

115TH CONGRESS
2D SESSION

S. 2503

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.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

1 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

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

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

Sec. 1. Short title; table of contents.

Sec. 2. Definitions.

TITLE I—LABORATORY MODERNIZATION AND TECHNOLOGY
TRANSFER

Sec. 101. Short title.

Sec. 102. Inclusion of early stage technology demonstration in authorized technology transfer activities.

Sec. 103. Sense of Congress on accelerating energy innovation.

Sec. 104. Restoration of laboratory directed research and development program.

Sec. 105. Research grants database.

Sec. 106. Technology transfer and transitions assessment.

Sec. 107. Agreements for commercializing technology pilot program.

Sec. 108. Short-term cost-share pilot program.

TITLE II—DEPARTMENT OF ENERGY RESEARCH COORDINATION

Sec. 201. Short title.

Sec. 202. Protection of information.

Sec. 203. Crosscutting research and development.

Sec. 204. Strategic research portfolio analysis and coordination plan.

Sec. 205. Strategy for facilities and infrastructure.

Sec. 206. Energy Innovation Hubs.

TITLE III—DEPARTMENT OF ENERGY OFFICE OF SCIENCE
POLICY

Sec. 301. Short title.

Sec. 302. Mission.

Sec. 303. Basic energy sciences.

Sec. 304. Advanced scientific computing research.

Sec. 305. High-energy physics.

Sec. 306. Biological and environmental research.

Sec. 307. Fusion energy.

Sec. 308. Nuclear physics.

Sec. 309. Science laboratories infrastructure program.

6 **SEC. 2. DEFINITIONS.**

7 In this Act:

8 (1) DEPARTMENT.—The term “Department”
9 means the Department of Energy.

1 (2) DIRECTOR.—The term “Director” means
2 the Director of the Office of Science of the Depart-
3 ment, except as otherwise indicated.

4 (3) NATIONAL LABORATORY.—The term “Na-
5 tional Laboratory” has the meaning given that term
6 in section 2 of the Energy Policy Act of 2005 (42
7 U.S.C. 15801).

8 (4) SECRETARY.—The term “Secretary” means
9 the Secretary of Energy.

10 **TITLE I—LABORATORY MODER-**
11 **NIZATION AND TECHNOLOGY**
12 **TRANSFER**

13 **SEC. 101. SHORT TITLE.**

14 This title may be cited as the “Laboratory Mod-
15 ernization and Technology Transfer Act”.

16 **SEC. 102. INCLUSION OF EARLY STAGE TECHNOLOGY DEM-**
17 **ONSTRATION IN AUTHORIZED TECHNOLOGY**
18 **TRANSFER ACTIVITIES.**

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

21 (1) by redesignating subsection (g) as sub-
22 section (h); and

23 (2) by inserting after subsection (f) the fol-
24 lowing:

1 “(g) **EARLY STAGE TECHNOLOGY DEMONSTRA-**
 2 **TION.**—The Secretary shall permit the directors of the Na-
 3 tional Laboratories to use funds authorized to support
 4 technology transfer within the Department to carry out
 5 early stage and precommercial technology demonstration
 6 activities to remove technology barriers that limit private
 7 sector interest and demonstrate potential commercial ap-
 8 plications of any research and technologies arising from
 9 National Laboratory activities.”.

10 **SEC. 103. SENSE OF CONGRESS ON ACCELERATING ENERGY**
 11 **INNOVATION.**

12 It is the sense of Congress that—

13 (1) although important progress has been made
 14 in cost reduction and deployment of clean energy
 15 technologies, accelerating clean energy innovation
 16 will help meet critical competitiveness, energy secu-
 17 rity, and environmental goals;

18 (2) accelerating the pace of clean energy inno-
 19 vation in the United States calls for—

20 (A) supporting existing research and devel-
 21 opment programs at the Department and the
 22 world-class National Laboratories;

23 (B) exploring and developing new path-
 24 ways for innovators, investors, and decision-
 25 makers to leverage the resources of the Depart-

ment 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.

1 **SEC. 104. RESTORATION OF LABORATORY DIRECTED RE-**
2 **SEARCH AND DEVELOPMENT PROGRAM.**

3 (a) IN GENERAL.—Except as provided in subsection
4 (b), the Secretary shall ensure that laboratory operating
5 contractors do not allocate costs of general and adminis-
6 trative overhead to laboratory directed research and devel-
7 opment.

8 (b) EXCEPTION FOR NATIONAL SECURITY LABORA-
9 TORIES.—This section shall not apply to the national secu-
10 rity laboratories with respect to which section 3119 of the
11 National Defense Authorization Act for Fiscal Year 2017
12 (Public Law 114–328) applies.

13 **SEC. 105. RESEARCH GRANTS DATABASE.**

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

21 (b) REQUIREMENTS.—Each listing described in sub-
22 section (a) shall include, at a minimum, for each listed
23 project, the Department office carrying out the project,
24 the project name, an abstract or summary of the project,
25 funding levels, project duration, contractor or grantee

1 name (including the names of any subcontractors), and
 2 expected objectives and milestones.

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

9 **SEC. 106. TECHNOLOGY TRANSFER AND TRANSITIONS AS-**
 10 **SESSMENT.**

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

20 **SEC. 107. AGREEMENTS FOR COMMERCIALIZING TECH-**
 21 **NOLOGY PILOT PROGRAM.**

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

1 (b) TERMS.—Each agreement entered into pursuant
2 to the pilot program referred to in subsection (a) shall
3 provide to the contractor of the applicable National Lab-
4 oratory, to the maximum extent determined to be appro-
5 priate by the Secretary, increased authority to negotiate
6 contract terms, such as intellectual property rights, pay-
7 ment structures, performance guarantees, and multiparty
8 collaborations.

9 (c) ELIGIBILITY.—

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

13 (2) AGREEMENTS WITH NON-FEDERAL ENTI-
14 TIES.—To carry out paragraph (1) and subject to
15 paragraph (3), the Secretary shall permit the direc-
16 tors of the National Laboratories to execute agree-
17 ments with a non-Federal entity, including a non-
18 Federal entity already receiving Federal funding
19 that will be used to support activities under agree-
20 ments executed pursuant to paragraph (1), provided
21 that such funding is solely used to carry out the
22 purposes of the Federal award.

