsection (a), the Secretary shall leverage the technical expertise of relevant Federal agencies and the 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.

''(c) OBJECTIVES.—The reactors described in subsection (b) shall operate to meet the following objectives:

''(1) Enabling physical validation of advanced nuclear reactor concepts.

''(2) Resolving technical uncertainty and increasing practical knowledge relevant to safety, resil-

ience, security, and functionality of advanced nuclear reactor concepts.

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

''(d) SHARING TECHNICAL EXPERTISE.—In carrying out the program under subsection (a), the Secretary may enter into a memorandum of understanding with the Chairman of the Commission in order to share technical expertise and knowledge through—

''(1) enabling the testing and demonstration of advanced nuclear reactor concepts to be proposed and funded by the private sector;

''(2) operating a database to store and share data and knowledge relevant to nuclear science and engineering between Federal agencies and the private sector;

''(3) developing and testing electric and non-electric integration and energy conversion systems relevant to advanced nuclear reactors;

''(4) leveraging expertise from the Commission with respect to safety analysis; and

''(5) enabling technical staff of the Commission to actively observe and learn about technologies developed under the program.

''(e) AGENCY COORDINATION.—The Chairman of the Commission and the Secretary shall enter into a memorandum of understanding regarding the following:

''(1) Ensuring that—

''(A) the Department has sufficient technical expertise to support the timely research, development, demonstration, and commercial application by the civilian nuclear industry of safe and innovative advanced nuclear reactor technology; and

''(B) the Commission has sufficient technical expertise to support the evaluation of applications for licenses, permits, and design certifications and other requests for regulatory approval for advanced nuclear reactors.

''(2) The use of computers and software codes to calculate the behavior and performance of advanced nuclear reactors based on mathematical models of the physical behavior of advanced nuclear reactors.

''(3) Ensuring that—

''(A) the Department maintains and develops the facilities necessary to enable the timely research, development, demonstration, and commercial application by the civilian nuclear in-

dustry of safe and innovative reactor technology; and

''(B) the Commission has access to the facilities described in subparagraph (A), as needed.

''(f) REPORTING REQUIREMENTS.—

''(1) IN GENERAL.—Not later than 180 days after the date of enactment of the Nuclear Energy Innovation Capabilities Act of 2017, the Secretary, in consultation with the National Laboratories, relevant Federal agencies, and other stakeholders, shall submit to the appropriate committees of Congress a report assessing the capabilities of the Department to authorize, host, and oversee privately funded experimental advanced nuclear reactors as described in subsection (b).

''(2) CONTENTS.—The report submitted under paragraph (1) shall address—

''(A) the safety review and oversight capabilities of the Department, including options to leverage expertise from the Commission and the National Laboratories;

''(B) options to regulate privately proposed and funded experimental reactors hosted by the Department;

''(C) potential sites capable of hosting privately funded experimental advanced nuclear reactors;

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

''(E) the liability of the Federal Government with respect to the disposal of low-level radioactive waste, spent nuclear fuel, or high-level radioactive waste (as those terms are defined in section 2 of the Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101));

''(F) the impact on the aggregate inventory in the United States of low-level radioactive waste, spent nuclear fuel, or high-level radioactive waste (as those terms are defined in section 2 of the Nuclear Waste Policy Act of 1982 (42 U.S.C. 10101));

''(G) potential cost structures relating to physical security, decommissioning, liability, and other long-term project costs; and

''(H) other challenges or considerations identified by the Secretary.

''(3) UPDATES.—Once every 2 years, the Secretary shall update relevant provisions of the report submitted under paragraph (1) and submit to the appropriate committees of Congress the update.

''(g) SAVINGS CLAUSES.—

''(1) LICENSING REQUIREMENT.—Nothing in this section authorizes the Secretary or any person to construct or operate a nuclear reactor for the purpose of demonstrating the suitability for commercial application of the nuclear reactor unless licensed by the Commission in accordance with section 202 of the Energy Reorganization Act of 1974 (42 U.S.C. 5842).

''(2) FINANCIAL PROTECTION.—Any activity carried out under this section that involves the risk of public liability shall be subject to the financial protection or indemnification requirements of section 170 of the Atomic Energy Act of 1954 (42 U.S.C. 2210) (commonly known as the 'Price-Anderson Act').''.

(i) BUDGET PLAN.—Subtitle E of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16271 et seq.) (as

amended by subsection (h)) is amended by adding at the end the following:

"SEC. 959. BUDGET PLAN.

"(a) IN GENERAL.—Not later than 1 year after the date of enactment of the Nuclear Energy Innovation Capabilities Act of 2017, the Secretary shall submit to the Committee on Energy and Natural Resources of the Senate and the Committee on Science, Space, and Technology of the House of Representatives 2 alternative 10-year budget plans for civilian nuclear energy research and development by the Secretary, as described in subsections (b) through (d).

"(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 civilian nuclear energy research and development of the Department for fiscal year 2016.

"(c) BUDGET PLAN ALTERNATIVE 2.—One of the budget plans submitted under subsection (a) shall be an unconstrained budget.

"(d) INCLUSIONS.—Each alternative budget plan submitted under subsection (a) shall include—

"(1) a prioritized list of the programs, projects, and activities of the Department to best support the

development of advanced nuclear reactor technologies;

''(2) realistic budget requirements for the Department to implement sections 955(c), 957, and 958; and

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

(j) CONFORMING AMENDMENTS.—The table of contents for the Energy Policy Act of 2005 is amended by striking the item relating to section 957 and inserting the following:

''957. High-performance computation and supportive research.
''958. Enabling nuclear energy innovation.
''959. Budget plan.''.

Passed the House of Representatives January 24, 2017.

Attest:

Clerk.

115TH CONGRESS
1ST SESSION

H. R. 589

AN ACT

To establish Department of Energy policy for science and energy research and development programs, and reform National Laboratory management and technology transfer programs, and for other purposes.