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(Original Signature of Member)

116TH CONGRESS  
2D SESSION

**H. R.** \_\_\_\_\_

To invest in basic scientific research and support technology innovation for the economic and national security of the United States, and for other purposes.

\_\_\_\_\_  
IN THE HOUSE OF REPRESENTATIVES

Mr. LUCAS introduced the following bill; which was referred to the Committee on \_\_\_\_\_  
\_\_\_\_\_

**A BILL**

To invest in basic scientific research and support technology innovation for the economic and national security of the United States, 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,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Securing American  
5 Leadership in Science and Technology Act of 2020”.

6 **SEC. 2. TABLE OF CONTENTS.**

7 The table of contents for this Act is as follows:

Sec. 1. Short title.

Sec. 2. Table of contents.

Sec. 3. Purposes.

TITLE I—NATIONAL SCIENCE AND TECHNOLOGY STRATEGY AND  
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

Subtitle A—National Science and Technology Strategy

Sec. 101. National science and technology strategy.

Sec. 102. Quadrennial science and technology review.

Subtitle B—Office of Science and Technology Policy

Sec. 111. Authorization of appropriations.

Sec. 112. GAO study on Federal research security.

TITLE II—DEPARTMENT OF ENERGY

Subtitle A— Office of Science

Sec. 201. Definitions.

Sec. 202. Basic energy sciences.

Sec. 203. Advanced scientific computing research.

Sec. 204. High energy physics.

Sec. 205. Biological and environmental research.

Sec. 206. Fusion energy.

Sec. 207. Nuclear physics.

Sec. 208. Science laboratories infrastructure program.

Sec. 209. Authorization of appropriations.

Subtitle B—Advanced Research Projects Agency–Energy

Sec. 211. Advanced Research Projects Agency–Energy.

Subtitle C—DOE Clean Energy Infrastructure

Sec. 221. Regional Energy Innovation Centers.

Sec. 222. Versatile neutron source.

Sec. 223. Carbon utilization research and development infrastructure.

Sec. 224. Frontier Observatory for Research in Geothermal Energy.

Sec. 225. Advanced energy storage initiative.

Sec. 226. Critical infrastructure research and construction.

TITLE III—NATIONAL INSTITUTE OF STANDARDS AND  
TECHNOLOGY

Sec. 301. Findings.

Sec. 302. Authorization of appropriations.

Sec. 303. NIST Facilities Modernization Fund.

Sec. 304. Quantum information science.

Sec. 305. Cybersecurity research.

Sec. 306. Artificial intelligence and data science.

Sec. 307. Internet of things.

Sec. 308. Composites research.

Sec. 309. Enabling the future bioeconomy.

Sec. 310. International standards development.

Sec. 311. Review of the center for neutron research.

Sec. 312. Hiring and management.

- Sec. 313. National institute of standards and technology foundation.
- Sec. 314. MEP outreach.
- Sec. 315. Definitions.

TITLE IV—NATIONAL OCEANIC AND ATMOSPHERIC  
ADMINISTRATION

- Sec. 401. Establishment of a technology transfer office.
- Sec. 402. Technology transfer and transitions assessment.
- Sec. 403. National Mesonet Program.
- Sec. 404. Severe weather extramural testbeds.
- Sec. 405. Next generation digital radar.
- Sec. 406. Fellowships.
- Sec. 407. Authorization of appropriations.

TITLE V—NATIONAL SCIENCE FOUNDATION

- Sec. 501. Authorization of appropriations.
- Sec. 502. NSF organizational review.
- Sec. 503. Ethics and security plans.
- Sec. 504. Major research instrumentation update.
- Sec. 505. NSF mid-scale project investments.
- Sec. 506. Reproducibility in science.
- Sec. 507. Public-private partnerships.
- Sec. 508. EPSCoR.
- Sec. 509. Computing Enclave Pilot Program.
- Sec. 510. Definitions.