23 (3) RESTRICTION.—The requirements of chap-
24 ter 18 of title 35, United States Code (commonly
25 known as the “Bayh-Dole Act”) shall apply if—

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

4 (B) at least one of the parties to the fund-
5 ing agreement is eligible to receive rights under
6 that chapter.

7 (d) SUBMISSION TO SECRETARY.—Each affected di-
8 rector of a National Laboratory shall submit to the Sec-
9 retary, with respect to each agreement entered into under
10 this section—

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

13 (2) the total estimated costs of the project;

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

16 (4) other documentation determined to be ap-
17 propriate by the Secretary.

18 (e) CERTIFICATION.—The Secretary shall require the
19 contractor of the affected National Laboratory to certify
20 that each activity carried out under a project for which
21 an agreement is entered into under this section—

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

24 (2) does not present, or minimizes, any appar-
25 ent conflict of interest, and avoids or neutralizes any

1 actual conflict of interest, as a result of the agree-
2 ment under this section.

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

5 (g) REPORTS.—

6 (1) OVERALL ASSESSMENT.—Not later than 60
7 days after the date described in subsection (f), the
8 Secretary, in coordination with directors of the Na-
9 tional Laboratories, shall submit to the appropriate
10 committees of Congress a report that—

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

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

15 (C) assesses the potential for program ac-
16 tivities to interfere with the responsibilities of
17 the National Laboratories to the Department;
18 and

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

21 (2) TRANSPARENCY.—The Secretary, in coordi-
22 nation with directors of the National Laboratories,
23 shall submit to the appropriate committees of Con-
24 gress an annual report that accounts for all
25 incidences of, and provides a justification for, non-

1 Federal entities using funds derived from a Federal
 2 contract or award to carry out agreements pursuant
 3 to this section.

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

5 (a) IN GENERAL.—Section 988(b) of the Energy Pol-
 6 icy Act of 2005 (42 U.S.C. 16352(b)) is amended—

7 (1) in paragraph (1), by striking “Except as
 8 provided in paragraphs (2) and (3)” and inserting
 9 “Except as provided in paragraphs (2), (3), and
 10 (4)”; and

11 (2) by adding at the end the following:

12 “(4) EXEMPTION FOR INSTITUTIONS OF HIGH-
 13 ER EDUCATION AND OTHER NONPROFIT INSTITU-
 14 TIONS.—

15 “(A) IN GENERAL.—Paragraph (1) shall
 16 not apply to a research or development activity
 17 performed by an institution of higher education
 18 or nonprofit institution (as defined in section 4
 19 of the Stevenson-Wydler Technology Innovation
 20 Act of 1980 (15 U.S.C. 3703)).

21 “(B) TERMINATION DATE.—The exemp-
 22 tion under subparagraph (A) shall apply during
 23 the 2-year period beginning on the date of en-
 24 actment of this paragraph.”.

25 (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 (1) in subsection (a)(3), by striking “subsection
2 (n)(1)” and inserting “subsection (o)(1)”;

3 (2) by redesignating subsection (n) as sub-
4 section (o); and

5 (3) by inserting after subsection (m) the fol-
6 lowing:

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

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

17 “(2) Investments provided to an awardee from
18 third parties (such as venture capital firms, hedge
19 funds, and private equity firms), including amounts
20 and the percentage of ownership of the awardee pro-
21 vided in return for the investments.

22 “(3) Additional financial support that the
23 awardee—

24 “(A) plans to or has invested into the tech-
25 nology developed under the award; or

1 “(B) is seeking from third parties.

2 “(4) Revenue from the licensing or sale of new
3 products or services resulting from research con-
4 ducted under the award.”.

5 **SEC. 203. CROSSCUTTING RESEARCH AND DEVELOPMENT.**

6 (a) IN GENERAL.—The Secretary shall use the capa-
7 bilities of the Department to identify strategic opportuni-
8 ties for collaborative research, development, demonstra-
9 tion, and commercial application of innovative science and
10 technologies.

11 (b) EXISTING PROGRAMS; COORDINATION OF ACTIVI-
12 TIES.—To the maximum extent practicable, the Secretary
13 shall seek—

14 (1) to leverage existing programs of the Depart-
15 ment; and

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

20 (c) ADDITIONAL ACTIONS.—The Secretary shall—

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

23 (2) develop a planning, evaluation, and tech-
24 nical assessment framework for setting objective

1 long-term strategic goals and evaluating progress
2 that—

3 (A) ensures integrity and independence;
4 and

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

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

11 (4) identify programs that may be more effec-
12 tively left to the States, industry, nongovernmental
13 organizations, institutions of higher education, or
14 other stakeholders.

15 **SEC. 204. STRATEGIC RESEARCH PORTFOLIO ANALYSIS**
16 **AND COORDINATION PLAN.**

17 The Energy Policy Act of 2005 is amended by strik-
18 ing section 994 (42 U.S.C. 16358) and inserting the fol-
19 lowing:

20 **“SEC. 994. STRATEGIC RESEARCH PORTFOLIO ANALYSIS**
21 **AND COORDINATION PLAN.**

22 “(a) IN GENERAL.—The Secretary shall periodically
23 review all of the science and technology activities of the
24 Department in a strategic framework that takes into ac-
25 count—

1 “(1) the frontiers of science to which the De-
2 partment can contribute;

3 “(2) the national needs relevant to the statu-
4 tory missions of the Department; and

5 “(3) global energy dynamics.

6 “(b) COORDINATION ANALYSIS AND PLAN.—

7 “(1) IN GENERAL.—As part of the review under
8 subsection (a), the Secretary shall develop a plan to
9 improve coordination and collaboration in research,
10 development, demonstration, and commercial appli-
11 cation activities across organizational boundaries of
12 the Department.

