

characteristics of aircraft and some of the characteristics of launch vehicles.

Companies would like to utilize space support vehicles to train crews and spaceflight participants by exposing them to the physiological effects encountered in spaceflight or conduct research in reduced gravity environments. Spaceports, like those in Florida and other States, would like to attract those companies to operate out of their facilities.

The DOT report concluded that: “The option of having a single statutory regime and regulatory office oversee a demonstrated commercial space program throughout its operational life cycle would allow consistent application of regulatory philosophy and safety oversight and be more efficient and cost effective for the launch operator as well as the licensing agency. For an evolving industry, a regulatory environment that can adjust to accommodate changes would allow for more flexible and more responsive oversight.”

Additionally, a GAO report issued last year recommended that the FAA examine the FAA’s current regulatory framework for space support vehicles and suggest legislative or regulatory changes as applicable.

I believe H.R. 5346 provides the appropriate regulatory approach by authorizing the Secretary of Transportation to develop the regulations by March 1, 2019, allowing licensed space support flights. The intent of timing is to include the development of regulations in the regulatory reform process that the Vice President and the National Space Council tasked the FAA to complete by that date.

Of course, I want to thank my friend of many, many decades, Congressman LAWSON from the great State of Florida, for his cosponsorship and support of this bill, as well as Chairman LAMAR SMITH and Subcommittee Chairman BRIAN BABIN, both of Texas, for advancing and cosponsoring this great piece of legislation.

Mr. Speaker, I reserve the balance of my time.

Mr. VEASEY. Mr. Speaker, I yield myself such time as I may consume.

Mr. Speaker, I rise to support a robust and successful commercial space industry. In that regard, I look forward to continuing to work with my colleagues on policies that facilitate the Nation’s continued growth and leadership in space.

The bill before us today, H.R. 5346, known as the Commercial Space Support Vehicle Act, will amend the statute to provide the Secretary of Transportation with authority to license or permit space support vehicles for space support flights such as crew training or research and development that are related to space launch or reentry.

While I am not aware of any pressing need for this amendment at this time, it may provide the industry with some additional flexibility.

In addition, Mr. Speaker, it is very important to point out, too, that the

FAA’s Office of Commercial Space Transportation is sufficiently resourced to accommodate any additional work so that the office can continue to focus on its core responsibilities of licensing and permitting commercial space launch and reentry vehicles.

Mr. Speaker, I support moving the bill out of the House, and I reserve the balance of my time.

Mr. POSEY. Mr. Speaker, I yield 2 minutes to the gentleman from Texas (Mr. SMITH).

Mr. SMITH of Texas. Mr. Speaker, I appreciate the longtime efforts of the gentleman from Florida (Mr. POSEY) to advance space initiatives. His efforts are reflected in H.R. 5346, the Commercial Space Support Vehicle Act, which he authored and brings to the floor today.

Maintaining and expanding America’s leadership in human space activity, especially in the commercial space sector, is a priority of mine and of paramount importance to Mr. POSEY and the members on the Science, Space, and Technology Committee.

The Commercial Space Support Vehicle Act was developed with input from the Department of Transportation as a new and better approach to streamline the licensing and permitting process of hybrid launch vehicles.

Private companies would like to use space support vehicles to train crews and spaceflight participants by exposing them to the physiological effects and reduced gravity environment encountered in spaceflight, and many spaceports would like to encourage those companies to operate out of their facilities.

H.R. 5346 provides the fairest, most appropriate regulatory approach by authorizing the Secretary of Transportation to develop regulations, according to the requirements of the bill, by March 1, 2019, thereby enabling licensed space support flights.

Mr. Speaker, again, I want to thank Mr. POSEY who is always a leader on space issues for taking the initiative on this bill.

□ 1430

Mr. POSEY. Mr. Speaker, I yield 3 minutes to the gentleman from Texas (Mr. BABIN).

Mr. BABIN. Mr. Speaker, I want to thank my colleague, the gentleman from Florida, Mr. BILL POSEY, for his tireless efforts in drafting the Commercial Space Support Vehicle Act and his leadership in the Space Subcommittee in moving this bill to the House floor today. He has always been and continues to be one of the leading champions in Congress for American leadership in space. I am pleased to be a cosponsor of this bill.

Simply said, this bill will create jobs and economic growth in the Nation’s commercial spaceports, and it will streamline licensing requirements so that our innovators in the hybrid launch vehicle market can train future

space flight crews and participants. These innovators are at the forefront of providing aerial platforms for very important microgravity research.

GAO recommended in its report that the FAA examine the FAA’s current regulatory framework for space support vehicles and suggest legislative or regulatory changes as applicable. I believe H.R. 5346 provides the appropriate regulatory approach by authorizing the Secretary of Transportation to develop the regulations by March 1, 2019, which will allow licensed space support flights.

Mr. POSEY. Mr. Speaker, I once again want to thank the cosponsors on both sides of the aisle. This has been about a 9-year journey to make this much-needed change to our laws.

Mr. Speaker, I reserve the balance of my time.

Mr. VEASEY. Mr. Speaker, I have no further speakers, and I yield back the balance of my time.

Mr. POSEY. Mr. Speaker, I have no further speakers, and I yield back the balance of my time.

The SPEAKER pro tempore (Mr. HULTGREN). The question is on the motion offered by the gentleman from Florida (Mr. POSEY) that the House suspend the rules and pass the bill, H.R. 5346.

The question was taken; and (two-thirds being in the affirmative) the rules were suspended and the bill was passed.

A motion to reconsider was laid on the table.

DEPARTMENT OF ENERGY SCIENCE AND INNOVATION ACT OF 2018

Mr. WEBER of Texas. Mr. Speaker, I move to suspend the rules and pass the bill (H.R. 5905) to authorize basic research programs in the Department of Energy Office of Science for fiscal years 2018 and 2019, as amended.

The Clerk read the title of the bill.

The text of the bill is as follows:

H.R. 5905

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 Science and Innovation Act of 2018”.