TITLE VI—STEM WORKFORCE FOR THE 21ST CENTURY

- Sec. 601. Findings; sense of Congress.
- Sec. 602. Advanced technical education and skilled technical workforce.
- Sec. 603. Graduate research fellowship program update.
- Sec. 604. Robert Noyce Teacher Scholarship Program Sense of Congress.

TITLE VII—ANTARCTIC SCIENCE AND CONSERVATION  
MODERNIZATION

Subtitle A—Antarctic Nongovernmental Activity Preparedness Act

- Sec. 701. Congressional findings and declaration of purpose.
- Sec. 702. Definitions.
- Sec. 703. Obligation of Persons Organizing Expeditions to prepare Contingency Plans and Obtain Insurance.
- Sec. 704. Certification of Compliance.
- Sec. 705. Costs and administrative fees.
- Sec. 706. Foreign expeditions.
- Sec. 707. Civil penalties.
- Sec. 708. Regulations.
- Sec. 709. Effective date.

Subtitle B—ANTARCTIC ENVIRONMENTAL LIABILITY ACT OF 2020

- Sec. 711. Short title.
- Sec. 712. Purpose.
- Sec. 713. Implementing amendments.
- Sec. 714. Effective date.

TITLE VIII—TECHNOLOGY TRANSFER AND INNOVATION

- Sec. 801. Federal laboratory computer programs update.
- Sec. 802. Extend CRADA information protection period.
- Sec. 803. Stevenson-Wydler Act authority update.
- Sec. 804. Royalty payments to Federal employees update.
- Sec. 805. Government intellectual property clarification.
- Sec. 806. Clarifying CRADA authority.
- Sec. 807. Expansion of agreements for commercializing technology authority.
- Sec. 808. Other transaction authority.
- Sec. 809. Nonprofit foundations.
- Sec. 810. Improving reporting and metrics.
- Sec. 811. Innovative approaches to technology transfer.
- Sec. 812. DOE public-private partnerships for commercialization.

1 **SEC. 3. PURPOSES.**

2       The purpose of this Act is to ensure the continued  
3 leadership of the United States in science and technology  
4 by—

5           (1) providing for a coordinated national science  
6 and technology strategy for the economic and na-  
7 tional security of the United States;

8           (2) prioritizing investment in Federal basic re-  
9 search by authorizing a doubling of basic research  
10 funding over the next 10 years at the Department  
11 of Energy, the National Science Foundation, the  
12 National Institute of Standards and Technology, and  
13 the National Oceanic and Atmospheric Administra-  
14 tion;

15           (3) providing for investment in key areas nec-  
16 essary for the competitiveness of the United States,  
17 including computing, cybersecurity, artificial intel-  
18 ligence and autonomous technology, materials and

1 advanced manufacturing, energy and climate, and  
2 the biosciences;

3 (4) providing for investment in critical science  
4 and technology infrastructure to maintain world-  
5 class research and user facilities;

6 (5) expanding the STEM workforce at all levels  
7 to meet the demands of a 21st Century economy;

8 (6) promoting regional innovation to support  
9 local economic growth across all regions of the  
10 United States;

11 (7) maximizing the effectiveness of the Federal  
12 Government's research and development activities;

13 (8) promoting collaboration among the Federal  
14 Government, Federal laboratories, universities, and  
15 industry; and

16 (9) improving technology transfer from the  
17 Federal Government and Federal laboratories to the  
18 private sector for commercialization.

1 **TITLE I—NATIONAL SCIENCE**  
2 **AND TECHNOLOGY STRATEGY**  
3 **AND OFFICE OF SCIENCE AND**  
4 **TECHNOLOGY POLICY**  
5 **Subtitle A—National Science and**  
6 **Technology Strategy**

7 **SEC. 101. NATIONAL SCIENCE AND TECHNOLOGY STRAT-**  
8 **EGY.**

9 Section 206 of the National Science and Technology  
10 Policy, Organization, and Priorities Act of 1976 (42  
11 U.S.C. 6615) is amended to read as follows:

12 **“SEC. 206. NATIONAL SCIENCE AND TECHNOLOGY STRAT-**  
13 **EGY.**

14 “(a) IN GENERAL.— Not later than the end of each  
15 calendar year immediately after the calendar year in which  
16 a review under section 206b is completed, the Director of  
17 the Office of Science and Technology Policy, in consulta-  
18 tion with the National Science and Technology Council,  
19 shall develop and submit to Congress a comprehensive na-  
20 tional science and technology strategy of the United States  
21 to meet national research and development objectives for  
22 the following 4-year period (in this Act referred to as ‘the  
23 national science and technology strategy’).