13 “(2) PLAN CONTENTS.—The plan developed
14 under paragraph (1) shall describe—

15 “(A) crosscutting scientific and technical
16 issues and research questions that span more
17 than one program or major office of the De-
18 partment;

19 “(B) ways in which the applied technology
20 programs of the Department are coordinating
21 activities and addressing the questions referred
22 to in subparagraph (A);

23 “(C) ways in which the technical inter-
24 change within the Department, particularly be-
25 tween the Office of Science and the applied

1 technology programs, could be enhanced, in-
2 cluding ways in which the research agendas of
3 the Office of Science and the applied programs
4 could better interact and assist each other;

5 “(D) ways in which the Secretary would
6 ensure that the overall research agenda of the
7 Department includes, in addition to funda-
8 mental, curiosity-driven research, fundamental
9 research related to topics of concern to the ap-
10 plied programs, and applications in Depart-
11 mental technology programs of research results
12 generated by fundamental, curiosity-driven re-
13 search;

14 “(E) critical assessments of any ongoing
15 programs that have experienced subpar per-
16 formance or cost overruns of 10 percent or
17 more over one or more years;

18 “(F) any activities that may be more effec-
19 tively left to the States, industry, nongovern-
20 mental organizations, institutions of higher edu-
21 cation, or other stakeholders; and

22 “(G) detailed evaluations and proposals for
23 innovation hubs, institutes, and research cen-
24 ters of the Department, including—

1 “(i) an affirmation that the hubs, in-
 2 stitutes, and research centers will—

3 “(I) advance the mission of the
 4 Department; and

5 “(II) prioritize research, develop-
 6 ment, and demonstration; and

7 “(ii) an affirmation that any hubs, in-
 8 stitutes, or research centers that are estab-
 9 lished or renewed within the Office of
 10 Science are consistent with the mission of
 11 the Office of Science described in sub-
 12 section (c) of section 209 of the Depart-
 13 ment of Energy Organization Act (42
 14 U.S.C. 7139).

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

17 “(1) the results of the review under subsection
 18 (a); and

19 “(2) the coordination plan under subsection
 20 (b).”.

21 **SEC. 205. STRATEGY FOR FACILITIES AND INFRASTRUC-**
 22 **TURE.**

23 (a) AMENDMENTS.—Section 993 of the Energy Pol-
 24 icy Act of 2005 (42 U.S.C. 16357) is amended—

1 (1) by striking the section heading and insert-
 2 ing the following: “**STRATEGY FOR FACILITIES**
 3 **AND INFRASTRUCTURE**”; and

4 (2) in subsection (b)(1), by striking “2008”
 5 and inserting “2018”.

6 (b) CLERICAL AMENDMENT.—The table of contents
 7 in section 1(b) of the Energy Policy Act of 2005 is amend-
 8 ed by striking the item relating to section 993 and insert-
 9 ing the following:

“Sec. 993. Strategy for facilities and infrastructure.”.

10 **SEC. 206. ENERGY INNOVATION HUBS.**

11 (a) DEFINITIONS.—In this section:

12 (1) **ADVANCED ENERGY TECHNOLOGY**.—The
 13 term “advanced energy technology” means—

14 (A) an innovative technology—

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

18 (ii) that produces nuclear energy;

19 (iii) for carbon capture and sequestra-
 20 tion;

21 (iv) that enables advanced vehicles,
 22 vehicle components, and related tech-
 23 nologies that result in significant energy
 24 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—

1 (A) an institution of higher education;

2 (B) an appropriate State or Federal entity,
3 including a federally funded research and devel-
4 opment center of the Department;

5 (C) a nongovernmental organization with
6 expertise in advanced energy technology re-
7 search, development, demonstration, or com-
8 mercial application; or

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

11 (b) AUTHORIZATION OF PROGRAM.—

12 (1) IN GENERAL.—The Secretary shall carry
13 out a program to enhance the economic, environ-
14 mental, and energy security of the United States by
15 making awards to consortia for establishing and op-
16 erating hubs, to be known as “Energy Innovation
17 Hubs”, to conduct and support, at, if practicable,
18 one centralized location, multidisciplinary, collabo-
19 rative research, development, demonstration, and
20 commercial application of advanced energy tech-
21 nologies.

22 (2) TECHNOLOGY DEVELOPMENT FOCUS.—The
23 Secretary shall designate for each Hub a unique ad-
24 vanced energy technology or basic research focus.

1 (3) COORDINATION.—The Secretary shall en-
2 sure the coordination of, and avoid unnecessary du-
3 plication of, the activities of each Hub with the ac-
4 tivities of—

5 (A) other research entities of the Depart-
6 ment, including the National Laboratories, the
7 Advanced Research Projects Agency—Energy,
8 and Energy Frontier Research Centers; and

9 (B) industry.

10 (c) APPLICATION PROCESS.—

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

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

16 (B) operate subject to a binding agree-
17 ment, entered into by each member of the con-
18 sortium, that documents—

19 (i) the proposed partnership agree-
20 ment, including the governance and man-
21 agement structure of the Hub;

22 (ii) measures the consortium will un-
23 dertake to enable cost-effective implemen-
24 tation of activities under the program de-
25 scribed in subsection (b)(1); and

- 1 (iii) a proposed budget, including fi-
2 nancial contributions from non-Federal
3 sources; and
4 (C) operate as a nonprofit organization.

5 (2) APPLICATION.—

6 (A) IN GENERAL.—A consortium seeking
7 to establish and operate a Hub under sub-
8 section (b)(1) shall submit to the Secretary an
9 application at such time, in such manner, and
10 containing such information as the Secretary
11 may require, including a detailed description of
12 each element of the consortium agreement re-
13 quired under paragraph (1)(B).

14 (B) REQUIREMENT.—If the consortium
15 members will not be located at one centralized
16 location, the application under subparagraph
17 (A) shall include a communications plan that
18 ensures close coordination and integration of
19 Hub activities.

20 (3) SELECTION.—

21 (A) IN GENERAL.—The Secretary shall se-
22 lect consortia for awards for the establishment
23 and operation of Hubs through a competitive
24 selection process.