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

- Sec. 1. Short title; table of contents.
- Sec. 2. Definitions.
- Sec. 3. Mission.
- Sec. 4. Basic energy sciences.
- Sec. 5. Advanced scientific computing research.
- Sec. 6. High energy physics.
- Sec. 7. Biological and environmental research.
- Sec. 8. Fusion energy.
- Sec. 9. Nuclear physics.
- Sec. 10. Science laboratories infrastructure program.
- Sec. 11. Authorization of appropriations.

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.

(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.

SEC. 3. 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. 4. BASIC ENERGY SCIENCES.

(a) **PROGRAM.**—The Director shall carry out a program in basic energy sciences, including materials sciences and engineering, chemical sciences, physical biosciences, and geosciences, for the purpose of providing the scientific foundations for new energy technologies.

(b) **MISSION.**—The mission of the program described in subsection (a) shall be to support fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels in order to provide the foundations for new energy technologies and to support Department missions in energy, environment, and national security.

(c) **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).

(d) **BASIC ENERGY SCIENCES RESEARCH INFRASTRUCTURE.**—

(1) **ADVANCED PHOTON SOURCE UPGRADE.**—

(A) **IN GENERAL.**—The Secretary shall provide for the upgrade to the Advanced Photon Source described in the publication approved by the Basic Energy Sciences Advisory Committee on June 9, 2016, titled “Report on Facility Upgrades”, including the development of a multi-bend achromat lattice to produce a high flux of coherent x-rays within the hard x-ray energy region and a suite of beamlines optimized for this source.

(B) **DEFINITIONS.**—In this paragraph:

(i) **FLUX.**—The term “flux” means the rate of flow of photons.

(ii) **HARD X-RAY.**—The term “hard x-ray” means a photon with energy greater than 20 kiloelectron volts.

(C) **START OF OPERATIONS.**—The Secretary shall, to the maximum extent practicable, ensure that the start of full operations of the upgrade under this paragraph occurs before December 31, 2025.

(D) **FUNDING.**—Out of funds authorized to be appropriated under section 11 for Basic Energy Sciences, there shall be made available to the Secretary to carry out the upgrade under this paragraph—

(i) \$93,000,000 for fiscal year 2018; and

(ii) \$130,000,000 for fiscal year 2019.

(2) **SPALLATION NEUTRON SOURCE PROTON POWER UPGRADE.**—

(A) **IN GENERAL.**—The Secretary shall provide for a proton power upgrade to the Spallation Neutron Source.

(B) **DEFINITION OF PROTON POWER UPGRADE.**—For the purposes of this paragraph, the term “proton power upgrade” means the Spallation Neutron Source power upgrade described in—

(i) the publication of the Office of Science of the Department of Energy titled “Facilities for the Future of Science: A Twenty-Year Outlook”, published December 2003;

(ii) the publication of the Office of Science of the Department of Energy titled “Four Years Later: An Interim Report on Facilities for the Future of Science: A Twenty-Year Outlook”, published August 2007; and

(iii) the publication approved by the Basic Energy Sciences Advisory Committee on June 9, 2016, titled “Report on Facility Upgrades”.

(C) **START OF OPERATIONS.**—The Secretary shall, to the maximum extent practicable, ensure that the start of full operations of the upgrade under this paragraph occurs before December 31, 2025.

(D) **FUNDING.**—Out of funds authorized to be appropriated under section 11 for Basic Energy Sciences, there shall be made available to the Secretary to carry out the upgrade under this paragraph—

(i) \$36,000,000 for fiscal year 2018; and

(ii) \$60,800,000 for fiscal year 2019.

(3) **SPALLATION NEUTRON SOURCE SECOND TARGET STATION.**—

(A) **IN GENERAL.**—The Secretary shall provide for a second target station for the Spallation Neutron Source.

(B) **DEFINITION OF SECOND TARGET STATION.**—For the purposes of this paragraph, the term “second target station” means the Spallation Neutron Source second target station described in—

(i) the publication of the Office of Science of the Department of Energy titled “Facilities for the Future of Science: A Twenty-Year Outlook”, published December 2003;

(ii) the publication of the Office of Science of the Department of Energy titled “Four Years Later: An Interim Report on Facilities for the Future of Science: A Twenty-Year Outlook”, published August 2007; and

(iii) the publication approved by the Basic Energy Sciences Advisory Committee on June 9, 2016, titled “Report on Facility Upgrades”.

(C) **START OF OPERATIONS.**—The Secretary shall, to the maximum extent practicable, ensure that the start of full operations of the second target station under this paragraph occurs before December 31, 2030, with the option for early operation in 2028.

(D) **FUNDING.**—Out of funds authorized to be appropriated under section 11 for Basic Energy Sciences, there shall be made available to the Secretary to carry out activities, including construction, under this paragraph—

(i) \$5,000,000 for fiscal year 2018; and

(ii) \$10,000,000 for fiscal year 2019.

(4) **ADVANCED LIGHT SOURCE UPGRADE.**—

(A) **IN GENERAL.**—The Secretary shall provide for the upgrade to the Advanced Light Source described in the publication approved by the Basic Energy Sciences Advisory Committee on June 9, 2016, titled “Report on Facility Upgrades”, including the development of a multi-bend achromat lattice to produce

a high flux of coherent x-rays within the soft x-ray energy region.

(B) **DEFINITIONS.**—In this paragraph:

(i) **FLUX.**—The term “flux” means the rate of flow of photons.

(ii) **SOFT X-RAY.**—The term “soft x-ray” means a photon with energy in the range from 50 to 2,000 electron volts.

(C) **START OF OPERATIONS.**—The Secretary shall, to the maximum extent practicable, ensure that the start of full operations of the upgrade under this paragraph occurs before December 31, 2026.

(D) **FUNDING.**—Out of funds authorized to be appropriated under section 11 for Basic Energy Sciences, there shall be made available to the Secretary to carry out the upgrade under this paragraph—

(i) \$20,000,000 for fiscal year 2018; and

(ii) \$50,000,000 for fiscal year 2019.