24 “(b) REQUIREMENTS.—Each national science and  
25 technology strategy required by subsection (a) shall delin-

1 eate a national science and technology strategy consistent  
2 with—

3 “(1) the recommendations and priorities devel-  
4 oped by the review established in section 206b;

5 “(2) the most recent national security strategy  
6 report submitted pursuant to section 1032 of the  
7 National Defense Authorization Act for Fiscal Year  
8 2012 (50 U.S.C. 3043);

9 “(3) other relevant national plans; and

10 “(4) the strategic plans of relevant Federal de-  
11 partments and agencies.

12 “(c) CONSULTATION.—The Director shall consult as  
13 necessary with the Office of Management and Budget and  
14 other appropriate elements of the Executive Office of the  
15 President to ensure that the recommendations and prior-  
16 ities delineated in the science and technology strategy are  
17 incorporated in the development of annual budget re-  
18 quests.

19 “(d) REPORT.—The President shall submit to Con-  
20 gress each year a comprehensive report on the national  
21 science and technology strategy of the United States. Each  
22 report on the national science and technology strategy of  
23 the United States shall include a description of—

24 “(1) strategic objectives and priorities necessary  
25 to maintain the leadership of the United States in

1 science and technology, including near-term, me-  
2 dium-term, and long-term research priorities;

3 “(2) programs, policies, and activities that the  
4 President recommends across all Federal agencies to  
5 achieve the strategic objectives in paragraph (1);  
6 and

7 “(3) global trends in science and technology, in-  
8 cluding potential threats to the leadership of the  
9 United States in science and technology.

10 “(e) PUBLICATION.—The Director shall, consistent  
11 with the protection of national security and other sensitive  
12 matters to the maximum extent practicable, make each re-  
13 port submitted under subsection (e) publicly available on  
14 an Internet website of the Office of Science and Tech-  
15 nology Policy.”.

16 **SEC. 102. QUADRENNIAL SCIENCE AND TECHNOLOGY RE-**  
17 **VIEW.**

18 The National Science and Technology Policy, Organi-  
19 zation, and Priorities Act of 1976 (42 U.S.C. 6601 et seq.)  
20 is amended by inserting after section 206—

21 **“SEC. 206b. QUADRENNIAL SCIENCE AND TECHNOLOGY RE-**  
22 **VIEW.**

23 “(a) REQUIREMENTS.—

24 “(1) QUADRENNIAL REVIEWS REQUIRED.—Not  
25 later than December 31, 2020, and every 4 years



1           thereafter, the Director of the Office of Science and  
2           Technology Policy shall complete a review of the  
3           science and technology enterprise of the United  
4           States (in this section referred to as the ‘quadren-  
5           nial science and technology review’)

6           “(2) SCOPE.—The quadrennial science and  
7           technology review shall be a comprehensive examina-  
8           tion of the science and technology strategy of the  
9           United States, including recommendations for main-  
10          taining global leadership in science and technology  
11          and guidance on the coordination of programs, as-  
12          sets, capabilities, budget, policies, and authorities  
13          across all Federal research and development pro-  
14          grams.

15          “(3) CONSULTATION.—The Director of the Of-  
16          fice of Science and Technology shall conduct each  
17          quadrennial science and technology review under this  
18          subsection in consultation with—

19                  “(A) the National Science and Technology  
20                  Council;

21                  “(B) the heads of other relevant Federal  
22                  Agencies;

23                  “(C) the President’s Council of Advisors  
24                  on Science and Technology;

25                  “(D) the National Science Board;

1 “(E) the National Security Council; and

2 “(F) other relevant governmental and non-  
3 governmental entities, including representatives  
4 from industry, institutions of higher education,  
5 non-profit institutions, members of Congress,  
6 and other policy experts.