1 (B) CONSIDERATIONS.—In selecting con-
 2 sortia under subparagraph (A), the Secretary
 3 shall consider—

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

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

8 (d) TERM.—

9 (1) IN GENERAL.—An award made to a Hub
 10 under this section shall be for a period of not more
 11 than 5 years, subject to the availability of appropria-
 12 tions, after which the award may be renewed, sub-
 13 ject to a rigorous merit review.

14 (2) EXISTING HUBS.—A Hub already in exist-
 15 ence on, or undergoing a renewal process on, the
 16 date of enactment of this Act—

17 (A) may continue to receive support during
 18 the 5-year period beginning on the date of es-
 19 tablishment of that Hub; and

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

22 (e) HUB OPERATIONS.—

23 (1) IN GENERAL.—Each Hub shall conduct or
 24 provide for multidisciplinary, collaborative research,
 25 development, demonstration, and commercial appli-

1 cation of advanced energy technologies within the
2 technology development focus designated under sub-
3 section (b)(2).

4 (2) ACTIVITIES.—Each Hub shall—

5 (A) encourage collaboration and commu-
6 nication among the member qualifying entities
7 of the consortium and awardees;

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

10 (C) submit an annual report to the De-
11 partment summarizing the activities of the
12 Hub, including—

13 (i) detailing organizational expendi-
14 tures; and

15 (ii) describing each project under-
16 taken by the Hub; and

17 (D) monitor project implementation and
18 coordination.

19 (3) CONFLICTS OF INTEREST.—Each Hub shall
20 maintain conflict of interest procedures, consistent
21 with the conflict of interest procedures of the De-
22 partment.

23 (4) PROHIBITION ON CONSTRUCTION.—

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

1 (i) no funds provided under this sec-
 2 tion may be used for construction of new
 3 buildings or facilities for Hubs; and

4 (ii) construction of new buildings or
 5 facilities shall not be considered as part of
 6 the non-Federal share of a Hub cost-shar-
 7 ing agreement.

8 (B) TEST BED AND RENOVATION EXCEP-
 9 TION.—Nothing in this paragraph prohibits the
 10 use of funds provided under this section or non-
 11 Federal cost share funds for the construction of
 12 a test bed or renovations to existing buildings
 13 or facilities for the purposes of research if the
 14 Secretary determines that the test bed or ren-
 15 ovations are limited to a scope and scale nec-
 16 essary for the research to be conducted.

17 **TITLE III—DEPARTMENT OF EN-**
 18 **ERGY OFFICE OF SCIENCE**
 19 **POLICY**

20 **SEC. 301. SHORT TITLE.**

21 This title may be cited as the “Department of Energy
 22 Office of Science Policy Act”.

1 **SEC. 302. MISSION.**

2 Section 209 of the Department of Energy Organiza-
3 tion Act (42 U.S.C. 7139) is amended by adding at the
4 end the following:

5 “(c) MISSION.—The mission of the Office of Science
6 shall be the delivery of scientific discoveries, capabilities,
7 and major scientific tools to transform the understanding
8 of nature and to advance the energy, economic, and na-
9 tional security of the United States.”.

10 **SEC. 303. BASIC ENERGY SCIENCES.**

11 (a) ENERGY FRONTIER RESEARCH CENTERS.—

12 (1) IN GENERAL.—The Director shall carry out
13 a program to provide awards, on a competitive,
14 merit-reviewed basis, to multi-institutional collabora-
15 tions or other appropriate entities to conduct funda-
16 mental and use-inspired energy research to accel-
17 erate scientific breakthroughs.

18 (2) COLLABORATIONS.—A collaboration receiv-
19 ing an award under this subsection may include mul-
20 tiple types of institutions and private sector entities.

21 (3) SELECTION AND DURATION.—

22 (A) IN GENERAL.—A collaboration under
23 this subsection shall be selected for a period of
24 4 years.

25 (B) EXISTING CENTERS.—An Energy
26 Frontier Research Center in existence and sup-

ported 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,

1 industry, the academic community, and other rel-
2 evant entities to create and examine materials and
3 chemical processes for the purpose of improving the
4 competitiveness of the United States.

5 (3) INCLUDED FACILITIES.—The national user
6 facilities developed, constructed, operated, or main-
7 tained under paragraph (1) shall include—

8 (A) x-ray light sources;

9 (B) neutron sources;

10 (C) nanoscale science research centers; and

11 (D) such other facilities as the Director
12 considers appropriate, consistent with section
13 209 of the Department of Energy Organization
14 Act (42 U.S.C. 7139).

15 (c) ACCELERATOR RESEARCH AND DEVELOP-
16 MENT.—The Director shall carry out research and devel-
17 opment on advanced accelerator and storage ring tech-
18 nologies relevant to the development of basic energy
19 sciences user facilities, in consultation with the High En-
20 ergy Physics and Nuclear Physics programs of the Office
21 of Science.

22 (d) SOLAR FUELS RESEARCH INITIATIVE.—

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

1 **“SEC. 973. SOLAR FUELS RESEARCH INITIATIVE.**

2 “(a) INITIATIVE.—

3 “(1) IN GENERAL.—The Secretary shall carry
4 out a research initiative, to be known as the ‘Solar
5 Fuels Research Initiative’ (referred to in this section
6 as the ‘Initiative’) to expand theoretical and funda-
7 mental knowledge of photochemistry, electro-
8 chemistry, biochemistry, and materials science useful
9 for the practical development of experimental sys-
10 tems to convert solar energy to chemical energy.

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

14 “(A) the Basic Energy Sciences Program
15 and the Biological and Environmental Research
16 Program of the Office of Science; and

17 “(B) the Office of Energy Efficiency and
18 Renewable Energy.

19 “(3) TEAMS.—

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

1 “(B) GOALS.—The multidisciplinary teams
2 described in subparagraph (A) shall pursue ag-
3 gressive, milestone-driven, basic research goals.