(5) **LINAC COHERENT LIGHT SOURCE II HIGH ENERGY UPGRADE.**—

(A) **IN GENERAL.**—The Secretary shall provide for the upgrade to the Linac Coherent Light Source II facility described in the publication approved by the Basic Energy Sciences Advisory Committee on June 9, 2016, titled “Report on Facility Upgrades”, including the development of experimental capabilities for high energy x-rays to reveal fundamental scientific discoveries. The Secretary shall ensure the upgrade under this paragraph enables the production and use of high energy, ultra-short pulse x-rays delivered at a high repetition rate.

(B) **DEFINITIONS.**—In this paragraph:

(i) **HIGH ENERGY X-RAY.**—The term a “high energy x-ray” means a photon with an energy at or exceeding 12 kiloelectron volts.

(ii) **HIGH REPETITION RATE.**—The term “high repetition rate” means the delivery of x-ray pulses up to one million pulses per second.

(iii) **ULTRA-SHORT PULSE X-RAYS.**—The term “ultra-short pulse x-rays” means x-ray bursts capable of durations of less than one hundred femtoseconds.

(C) **START OF OPERATIONS.**—The Secretary shall, to the maximum extent practicable, ensure that the start of full operations of the upgrade under this paragraph occurs before December 31, 2025.

(D) **FUNDING.**—Out of funds authorized to be appropriated under section 11 for Basic Energy Sciences, there shall be made available to the Secretary to carry out the upgrade under this paragraph—

(i) \$20,000,000 for fiscal year 2018; and

(ii) \$55,000,000 for fiscal year 2019.

(e) **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 Office of Science’s High Energy Physics and Nuclear Physics programs.

(f) **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) FUNDING.—

“(A) IN GENERAL.—From within funds authorized to be appropriated under section 11 of the Department of Energy Science and Innovation Act of 2018, for Basic Energy Sciences, the Secretary shall make available for carrying out activities under this subsection \$50,000,000 for each of fiscal years 2018 through 2019.

“(B) 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; and

“(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) FUNDING.—

“(A) IN GENERAL.—From within funds authorized to be appropriated under section 11 of the Department of Energy Science and Innovation Act of 2018, for Basic Energy Sciences and Biological and Environmental Research, the Secretary shall make available for carrying out activities under this subsection \$50,000,000 for each of fiscal years 2018 through 2019.

“(B) 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 of 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.”.

(g) 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 involving 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) FUNDING.—

“(A) IN GENERAL.—From within funds authorized to be appropriated under section 11 of the Department of Energy Science and Innovation Act of 2018, for Basic Energy Sciences and Biological and Environmental Research, the Secretary shall make available for carrying out activities under this subsection \$50,000,000 for each of the fiscal years 2018 through 2019.

“(B) 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 maximize 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) FUNDING.—

“(A) IN GENERAL.—From within funds authorized to be appropriated under section 11 of the Department of Energy Science and Innovation Act of 2018, for Basic Energy Sciences and Advanced Scientific Computing Research, the Secretary shall make available for carrying out activities under this

subsection \$30,000,000 for each of the fiscal years 2018 through 2019.

“(B) 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) FUNDING.—

“(A) IN GENERAL.—From within funds authorized to be appropriated under section 11 of the Department of Energy Science and Innovation Act of 2018, for Basic Energy Sciences and Biological and Environmental Research, the Secretary shall make available for carrying out activities under this subsection \$20,000,000 for each of fiscal years 2018 through 2019.

“(B) 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.”

(h) 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.

(i) MATERIALS RESEARCH DATABASE.—

(1) IN GENERAL.—As part of the program in materials sciences and engineering, the Director shall support the development of a web-based platform to provide access to a database of computed information on known and predicted materials properties and computational tools to accelerate breakthroughs in materials discovery and design.

(2) In carrying out this section, the Director shall—

(A) conduct cooperative research with industry, academia, and other research institutions to facilitate the design of novel materials;

(B) leverage existing high performance computing systems to conduct high-throughput calculations, and develop computational and data mining algorithms for the prediction of material properties;

(C) advance understanding, prediction, and manipulation of materials;

(D) strengthen the foundation for new technologies and advanced manufacturing; and

(E) drive the development of advanced materials for applications that span the Department's missions in energy, environment, and national security.

(3) In carrying out this section, the Director shall leverage programs and activities across the Department.

SEC. 5. ADVANCED SCIENTIFIC COMPUTING RESEARCH.

(a) PROGRAM.—The Director shall carry out a research, development, and demonstration program to advance computational and networking capabilities to analyze, model, simulate, and predict complex phenomena relevant to the development of new energy technologies and the competitiveness of the United States.

(b) 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”.

(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”.

(2) DEFINITIONS.—Section 2 of the American Super Computing Leadership Act (15 U.S.C. 5541), as renamed by paragraph (1), 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 (15 U.S.C. 5542), as renamed by paragraph (1), 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 “multithreading 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 a National Laboratory partnership for industry partners and institutions of higher education for codesign of exascale hardware, technology, software, and applications across all applicable organizations of the Department;

“(ii) acquire multiple exascale computing systems at the existing Departmental facilities that represent at least two distinct technology options developed 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, large scale data analytics and management, and artificial intelligence;

“(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, large scale data analytics and management, and artificial intelligence; and

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

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

“(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.”.

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

(d) APPLIED MATHEMATICS AND SOFTWARE DEVELOPMENT FOR HIGH-END COMPUTING SYSTEMS, COMPUTATIONAL, AND COMPUTER SCIENCES RESEARCH.—

(1) IN GENERAL.—The Director shall carry out activities to develop, test, and support—

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

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

(2) PORTFOLIO BALANCE.—The Director shall maintain a balanced portfolio within the advanced scientific computing research and development program established under section 976 of the Energy Policy Act of 2005 (42 U.S.C. 16316) that supports robust investment in applied mathematical, computational, and computer sciences research while accommodating necessary investments in high-performance computing hardware and facilities.

(e) WORKFORCE DEVELOPMENT.—The Director of the Office of Advanced Scientific Computing Research shall support the development of a computational science workforce through a program that—

(1) facilitates collaboration between university students and researchers at the National Laboratories; and

(2) endeavors to advance science in areas relevant to the mission of the Department through the application of computational science.

SEC. 6. HIGH ENERGY PHYSICS.

(a) PROGRAM.—The Director shall carry out a research program on the fundamental constituents of matter and energy and the nature of space and time.