7 “(4) COORDINATION.—The Director shall en-  
8 sure that each quadrennial science and technology  
9 review conducted under this section is coordinated  
10 with other relevant statutorily required reviews, and  
11 to the maximum extent practicable incorporates in-  
12 formation and recommendations from existing re-  
13 views to avoid duplication.

14 “(b) CONTENTS.—In each quadrennial science and  
15 technology review, the Director shall—

16 “(1) provide an integrated view of, and rec-  
17 ommendations for, science and technology policy  
18 across the Federal Government, while considering  
19 economic and national security;

20 “(2) assess and recommend priorities for re-  
21 search, development and demonstration programs to  
22 maintain American leadership in science and tech-  
23 nology;

24 “(3) assess the global competition in science  
25 and technology and identify potential threats to the

1 leadership of the United States in science and tech-  
2 nology;

3 “(4) assess and make recommendations on the  
4 science, technology, engineering, mathematics and  
5 computer science workforce in the United States;

6 “(5) assess and make recommendations to im-  
7 prove regional innovation across the United States;

8 “(6) assess and identify the infrastructure and  
9 tools needed to maintain the leadership of the  
10 United States in science and technology; and

11 “(7) review administrative or legislative policies  
12 that affect the science and technology enterprise and  
13 identify and make recommendations on policies that  
14 hinder research and development in the United  
15 States.

16 “(c) REPORTING.—

17 “(1) IN GENERAL.—Not later than December  
18 31 of the year in which a quadrennial science and  
19 technology review is conducted, the Director shall  
20 submit a report of the review to Congress.

21 “(2) PUBLICATION.—The Director shall, con-  
22 sistent with the protection of national security and  
23 other sensitive matters to the maximum extent pos-  
24 sible, make each report submitted under paragraph

1 (1) publicly available on an Internet website of the  
2 Office of Science and Technology Policy.”.

3 **Subtitle B—Office of Science and**  
4 **Technology Policy**

5 **SEC. 111. AUTHORIZATION OF APPROPRIATIONS.**

6 There are authorized to be appropriated for the Of-  
7 fice of Science and Technology Policy—

8 (1) 5,544,000 for fiscal year 2020;

9 (2) 6,100,000 for fiscal year 2021;

10 (3) 6,500,000 for fiscal year 2022;

11 (4) 6,500,000 for fiscal year 2023;

12 (5) 6,500,000 for fiscal year 2024;

13 (6) 6,500,000 for fiscal year 2025;

14 (7) 6,500,000 for fiscal year 2026;

15 (8) 6,500,000 for fiscal year 2027;

16 (9) 6,500,000 for fiscal year 2028; and

17 (10) 6,500,000 for fiscal year 2029.

18 **SEC. 112. GAO STUDY ON FEDERAL RESEARCH SECURITY.**

19 Not later than 1 year after the date of enactment  
20 of this Act, the Comptroller General shall transmit to the  
21 Congress a report detailing the results of a study on Fed-  
22 eral science agency efforts to protect federally funded re-  
23 search and development from foreign interference, theft,  
24 or espionage. Such study shall include—

1 (1) an inventory of current policies, procedures,  
2 and guidance for protecting federally funded intra-  
3 mural and extramural research from foreign inter-  
4 ference, theft, or espionage;

5 (2) an inventory of policies and procedures for  
6 foreign scientists participating in research or re-  
7 search administration at Federal facilities, including  
8 Federal laboratories;

9 (3) an inventory of known security breaches  
10 and other similar incidents of foreign interference,  
11 theft, or espionage of intramural research, merit-re-  
12 view panels, or other Federal grant administration  
13 activities;

14 (4) an assessment of the best practices at Fed-  
15 eral agencies for protecting federally funded re-  
16 search;

17 (5) an assessment of interagency coordination  
18 efforts on policies and procedures on research secu-  
19 rity;

20 (6) an assessment of any potential con-  
21 sequences that any agency practice would have on  
22 international collaboration and United States leader-  
23 ship in science and technology; and

1 (7) recommendations for further steps that  
2 agencies should take to protect federally funded re-  
3 search from foreign interference, theft or espionage.