4 “(C) RESOURCES.—The Secretary shall
5 provide sufficient resources to the multidisci-
6 plinary teams described in subparagraph (A) to
7 achieve the goals described in subparagraph (B)
8 over a period of time to be determined by the
9 Secretary.

10 “(4) ADDITIONAL ACTIVITIES.—The Secretary
11 may organize additional activities under this sub-
12 section through Energy Frontier Research Centers,
13 Energy Innovation Hubs, or other organizational
14 structures.

15 “(b) ARTIFICIAL PHOTOSYNTHESIS.—

16 “(1) IN GENERAL.—The Secretary shall carry
17 out under the Initiative a program to support re-
18 search needed to bridge scientific barriers to, and
19 discover knowledge relevant to, artificial photosyn-
20 thetic systems.

21 “(2) ACTIVITIES.—As part of the program de-
22 scribed in paragraph (1)—

23 “(A) the Director of the Office of Basic
24 Energy Sciences shall support basic research to

1 pursue distinct lines of scientific inquiry, in-
2 cluding—

3 “(i) photoinduced production of hy-
4 drogen and oxygen from water; and

5 “(ii) the sustainable photoinduced re-
6 duction of carbon dioxide to fuel products
7 including hydrocarbons, alcohols, carbon
8 monoxide, and natural gas; and

9 “(B) the Assistant Secretary for Energy
10 Efficiency and Renewable Energy shall support
11 translational research, development, and valida-
12 tion of physical concepts developed under the
13 program.

14 “(3) STANDARD OF REVIEW.—The Secretary
15 shall review activities carried out under the program
16 described in paragraph (1) to determine the achieve-
17 ment of technical milestones.

18 “(4) PROHIBITION.—No funds allocated to the
19 program described in paragraph (1) may be obli-
20 gated or expended for commercial application of en-
21 ergy technology.

22 “(c) BIOCHEMISTRY, REPLICATION OF NATURAL
23 PHOTOSYNTHESIS, AND RELATED PROCESSES.—

24 “(1) IN GENERAL.—The Secretary shall carry
25 out under the Initiative a program to support re-

1 search needed to replicate natural photosynthetic
2 processes by use of artificial photosynthetic compo-
3 nents and materials.

4 “(2) ACTIVITIES.—As part of the program de-
5 scribed in paragraph (1)—

6 “(A) the Director of the Office of Basic
7 Energy Sciences shall support basic research to
8 expand fundamental knowledge to replicate nat-
9 ural synthesis processes, including—

10 “(i) the photoinduced reduction of
11 dinitrogen to ammonia;

12 “(ii) the absorption of carbon dioxide
13 from ambient air;

14 “(iii) molecular-based charge separa-
15 tion and storage;

16 “(iv) photoinitiated electron transfer;
17 and

18 “(v) catalysis in biological or bio-
19 mimetic systems;

20 “(B) the Associate Director of Biological
21 and Environmental Research shall support sys-
22 tems biology and genomics approaches to un-
23 derstand genetic and physiological pathways
24 connected to photosynthetic mechanisms; and

1 “(C) the Assistant Secretary for Energy
 2 Efficiency and Renewable Energy shall support
 3 translational research, development, and valida-
 4 tion of physical concepts developed under the
 5 program.

6 “(3) STANDARD OF REVIEW.—The Secretary
 7 shall review activities carried out under the program
 8 described in paragraph (1) to determine the achieve-
 9 ment of technical milestones.

10 “(4) PROHIBITION.—No funds allocated to the
 11 program described in paragraph (1) may be obli-
 12 gated or expended for commercial application of en-
 13 ergy technology.”.

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

“Sec. 973. Solar fuels research initiative.”.

18 (e) ELECTRICITY STORAGE RESEARCH INITIATIVE.—

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

22 **“SEC. 975. ELECTRICITY STORAGE RESEARCH INITIATIVE.**

23 “(a) INITIATIVE.—

24 “(1) IN GENERAL.—The Secretary shall carry
 25 out a research initiative, to be known as the ‘Elec-

1 tricity Storage Research Initiative’ (referred to in
2 this section as the ‘Initiative’)—

3 “(A) to expand theoretical and funda-
4 mental knowledge to control, store, and con-
5 vert—

6 “(i) electrical energy to chemical en-
7 ergy; and

8 “(ii) chemical energy to electrical en-
9 ergy; and

10 “(B) to support scientific inquiry into the
11 practical understanding of chemical and phys-
12 ical processes that occur within systems involv-
13 ing crystalline and amorphous solids, polymers,
14 and organic and aqueous liquids.

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

18 “(A) the Basic Energy Sciences Program,
19 the Advanced Scientific Computing Research
20 Program, and the Biological and Environmental
21 Research Program of the Office of Science; and

22 “(B) the Office of Energy Efficiency and
23 Renewable Energy.

24 “(3) TEAMS.—

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

7 “(B) GOALS.—The multidisciplinary teams
8 described in subparagraph (A) shall pursue ag-
9 gressive, milestone-driven, basic research goals.

10 “(C) RESOURCES.—The Secretary shall
11 provide sufficient resources to the multidisci-
12 plinary teams described in subparagraph (A) to
13 achieve the goals described in subparagraph (B)
14 over a period of time to be determined by the
15 Secretary.

16 “(4) ADDITIONAL ACTIVITIES.—The Secretary
17 may organize additional activities under this sub-
18 section through Energy Frontier Research Centers,
19 Energy Innovation Hubs, or other organizational
20 structures.

21 “(b) MULTIVALENT SYSTEMS.—

22 “(1) IN GENERAL.—The Secretary shall carry
23 out under the Initiative a program to support re-
24 search needed to bridge scientific barriers to, and

1 discover knowledge relevant to, multivalent ion mate-
2 rials in electric energy storage systems.

3 “(2) ACTIVITIES.—As part of the program de-
4 scribed in paragraph (1)—

5 “(A) the Director of the Office of Basic
6 Energy Sciences shall investigate electro-
7 chemical properties and the dynamics of mate-
8 rials, including charge transfer phenomena and
9 mass transport in materials; and

10 “(B) the Assistant Secretary for Energy
11 Efficiency and Renewable Energy shall support
12 translational research, development, and valida-
13 tion of physical concepts developed under the
14 program.