(b) MISSION.—The mission of the program described in subsection (a) shall be to support theoretical and experimental research in both elementary particle physics and fundamental accelerator science and technology to understand fundamental properties of the universe.

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

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

planning process as part of the program described in subsection (a);

(2) the Director should prioritize domestically hosted research projects that will maintain the United States position as a global leader in particle physics and attract the world's most talented physicists and foreign investment for international collaboration; and

(3) 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.

(d) NEUTRINO RESEARCH.—As part of the program described in subsection (a), 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.

(e) LONG-BASELINE NEUTRINO FACILITY FOR DEEP UNDERGROUND NEUTRINO EXPERIMENT.—

(1) IN GENERAL.—The Secretary shall provide for a Long-Baseline Neutrino Facility to facilitate the international Deep Underground Neutrino Experiment to enable a program in neutrino physics to measure the fundamental properties of neutrinos, explore physics beyond the Standard Model, and better clarify the nature of matter and antimatter.

(2) FACILITY CAPABILITIES.—The Secretary shall ensure that the facility described in paragraph (1) will provide, at a minimum, the following capabilities:

(A) A broad-band neutrino beam capable of 1.2 megawatts (MW) of beam power and upgradable to 2.4 MW of beam power.

(B) Four caverns excavated for a forty kiloton fiducial detector mass and supporting surface buildings and utilities.

(C) Neutrino detector facilities at both the Far Site in South Dakota and the Near Site in Illinois to categorize and study neutrinos on their 800-mile journey between the two sites.

(D) Cryogenic systems to support neutrino detectors.

(3) START OF OPERATIONS.—The Secretary shall, to the maximum extent practicable, ensure that the start of full operations of the facility under this subsection occurs before December 31, 2026.

(4) FUNDING.—Out of funds authorized to be appropriated under section 11 for High Energy Physics, there shall be made available to the Secretary to carry out activities, including construction of the facility, under this subsection—

(A) \$95,000,000 for fiscal year 2018; and

(B) \$175,000,000 for fiscal year 2019.

(5) DARK ENERGY AND DARK MATTER RESEARCH.—As part of the program described in paragraph (1), 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.

(6) 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.

SEC. 7. BIOLOGICAL AND ENVIRONMENTAL RESEARCH.

(a) PROGRAM.—The Director shall carry out a program of basic research in the areas of biological systems science and environmental science relevant to the development of new energy technologies and to support Department missions in energy, environment, and national security.

(b) 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.

(c) BIOENERGY RESEARCH CENTERS.—

(1) IN GENERAL.—In carrying out activities under subsection (a), the Director shall select and establish up to 4 bioenergy research centers to conduct basic and fundamental research in plant and microbial systems biology, bio imaging and analysis, and genomics to inform the production of fuels, chemicals from sustainable biomass resources, and to facilitate the translation of basic research results to industry.

(2) SELECTION.—The Director shall select centers under paragraph (1) on a competitive, merit-reviewed basis. The Director shall consider applications from National Laboratories, multi-institutional collaborations, and other appropriate entities.

(3) DURATION.—A center established under this subsection shall receive support for a period of not more than 5 years, subject to the availability of appropriations.

(4) EXISTING CENTERS.—The Director may select a center for participation under this subsection that is in existence, or undergoing a renewal process, on the date of enactment of this Act. Such center shall be eligible to receive support for the duration the 5-year period beginning on the date of establishment of such center.

(5) RENEWAL.—Upon the expiration of any period of support of a center under this subsection, the Director may renew support for the center, on a merit-reviewed basis, for a period of not more than 5 years.

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

(d) LOW DOSE RADIATION RESEARCH PROGRAM.—

(1) IN GENERAL.—Subtitle G of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16311 et seq.) is amended by inserting after section 977 the following new section:

“SEC. 977A. LOW-DOSE RADIATION RESEARCH PROGRAM.

“(a) IN GENERAL.—The Secretary shall carry out a basic research program on low-dose radiation to—

“(1) enhance the scientific understanding of, and reduce uncertainties associated with, the effects of exposure to low-dose radiation; and

“(2) inform improved risk-assessment and risk-management methods with respect to such radiation.

“(b) PROGRAM COMPONENTS.—In carrying out the program required under subsection (a), the Secretary shall—

“(1) formulate scientific goals for low-dose radiation basic research in the United States;

“(2) identify ongoing scientific challenges for understanding the long-term effects of ionizing radiation on biological systems;

“(3) develop a long-term strategic and prioritized basic research agenda to address such scientific challenges in coordination with other research efforts;

“(4) leverage the collective body of knowledge from existing low-dose radiation research; and

“(5) engage with other Federal agencies, research communities, and potential users of information produced under this section, including institutions concerning radiation research, medical physics, radiology, health physics, and emergency response.

“(c) COORDINATION.—In carrying out the program, the Secretary, in coordination with the Physical Science Subcommittee of the National Science and Technology Council, shall—

“(1) support the directives under section 106 of the American Innovation and Competitiveness Act (42 U.S.C. 6601 note);

“(2) ensure that the Office of Science of the Department of Energy consults with the National Aeronautics and Space Administration, the National Institutes of Health, the Environmental Protection Agency, the Department of Defense, the Nuclear Regulatory Commission, and the Department of Homeland Security;

“(3) advise and assist the National Science and Technology Council on policies and initiatives in radiation biology, including enhancing scientific knowledge of the effects of low-dose radiation on biological systems to improve radiation risk-assessment and risk-management methods; and

“(4) identify opportunities to stimulate international cooperation relating to low-dose radiation and leverage research and knowledge from sources outside of the United States.

“(d) RESEARCH PLAN.—Not later than 180 days after the date of enactment of this Act, the Secretary 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 4-year research plan that identifies and prioritizes basic research needs relating to low-dose radiation. In developing such plan, the Secretary shall incorporate the components described in subsection (b).

“(e) DEFINITION OF LOW-DOSE RADIATION.—In this section, the term ‘low-dose radiation’ means a radiation dose of less than 100 millisieverts.

“(f) RULE OF CONSTRUCTION.—Nothing in this section shall be construed to subject any research carried out by the Secretary for the program under this section to any limitations described in 977(e) of the Energy Policy Act of 2005 (42 U.S.C. 16317(e)).

“(g) FUNDING.—From within funds authorized to be appropriated under section 11 of the Department of Energy Science and Innovation Act of 2018, for Biological and Environmental Research, the Secretary make available to carry out this section—

“(1) \$20,000,000 for fiscal year 2018; and

“(2) \$20,000,000 for fiscal year 2019.”

(2) CONFORMING AMENDMENT.—The table of contents for subtitle G of title IX of the Energy Policy Act of 2005 is amended by inserting after the item relating to section 977 the following:

“977A. Low-dose radiation research program.”

(e) MODELING RESEARCH.—As part of the activities described in subsection (a), the Director is authorized to carry out research to develop multiscale computational models that incorporate and examine interactions among human and earth systems.

(f) 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.

SEC. 8. FUSION ENERGY.

(a) PROGRAM.—The Director shall carry out a fusion energy sciences research program to expand the understanding of plasmas and matter at very high temperatures and densities and build the science and engineering foundation needed to develop a fusion energy source.

(b) INERTIAL FUSION ENERGY RESEARCH AND DEVELOPMENT PROGRAM.—The Secretary shall carry out a program of research and technology development in inertial fusion for energy applications, including ion beam, laser, and pulsed power fusion systems.

(c) TOKAMAK RESEARCH AND DEVELOPMENT.—

(1) IN GENERAL.—The Director shall support research and development activities and facility operations to optimize the tokamak approach to fusion energy.

(2) INTERNATIONAL THERMONUCLEAR EXPERIMENTAL REACTOR CONSTRUCTION.—Section 972 of the Energy Policy Act of 2005 (42 U.S.C. 16312) is amended by adding at the end the following new paragraph:

“(7) ITER CONSTRUCTION.—

“(A) IN GENERAL.—There is authorized United States participation in the construction and operations of the ITER project, as agreed to under the April 25, 2007 ‘Agreement on the Establishment of the ITER International Fusion Energy Organization for the Joint Implementation of the ITER Project.’.

“(B) FACILITY REQUIREMENTS.—The Secretary shall ensure that the mission-oriented user facility will enable the study of a burning plasma, and shall be built to have the following characteristics in its full configuration:

“(i) A tokamak device with a plasma radius of 6.2 meters and a magnetic field of 5.3 T.

“(ii) Capable of creating and sustaining a 15-million-Ampere plasma current for greater than 300 seconds.

“(C) AUTHORIZATION OF APPROPRIATIONS.—From within funds authorized to be appropriated under section 11 of the Department of Energy Science and Innovation Act of 2018, for Fusion Energy Sciences, there is authorized for in-kind contributions under this paragraph—

“(i) \$122,000,000 for fiscal year 2018; and

“(ii) \$163,000,000 for fiscal year 2019.

“(D) AUTHORIZATION OF APPROPRIATIONS.—From within funds authorized to be appropriated under section 11 of the Department of Energy Science and Innovation Act of 2018, for Fusion Energy Sciences, there is authorized for cash contributions under this paragraph—

“(i) \$50,000,000 for fiscal year 2018; and

“(ii) \$50,000,000 for fiscal year 2019.”

(d) ALTERNATIVE AND ENABLING CONCEPTS.—

(1) IN GENERAL.—As part of the program described in subsection (a), the Director shall support research and development activities and facility operations at United States universities, national laboratories, and private facilities 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. Fusion energy concepts and activities explored under this paragraph may include—

(A) high magnetic field approaches facilitated by high temperature superconductors;

(B) advanced stellarator concepts;

(C) non-tokamak confinement configurations operating at low magnetic fields;

(D) magnetized target fusion energy concepts;

(E) liquid metals to address issues associated with fusion plasma interactions with the inner wall of the encasing device;

(F) immersion blankets for heat management and fuel breeding;

(G) advanced scientific computing activities; and

(H) other promising fusion energy concepts identified by the Director.

(2) COORDINATION WITH ARPA-E.—The Under Secretary and the Director shall coordinate with the Director of the Advanced Research Projects Agency-Energy (in this paragraph referred to as “ARPA-E”) to—

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

(B) 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

(C) avoid unintentional duplication of activities.

(e) 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.”.

(f) 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, including activities to advance inertial and alternative fusion energy concepts, 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. 9. NUCLEAR PHYSICS.

(a) PROGRAM.—The Director shall carry out a program of experimental and theoretical

research, and support associated facilities, to discover, explore, and understand all forms of nuclear matter.

(b) 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.

(c) 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”.

(d) FACILITY FOR RARE ISOTOPE BEAMS.—

(1) IN GENERAL.—The Secretary shall provide for a Facility for Rare Isotope Beams to advance the understanding of rare nuclear isotopes and the evolution of the cosmos.

(2) FACILITY CAPABILITY.—In carrying out paragraph (1), the Secretary shall provide for, at a minimum, a rare isotope beam facility capable of 400 kW of beam power.

(3) START OF OPERATIONS.—The Secretary shall, to the maximum extent practicable, ensure that the start of full operations of the facility under this subsection occurs before June 30, 2022, with early operation in 2018.

(4) FUNDING.—Out of funds authorized to be appropriated under section 11 for Nuclear Physics, there shall be made available to the Secretary to carry out activities, including construction of the facility, under this subsection—

(A) \$101,200,000 for fiscal year 2018; and

(B) \$86,000,000 for fiscal year 2019.

SEC. 10. 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 Office of Science laboratories. The program shall include projects to—

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

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

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

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

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

(b) APPROACH.—In carrying out this section, the Director shall utilize all available approaches and mechanisms, including capital line items, minor construction projects, energy savings performance contracts, utility energy service contracts, alternative financing, and expense funding, as appropriate.

SEC. 11. AUTHORIZATION OF APPROPRIATIONS.