15 “(3) STANDARD OF REVIEW.—The Secretary
16 shall review activities carried out under the program
17 described in paragraph (1) to determine the achieve-
18 ment of technical milestones.

19 “(4) PROHIBITION.—No funds allocated to the
20 program described in paragraph (1) may be obli-
21 gated or expended for commercial application of en-
22 ergy technology.

23 “(c) ELECTROCHEMISTRY MODELING AND SIMULA-
24 TION.—

1 “(1) IN GENERAL.—The Secretary shall carry
2 out under the Initiative a program to support re-
3 search to model and simulate organic electrolytes,
4 including the static and dynamic electrochemical be-
5 havior and phenomena of organic electrolytes at the
6 molecular and atomic level in monovalent and multi-
7 valent systems.

8 “(2) ACTIVITIES.—As part of the program de-
9 scribed in paragraph (1)—

10 “(A) the Director of the Office of Basic
11 Energy Sciences, in coordination with the Asso-
12 ciate Director of Advanced Scientific Com-
13 puting Research, shall support the development
14 of high performance computational tools
15 through a joint development process to maxi-
16 mize the effectiveness of current and projected
17 high performance computing systems; and

18 “(B) the Assistant Secretary for Energy
19 Efficiency and Renewable Energy shall support
20 translational research, development, and valida-
21 tion of physical concepts developed under the
22 program.

23 “(3) STANDARD OF REVIEW.—The Secretary
24 shall review activities carried out under the program

1 described in paragraph (1) to determine the achieve-
2 ment of technical milestones.

3 “(4) PROHIBITION.—No funds allocated to the
4 program described in paragraph (1) may be obli-
5 gated or expended for commercial application of en-
6 ergy technology.

7 “(d) MESOSCALE ELECTROCHEMISTRY.—

8 “(1) IN GENERAL.—The Secretary shall carry
9 out under the Initiative a program to support re-
10 search needed to reveal electrochemistry in confined
11 mesoscale spaces, including scientific discoveries rel-
12 evant to—

13 “(A) bio-electrochemistry and electro-
14 chemical energy conversion and storage in con-
15 fined spaces; and

16 “(B) the dynamics of the phenomena de-
17 scribed in subparagraph (A).

18 “(2) ACTIVITIES.—As part of the program de-
19 scribed in paragraph (1)—

20 “(A) the Director of the Office of Basic
21 Energy Sciences and the Associate Director of
22 Biological and Environmental Research shall in-
23 vestigate phenomena of mesoscale electro-
24 chemical confinement for the purpose of repli-

1 eating and controlling new electrochemical be-
 2 havior; and

3 “(B) the Assistant Secretary for Energy
 4 Efficiency and Renewable Energy shall support
 5 translational research, development, and valida-
 6 tion of physical concepts developed under the
 7 program.

8 “(3) STANDARD OF REVIEW.—The Secretary
 9 shall review activities carried out under the program
 10 described in paragraph (1) to determine the achieve-
 11 ment of technical milestones.

12 “(4) PROHIBITION.—No funds allocated to the
 13 program described in paragraph (1) may be obli-
 14 gated or expended for commercial application of en-
 15 ergy technology.”.

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

“Sec. 975. Electricity storage research initiative.”.

20 **SEC. 304. ADVANCED SCIENTIFIC COMPUTING RESEARCH.**

21 (a) AMERICAN SUPER COMPUTING LEADERSHIP.—

22 (1) RENAMING OF ACT.—

23 (A) IN GENERAL.—Section 1 of the De-
 24 partment of Energy High-End Computing Revi-
 25 talization Act of 2004 (15 U.S.C. 5501 note;

1 Public Law 108–423) is amended by striking
2 “Department of Energy High-End Computing
3 Revitalization Act of 2004” and inserting
4 “American Super Computing Leadership Act of
5 2017”.

6 (B) CONFORMING AMENDMENT.—Section
7 976(a)(1) of the Energy Policy Act of 2005 (42
8 U.S.C. 16316(1)) is amended by striking “De-
9 partment of Energy High-End Computing Revi-
10 talization Act of 2004” and inserting “Amer-
11 ican Super Computing Leadership Act of
12 2017”.

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

16 (A) by redesignating paragraphs (2)
17 through (5) as paragraphs (3) through (6), re-
18 spectively;

19 (B) by striking paragraph (1) and insert-
20 ing the following:

21 “(1) DEPARTMENT.—The term ‘Department’
22 means the Department of Energy.

23 “(2) EXASCALE COMPUTING.—The term
24 ‘exascale computing’ means computing through the
25 use of a computing machine that performs near or

1 above 10 to the 18th power operations per second.”;
 2 and

3 (C) in paragraph (6) (as redesignated by
 4 subparagraph (A)), by striking “, acting
 5 through the Director of the Office of Science of
 6 the Department of Energy”.

7 (3) DEPARTMENT OF ENERGY HIGH-END COM-
 8 PUTING RESEARCH AND DEVELOPMENT PROGRAM.—
 9 Section 3 of the American Super Computing Leader-
 10 ship Act of 2017 (15 U.S.C. 5542) is amended—

11 (A) in subsection (a)(1), by striking “pro-
 12 gram” and inserting “coordinated program
 13 across the Department”;

14 (B) in subsection (b)(2), by striking “,
 15 which may” and all that follows through “archi-
 16 tectures”; and

17 (C) by striking subsection (d) and insert-
 18 ing the following:

19 “(d) EXASCALE COMPUTING PROGRAM.—

20 “(1) IN GENERAL.—The Secretary shall con-
 21 duct a research program (referred to in this sub-
 22 section as the ‘Program’) for exascale computing, in-
 23 cluding the development of two or more exascale
 24 computing machine architectures, to promote the
 25 missions of the Department.

1 “(2) EXECUTION.—

2 “(A) IN GENERAL.—In carrying out the
3 Program, the Secretary shall—

4 “(i) establish two or more National
5 Laboratory partnerships with industry
6 partners and institutions of higher edu-
7 cation for the research and development of
8 two or more exascale computing architec-
9 tures across all applicable organizations of
10 the Department;

11 “(ii) conduct mission-related codesign
12 activities in developing the exascale com-
13 puting architectures under clause (i);

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

22 “(iv) explore the use of exascale com-
23 puting technologies to advance a broad
24 range of science and engineering; and

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

8 “(B) SELECTION OF PARTNERS.—The Sec-
9 retary shall select the partnerships with the
10 computing facilities of the Department under
11 subparagraph (A) through a competitive, peer-
12 review process.

13 “(3) CODESIGN AND APPLICATION DEVELOP-
14 MENT.—

15 “(A) IN GENERAL.—The Secretary shall—

16 “(i) carry out the Program through
17 an integration of applications, computer
18 science, applied mathematics, and com-
19 puter hardware architecture using the
20 partnerships established pursuant to para-
21 graph (2) to ensure that, to the maximum
22 extent practicable, two or more exascale
23 computing machine architectures are capa-
24 ble of solving Department target applica-
25 tions and broader scientific problems, in-

cluding predictive modeling and simulation
and large scale data analytics and manage-
ment; and

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

“(B) REPORT.—The Secretary shall sub-
mit to Congress a report describing—

“(i) how the integration under sub-
paragraph (A) is furthering application
science data and computational workloads
across application interests, including na-
tional security, material science, physical
science, cybersecurity, biological science,
the Materials Genome and BRAIN Initia-
tives of the President, advanced manufac-
turing, and the national electric grid; and

“(ii) the roles and responsibilities of
National Laboratories and industry, in-
cluding the definition of the roles and re-
sponsibilities within the Department to en-
sure an integrated program across the De-
partment.

“(4) PROJECT REVIEW.—

1 “(A) IN GENERAL.—The exascale architec-
2 tures developed pursuant to partnerships estab-
3 lished pursuant to paragraph (2) shall be re-
4 viewed through a project review process.

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

9 “(i) the results of the review con-
10 ducted under subparagraph (A); and

11 “(ii) the coordination and manage-
12 ment of the Program to ensure an inte-
13 grated research program across the De-
14 partment.

15 “(5) ANNUAL REPORTS.—At the time of the
16 budget submission of the Department for each fiscal
17 year, the Secretary, in consultation with the mem-
18 bers of the partnerships established pursuant to
19 paragraph (2), shall submit to Congress a report
20 that describes funding for the Program as a whole
21 by functional element of the Department and critical
22 milestones.”.

23 (b) HIGH-PERFORMANCE COMPUTING AND NET-
24 WORKING RESEARCH.—The Director shall support re-
25 search in high-performance computing and networking rel-

1 evant to energy applications, including modeling, simula-
 2 tion, and advanced data analytics for basic and applied
 3 energy research programs carried out by the Secretary.

4 (c) APPLIED MATHEMATICS AND SOFTWARE DEVEL-
 5 OPMENT FOR HIGH-END COMPUTING SYSTEMS.—The Di-
 6 rector shall carry out activities to develop, test, and sup-
 7 port—

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

11 (2) tools, languages, and operating systems for
 12 high-end computing systems (as defined in section 2
 13 of the American Super Computing Leadership Act of
 14 2017 (15 U.S.C. 5541)).

15 **SEC. 305. HIGH-ENERGY PHYSICS.**

16 (a) SENSE OF CONGRESS.—It is the sense of Con-
 17 gress that—

18 (1) the Director should incorporate the findings
 19 and recommendations of the report of the Particle
 20 Physics Project Prioritization Panel entitled “Build-
 21 ing for Discovery: Strategic Plan for U.S. Particle
 22 Physics in the Global Context” into the planning
 23 process of the Department; and

24 (2) the nations that lead in particle physics by
 25 hosting international teams dedicated to a common

1 scientific goal attract the world's best talent and in-
2 spire future generations of physicists and tech-
3 nologists.

4 (b) INTERNATIONAL COLLABORATION.—The Direc-
5 tor, as practicable and in coordination with other appro-
6 priate Federal agencies as necessary, shall ensure the ac-
7 cess of United States researchers to the most advanced
8 accelerator facilities and research capabilities in the world,
9 including the Large Hadron Collider.

10 (c) NEUTRINO RESEARCH.—The Director shall carry
11 out research activities on rare decay processes and the na-
12 ture of the neutrino, which may include collaborations
13 with the National Science Foundation or international col-
14 laborations.

15 (d) DARK ENERGY AND DARK MATTER RE-
16 SEARCH.—The Director shall carry out research activities
17 on the nature of dark energy and dark matter, which may
18 include collaborations with the National Aeronautics and
19 Space Administration or the National Science Foundation;
20 or international collaborations.

21 **SEC. 306. BIOLOGICAL AND ENVIRONMENTAL RESEARCH.**

22 (a) BIOLOGICAL SYSTEMS.—The Director shall carry
23 out research and development activities in fundamental,
24 structural, computational, and systems biology to increase

1 systems-level understanding of the complex biological sys-
 2 tems, which may include activities—

3 (1) to accelerate breakthroughs and new knowl-
 4 edge that would enable the cost-effective, sustainable
 5 production of—

6 (A) biomass-based liquid transportation
 7 fuels;

8 (B) bioenergy; and

9 (C) biobased materials;

10 (2) to improve understanding of the global car-
 11 bon cycle, including processes for removing carbon
 12 dioxide from the atmosphere, through photosynthesis
 13 and other biological processes, for sequestration and
 14 storage; and

15 (3) to understand the biological mechanisms
 16 used to transform, immobilize, or remove contami-
 17 nants from subsurface environments.

18 (b) LIMITATION FOR RESEARCH FUNDS.—The Di-
 19 rector shall not approve new climate science-related initia-
 20 tives without making a determination that such work is
 21 well-coordinated with any relevant work carried out by
 22 other Federal agencies.