(a) FISCAL YEAR 2018.—There are authorized to be appropriated to the Secretary for the Office of Science for fiscal year 2018 \$6,259,903,000, of which—

(1) \$2,090,000,000 shall be for Basic Energy Science;

(2) \$908,000,000 shall be for High Energy Physics;

(3) \$673,000,000 shall be for Biological and Environmental Research;

(4) \$684,000,000 shall be for Nuclear Physics;

(5) \$810,000,000 shall be for Advanced Scientific Computing Research;

(6) \$532,111,000 shall be for Fusion Energy Sciences;

(7) \$257,292,000 shall be for Science Laboratories Infrastructure;

(8) \$183,000,000 shall be for Science Program Direction;

(9) \$103,000,000 shall be for Safeguards and Security; and

(10) \$19,500,000 shall be for Workforce Development for Teachers and Scientists.

(b) FISCAL YEAR 2019.—There are authorized to be appropriated to the Secretary for the Office of Science for fiscal year 2019 \$6,600,000,000, of which—

(1) \$2,129,233,000 shall be for Basic Energy Science;

(2) \$1,004,510,000 shall be for High Energy Physics;

(3) \$673,000,000 shall be for Biological and Environmental Research;

(4) \$690,000,000 shall be for Nuclear Physics;

(5) \$899,010,000 shall be for Advanced Scientific Computing Research;

(6) \$640,000,000 shall be for Fusion Energy Sciences;

(7) \$257,292,000 shall be for Science Laboratories Infrastructure;

(8) \$181,345,000 shall be for Science Program Direction;

(9) \$106,110,000 shall be for Safeguards and Security; and

(10) \$19,500,000 shall be for Workforce Development for Teachers and Scientists.

The SPEAKER pro tempore. Pursuant to the rule, the gentleman from Texas (Mr. WEBER) and the gentleman from Texas (Mr. VEASEY) each will control 20 minutes.

The Chair recognizes the gentleman from Texas (Mr. WEBER).

GENERAL LEAVE

Mr. WEBER of Texas. Mr. Speaker, I ask unanimous consent that all Members may have 5 legislative days to revise and extend their remarks and include extraneous material on H.R. 5905, the bill under consideration.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from Texas?

There was no objection.

Mr. WEBER of Texas. Mr. Speaker, I yield myself such time as I may consume.

Mr. Speaker, I rise in support of H.R. 5905, the Department of Energy Science and Innovation Act of 2018.

This legislation authorizes the Department of Energy's Office of Science programs for fiscal years 2018 and 2019. It also authorizes upgrades and new construction of major user facilities at the Department of Energy national labs and universities.

Over the past 4 years, the Energy Subcommittee has met with stakeholders, held hearings, and worked extensively with our colleagues to draft the language included in today's legislation. During this comprehensive process, we spoke with DOE officials, directors of DOE national labs, academia, and industry representatives about the right priorities for these Office of Science programs. The result was a series of bills that the Science, Space, and Technology Committee has advanced through the House this Congress, including H.R. 589, H.R. 4376, H.R. 4377, and H.R. 4675.

The legislation we will consider today combines these bills to form a bipartisan authorization of the department's basic science research. This includes more than \$6 billion in fundamental research and discovery science, largely performed at DOE national laboratories and user facilities around the country.

Last month, I had the opportunity to visit a number of these facilities at Argonne National Laboratory and Fermi National Accelerator Laboratory with several of my Science, Space, and Technology Committee colleagues. We got to see firsthand the incredible work that those researchers do for our country and for the world.

From advanced scientific computing to nuclear physics to fusion energy science, focusing on basic research at our national labs provides the best opportunity for U.S. economic growth and technology innovation.

H.R. 5905 authorizes funding for critical infrastructure projects at these national labs. In the Basic Energy Sciences program, it authorizes upgrades to world-leading X-ray light source facilities around the country, like the Advanced Photon Source at Argonne National Laboratory and the Advanced Light Source at Lawrence Berkeley National Laboratory.

These facilities give American scientists the tools they need to study the structure and behavior of both physical and biological materials, enabling innovation in many fields, including creating new materials for industrial as well as pharmaceutical use.

This legislation also authorizes the construction of new DOE research facilities for physics and high-energy physics. This includes construction of the Facility for Rare Isotope Beams, or FRIB, at Michigan State University, which will enable critical nuclear physics research across a wide breadth of fields, ranging from astrophysics to medicine, and eventually the construction of the Long-Baseline Neutrino Facility at Fermilab, an internationally coordinated project to build the world's highest intensity neutrino beam. The research at this facility will help shed light on the universe and its origins.

This bill, Mr. Speaker, also specifically authorizes basic research in fields that are critical to U.S. dominance in science and technology. It authorizes research in exascale computing, electricity storage, and fusion energy sciences. It establishes a DOE exascale computing program, a low-dose radiation research program, and programs for managing our Energy Frontier Research Centers and Bioenergy Research Centers, while also ensuring that we fulfill our commitments to the ITER project for fiscal years 2018 and 2019.

Significant investments in basic science research by foreign countries like China threaten America's global standing as the leader in scientific knowledge. To maintain our competitive advantage as a world leader in science, we must continue to support

the research and research infrastructure that will lead to next generation technologies.

H.R. 5905 is a commonsense bill that will maintain American leadership in science. I want to thank Chairman SMITH, Representative LOFGREN, Vice Chairman LUCAS, and many of my Science, Space, and Technology Committee colleagues for cosponsoring this important legislation. I am grateful for the opportunity to work with the members of this committee to gather research that will help America compete around the world.

Mr. Speaker, I reserve the balance of my time.

Mr. VEASEY. Mr. Speaker, I yield myself such time as I may consume.

Mr. Speaker, I rise today in support of H.R. 5905, the Department of Energy Science and Innovation Act of 2018. This bill provides important statutory direction to the Department of Energy's Office of Science, which is our Nation's largest supporter of research in the physical sciences. So it is impossible to overstate its importance to our energy future and to our overall innovation enterprise.

This agency also operates more than 30 world-class scientific user facilities, whose applications range from developing new materials for next generation batteries, to new pharmaceuticals that will better treat diseases, to even examining the fundamental building blocks of the universe.

Much of this bill is derived from previous bipartisan, bicameral agreements that were included in H.R. 589, the House-passed Department of Energy Research and Innovation Act of 2017.

As we await Senate action on that legislation, I support moving forward with additional language included in this bill that would authorize upgrades to several important user facilities, direct DOE to provide sufficient support to maintain our commitments to the ITER international fusion project, and provide statutory authority to fund low-dose radiation research as well as a promising computational materials initiative at our national labs.

I also note that I am happy to see robust funding levels included in this bipartisan bill, particularly for the Biological and Environmental Research program, which supports critical research to reduce uncertainties and better understand the impacts of climate change. I strongly support this bill and encourage my colleagues to do the same.

Mr. Speaker, I reserve the balance of my time.

Mr. WEBER of Texas. Mr. Speaker, I yield 4 minutes to the gentleman from Texas (Mr. SMITH).

Mr. SMITH of Texas. Mr. Speaker, first of all, let me thank the chairman of the Energy Subcommittee, Mr. WEBER, the gentleman from Texas, for yielding.

I strongly support this bill, H.R. 5905, the Department of Energy Science and Innovation Act of 2018. This bipartisan legislation, sponsored by 12 members of the House Science, Space, and Technology Committee authorizes the basic research programs within the DOE Office of Science for fiscal years 2018 and 2019. The programs include research in basic energy sciences, advanced scientific computing, high-energy physics, biological and environmental research, fusion energy science, and nuclear physics.

These basic research programs are the core mission of the Department of Energy and will produce the scientific discoveries that will help maintain U.S. leadership in technology.

This bill also prioritizes basic research funding for solar fuels, electricity storage, bioenergy research, exascale computing, and low-dose radiation research. It provides the Office of Science funding for upgrades and construction of seven high-priority user facilities at DOE national labs.

This legislation is the product of more than 4 years of bipartisan work by the Science, Space, and Technology Committee to advance basic research and set clear science priorities for the Department of Energy.

H.R. 5905 builds on the initiatives included in the House-passed bill, H.R. 589, the Department of Energy Research and Innovation Act, and also incorporates four bipartisan Science, Space, and Technology Committee infrastructure bills that passed the House in February.

One example of the central missions authorized in the DOE Science and Innovation Act is the exascale computing program. Developing an exascale system is critical to enabling scientific discovery, strengthening national security, and promoting U.S. competitiveness. Exascale computing will have real-world benefits for American industry and entice the best researchers in the world to conduct groundbreaking science at the DOE labs.

To strengthen U.S. energy independence, this legislation also supports fusion energy sciences. When commercial fusion becomes available, it will revolutionize the energy market and could significantly reduce global carbon emissions.

H.R. 5905 also authorizes funds for U.S. contributions to the International Thermonuclear Experimental Reactor project, a critical step to achieving commercial fusion energy.

Again, I want to thank Representative WEBER, as well as Representative LOFGREN, for their longstanding support of basic research and investments in our world-class science facilities at the DOE national labs.

Mr. Speaker, I urge my colleagues to support the bill.

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Mr. WEBER of Texas. Mr. Speaker, I yield 1½ minutes to the gentleman from Kansas (Mr. MARSHALL), the distinguished doctor.

Mr. MARSHALL. Mr. Speaker, I rise today in support of H.R. 5905, the Department of Energy Science and Innovation Act, sponsored by my friend and colleague Representative WEBER. His bill contains the text of my bill, the Low-Dose Radiation Research Act, which unanimously passed the House this past February.

The language directs the Department of Energy to utilize \$20 million to carry out a research program on low-dose radiation within the Office of Science. This program will increase our understanding of the health effects that low doses of radiation have on biological systems.

Research has consistently shown us the adverse health effects associated with high doses of radiation, but we are a long way from accurately assessing the effects of low doses of radiation. As the product of industrial activities, medical procedures, and naturally occurring systems, humans are exposed to low doses of radiation every day, and it is imperative we can accurately assess this risk.

There is broad consensus among the radiobiology community that more research is necessary for Federal agencies, physicians, and related experts to advance the use of radiation technologies. We have invaluable diagnostic tools today, such as CT scans, which emit low doses of radiation. It is vital that physicians are able to inform patients of the health risks associated with these types of imaging processes. As a physician in my home State of Kansas, I have a firsthand understanding of the crucial importance of verified research and ensuring the best medical outcomes for my patients.

I am proud to support this bill and urge my colleagues to do the same.

Mr. WEBER of Texas. Mr. Speaker, I yield myself such time as I may consume.

Mr. Speaker, by harnessing the strength of our national labs and investing in basic research, H.R. 5905 will help ensure Americans' leadership in science and technology.

Mr. Speaker, I again want to thank my 11 colleagues on the Committee on Science, Space, and Technology who have cosponsored H.R. 5905, including Chairman LAMAR SMITH, Representative ZOE LOFGREN, and Vice Chairman FRANK LUCAS. I also want to thank the dozens of researchers and stakeholders who provided feedback as we developed this legislation.

Mr. Speaker, I urge the adoption of this commonsense, bipartisan legislation, and I reserve the balance of my time.

Mr. VEASEY. Mr. Speaker, I yield back the balance of my time.

Mr. WEBER of Texas. Mr. Speaker, this is great legislation. Again, I want to urge the adoption of this common-sense, bipartisan legislation, and I yield back the balance of my time.

The SPEAKER pro tempore. The question is on the motion offered by the gentleman from Texas (Mr. WEBER) that the House suspend the rules and pass the bill, H.R. 5905, as amended.

The question was taken; and (two-thirds being in the affirmative) the rules were suspended and the bill, as amended, was passed.

A motion to reconsider was laid on the table.

ARPA-E ACT OF 2018

Mr. LUCAS. Mr. Speaker, I move to suspend the rules and pass the bill (H.R. 5906) to amend the America COMPETES Act to establish Department of Energy policy for Advanced Research Projects Agency-Energy, and for other purposes, as amended.

The Clerk read the title of the bill.

The text of the bill is as follows:

H.R. 5906

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 “ARPA-E Act of 2018”.

SEC. 2. ADVANCED RESEARCH PROJECTS AGENCY-ENERGY.

(a) ESTABLISHMENT.—Section 5012(b) of the America COMPETES Act (42 U.S.C. 16538(b)) is amended by striking “development of energy technologies” and inserting “development of transformative science and technology solutions to address energy, environmental, economic, and national security challenges”.