23 (c) LOW-DOSE RADIATION RESEARCH PROGRAM.—

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

1 (2) PURPOSE.—The purpose of the program is
2 to enhance the scientific understanding of, and re-
3 duce uncertainties associated with, the effects of ex-
4 posure to low-dose radiation to inform improved
5 risk-management methods.

6 **SEC. 307. FUSION ENERGY.**

7 (a) FUSION MATERIALS RESEARCH AND DEVELOP-
8 MENT.—As part of the activities authorized in section 978
9 of the Energy Policy Act of 2005 (42 U.S.C. 16318)—

10 (1) the Director, in coordination with the As-
11 sistant Secretary for Nuclear Energy of the Depart-
12 ment, shall carry out research and development ac-
13 tivities to identify, characterize, and demonstrate
14 materials that can endure the neutron, plasma, and
15 heat fluxes expected in a fusion power system; and

16 (2) the Director shall provide an assessment
17 of—

18 (A) the need for one or more facilities that
19 can examine and test potential fusion and next
20 generation fission materials and other enabling
21 technologies relevant to the development of fu-
22 sion power; and

23 (B) whether a single new facility that sub-
24 stantially addresses magnetic fusion and next
25 generation fission materials research needs is

1 feasible, in conjunction with the expected capa-
2 bilities of facilities operational as of the date of
3 enactment of this Act.

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

8 (c) INERTIAL FUSION ENERGY RESEARCH AND DE-
9 VELOPMENT.—The Director shall support research and
10 development activities for inertial fusion for energy appli-
11 cations.

12 (d) ALTERNATIVE AND ENABLING CONCEPTS.—The
13 Director shall support research and development activities
14 and facility operations at institutions of higher education,
15 National Laboratories, and private facilities in the United
16 States for a portfolio of alternative and enabling fusion
17 energy concepts that may provide solutions to significant
18 challenges to the establishment of a commercial magnetic
19 fusion power plant, prioritized based on the ability of the
20 United States to play a leadership role in the international
21 fusion research community.

22 (e) COORDINATION WITH ARPA-E.—The Director
23 shall coordinate with the Director of the Advanced Re-
24 search Projects Agency–Energy (referred to in this sub-
25 section as “ARPA-E”) to—

1 (1) assess the potential for any fusion energy
 2 project supported by ARPA-E to represent a prom-
 3 ising approach to a commercially viable fusion power
 4 plant;

5 (2) determine whether the results of any fusion
 6 energy project supported by ARPA-E merit the sup-
 7 port of follow-on research activities carried out by
 8 the Office of Science; and

9 (3) avoid the unintentional duplication of activi-
 10 ties.

11 (f) FAIRNESS IN COMPETITION FOR SOLICITATIONS
 12 FOR INTERNATIONAL PROJECT ACTIVITIES.—Section 33
 13 of the Atomic Energy Act of 1954 (42 U.S.C. 2053) is
 14 amended by inserting before the first sentence the fol-
 15 lowing: “In this section, with respect to international re-
 16 search projects, the term ‘private facilities or laboratories’
 17 means facilities or laboratories located in the United
 18 States.”.

19 (g) IDENTIFICATION OF PRIORITIES.—

20 (1) REPORT.—

21 (A) IN GENERAL.—Not later than 2 years
 22 after the date of enactment of this Act, the Sec-
 23 retary shall submit to Congress a report on the
 24 fusion energy research and development activi-
 25 ties that the Department proposes to carry out

1 over the 10-year period following the date of
2 the report under not fewer than 3 realistic
3 budget scenarios, including a scenario based on
4 3-percent annual growth in the non-ITER por-
5 tion of the budget for fusion energy research
6 and development activities.

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

9 (i) identify specific areas of fusion en-
10 ergy research and enabling technology de-
11 velopment in which the United States can
12 and should establish or solidify a lead in
13 the global fusion energy development ef-
14 fort;

15 (ii) identify priorities for initiation of
16 facility construction and facility decommis-
17 sioning under each of the three budget sce-
18 narios described in subparagraph (A); and

19 (iii) assess the ability of the fusion
20 workforce of the United States to carry out
21 the activities identified under clauses (i)
22 and (ii), including the adequacy of pro-
23 grams at institutions of higher education
24 in the United States to train the leaders

1 and workers of the next generation of fu-
2 sion energy researchers.

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

9 (3) REQUIREMENT.—No member of the Fusion
10 Energy Sciences Advisory Committee shall be ex-
11 cluded from participating in developing or voting on
12 final approval of the report required under para-
13 graph (1)(A).

14 **SEC. 308. NUCLEAR PHYSICS.**

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

17 (1) may carry out a program for the production
18 of isotopes, including the development of techniques
19 to produce isotopes, that the Secretary determines
20 are needed for research, medical, industrial, or re-
21 lated purposes; and

22 (2) shall ensure that isotope production activi-
23 ties carried out under the program under this para-
24 graph do not compete with private industry unless
25 the Director determines that critical national inter-

1 ests require the involvement of the Federal Govern-
2 ment.

3 (b) RENAMING OF THE RARE ISOTOPE ACCEL-
4 ERATOR.—Section 981 of the Energy Policy Act of 2005
5 (42 U.S.C. 16321) is amended—

6 (1) in the section heading, by striking “**RARE**
7 **ISOTOPE ACCELERATOR**” and inserting “**FACIL-**
8 **ITY FOR RARE ISOTOPE BEAMS**”; and

9 (2) by striking “Rare Isotope Accelerator” each
10 place it appears and inserting “Facility for Rare Iso-
11 tope Beams”.

12 **SEC. 309. SCIENCE LABORATORIES INFRASTRUCTURE PRO-**
13 **GRAM.**

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

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

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

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

24 (3) to modernize utility systems to prevent fail-
25 ures and ensure efficiency;

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

3 (5) to construct modern facilities to conduct ad-
4 vanced research in controlled environmental condi-
5 tions.

Passed the Senate July 23, 2018.

Attest:

Secretary.

115TH CONGRESS
2^D SESSION

S. 2503

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.