(b) GOALS.—Section 5012(c) of such Act (42 U.S.C. 16538(c)) is amended—

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

“(A) to enhance the economic and energy security of the United States through the development of energy technologies that—

“(i) reduce imports of energy from foreign sources;

“(ii) reduce energy-related emissions, including greenhouse gases;

“(iii) improve the energy efficiency of all economic sectors;

“(iv) provide transformative solutions to improve the management, clean-up, and disposal of—

“(I) low-level radioactive waste;

“(II) spent nuclear fuel; and

“(III) high-level radioactive waste;

“(v) improve efficiency and reduce the environmental impact of all forms of energy production;

“(vi) improve the resiliency, reliability, and security of the electric grid; and

“(vii) address other challenges within the mission of the Department as determined by the Secretary; and”;

(2) in paragraph (2) by striking “energy technology projects” and inserting “advanced technology projects”.

(c) RESPONSIBILITIES.—Section 5012(e)(3)(A) of such Act (42 U.S.C. 16538(e)(3)(A)) is amended by striking “energy”.

(d) STRATEGIC VISION ROADMAP.—Section 5012(h)(2) of such Act (42 U.S.C. 16538(h)(2)) is amended to read as follows:

“(2) STRATEGIC VISION ROADMAP.—In the report required under paragraph (1), the Director shall include a roadmap describing the strategic vision that ARPA-E will use to guide the choices of ARPA-E for future technology investments over the following 2 fiscal years.”.

(e) COORDINATION AND NONDUPLICATION.—Section 5012(i)(1) of such Act (42 U.S.C. 16538(i)(1)) is amended to read as follows:

“(1) IN GENERAL.—To the maximum extent practicable, the Director shall ensure that—

“(A) the activities of ARPA-E are coordinated with, and do not duplicate the efforts of, programs and laboratories within the Department and other relevant research agencies; and

“(B) ARPA-E does not provide funding for a project unless the prospective grantee demonstrates sufficient attempts to secure private financing or indicates that the project is not independently commercially viable.”.

(f) EVALUATION.—Section 5012(l) of such Act (42 U.S.C. 16538(l)) is amended—

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

“(1) IN GENERAL.—Not later than 3 years after the date of enactment of the ARPA-E Act of 2018, the Secretary is authorized to enter into a contract with the National Academy of Sciences under which the National Academy shall conduct an evaluation of how well ARPA-E is achieving the goals and mission of ARPA-E.”; and

(2) in paragraph (2)—

(A) by striking “shall” and inserting “is authorized to”; and

(B) by striking “the recommendation of the National Academy of Sciences” and inserting “a recommendation”.

(g) PROTECTION OF PROPRIETARY INFORMATION.—Section 5012 of such Act (42 U.S.C. 16538) is amended—

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

(2) by inserting after subsection (m) the following new subsection:

“(n) PROTECTION OF PROPRIETARY INFORMATION.—

“(1) IN GENERAL.—The following categories of information collected by ARPA-E from recipients of awards under this section shall be considered privileged and confidential and not subject to disclosure pursuant to section 552 of title 5, United States Code:

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

“(B) 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.

“(C) Additional financial support that the awardee—

“(i) plans to invest, or has invested, into the technology developed under the award; or

“(ii) is seeking from third parties.

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

“(2) EFFECT OF SUBSECTION.—Nothing in this subsection shall be construed to affect—

“(A) the authority of the Secretary to use information without publicly disclosing such information; or

“(B) the responsibility of the Secretary to transmit information to Congress as required by law.”.

(h) FUNDING.—Section 5012(o)(4) of such Act (42 U.S.C. 16538(o)(4)), as redesignated by subsection (g)(1), is amended by striking “dur-

ing the 5-year period beginning on the date of enactment of this Act”.

(i) TECHNICAL AMENDMENTS.—

(1) Section 5012(g)(3)(A)(iii) of such Act (42 U.S.C. 16538(g)(3)(A)(iii)) is amended by striking “subpart” each place it appears and inserting “subparagraph”.

(2) Section 5012(o)(2) of such Act (42 U.S.C. 16538(o)(2)), as redesignated by subsection (g)(1), is amended by striking “paragraphs (4) and (5)” and inserting “paragraph (4)”.

The SPEAKER pro tempore. Pursuant to the rule, the gentleman from Oklahoma (Mr. LUCAS) and the gentleman from Texas (Mr. VEASEY) each will control 20 minutes.

The Chair recognizes the gentleman from Oklahoma.

GENERAL LEAVE

Mr. LUCAS. Mr. Speaker, I ask unanimous consent that all Members may have 5 legislative days in which to revise and extend their remarks and to include extraneous material on H.R. 5906, the bill now under consideration.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from Oklahoma?

There was no objection.

Mr. LUCAS. Mr. Speaker, I yield myself such time as I may consume.

Mr. Speaker, I rise in support of H.R. 5906, the ARPA-E Act of 2018. This legislation requires the Department to refocus ARPA-E towards developing transformative science and technology solutions to address energy, environment, economic, and national security issues.

ARPA-E was created to ensure that the U.S. energy sector maintained a competitiveness in developing emerging energy technologies. The program was established to help develop high-potential, high-impact energy technologies that were too early stage to attract private sector investment.

ARPA-E was designed to bring this finite R&D funding for a limited time, with the intention to make quick, notable impact on the development of new energy technologies.

In order to accomplish this goal, ARPA-E was given a unique management structure, with flexibility to start and stop research projects that are no longer achieving individual goals, expedited hiring and firing authority to make sure that ARPA-E staff could adequately select and support projects, and the tools to identify market challenges that could affect the advancement in project technologies.

However, we have all heard of the concerns with ARPA-E. The first is the worry that this is just one more of the same from DOE. With the Energy Efficiency and Renewable Energy program office funded at over \$2.3 billion, it is easy to see why some would ask if we need another clean energy program.

Second, we have all heard of concerns over the years that ARPA-E wasn't meeting its intended goal—to fund the kind of technologies that are so innovative they would never attract private sector investment—but was instead provided funding to big companies with