4 **TITLE II—DEPARTMENT OF**  
5 **ENERGY**

6 **Subtitle A— Office of Science**

7 **SEC. 201. DEFINITIONS.**

8 In this Act:

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

11 (2) DIRECTOR.—The term “Director” means  
12 the Director of the Office of Science of the Depart-  
13 ment.

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

18 (4) SECRETARY.—The term “Secretary” means  
19 the Secretary of Energy.

20 **SEC. 202. BASIC ENERGY SCIENCES.**

21 (a) PROGRAM.—The Director shall carry out a funda-  
22 mental research program in basic energy sciences, includ-  
23 ing materials sciences and engineering, chemical sciences,  
24 physical biosciences, and geosciences, in order to provide  
25 the foundations for new energy technologies and to sup-

1 port Department missions in energy, environment, and na-  
2 tional security.

3 (b) BASIC ENERGY SCIENCES USER FACILITIES.—

4 Section 303(b)(3) of the Department of Energy Research  
5 and Innovation Act (42 U.S.C. 18641) is amended—

6 (1) in subparagraph (C), by striking “and”;

7 (2) by redesignating subparagraph (D) as sub-  
8 paragraph (E); and

9 (3) by inserting after subparagraph (C) the fol-  
10 lowing:

11 “(D) autonomous chemistry and materials  
12 synthesis facilities that leverage advances in ar-  
13 tificial intelligence; and”.

14 (c) BASIC ENERGY SCIENCES RESEARCH INFRA-  
15 STRUCTURE.—

16 (1) ADVANCED PHOTON SOURCE UPGRADE.—

17 (A) IN GENERAL.—The Secretary shall  
18 provide for the upgrade to the Advanced Pho-  
19 ton Source described in the publication ap-  
20 proved by the Basic Energy Sciences Advisory  
21 Committee on June 9, 2016, titled “Report on  
22 Facility Upgrades”, including the development  
23 of a multi-bend achromat lattice to produce a  
24 high flux of coherent x-rays within the hard x-

1 ray energy region and a suite of beamlines opti-  
2 mized for this source.

3 (B) DEFINITIONS.—In this paragraph:

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

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

9 (C) START OF OPERATIONS.—The Sec-  
10 retary shall, to the maximum extent practicable,  
11 ensure that the start of full operations of the  
12 upgrade under this paragraph occurs before  
13 March 31, 2026.

14 (D) FUNDING.—Out of funds authorized  
15 to be appropriated under section 209 for Basic  
16 Energy Science, there shall be made available to  
17 the Secretary to carry out the upgrade under  
18 this paragraph—

19 (i) \$170,000,000 for fiscal year 2020;

20 (ii) \$159,800,000 for fiscal year 2021;

21 (iii) \$106,200,000 for fiscal year

22 2022; and

23 (iv) \$5,000,000 for fiscal year 2023.

24 (2) SPALLATION NEUTRON SOURCE PROTON  
25 POWER UPGRADE.—



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

4 (B) PROTON POWER UPGRADE DEFINED.—  
5 For the purposes of this paragraph, the term  
6 “proton power upgrade” means the Spallation  
7 Neutron Source power upgrade described in—

8 (i) the publication of the Office of  
9 Science of the Department of Energy titled  
10 “Facilities for the Future of Science: A  
11 Twenty-Year Outlook”, published Decem-  
12 ber 2003;

13 (ii) the publication of the Office of  
14 Science of the Department of Energy titled  
15 “Four Years Later: An Interim Report on  
16 Facilities for the Future of Science: A  
17 Twenty-Year Outlook”, published August  
18 2007; and

19 (iii) the publication approved by the  
20 Basic Energy Sciences Advisory Committee  
21 on June 9, 2016, titled “Report on Facil-  
22 ity Upgrades”.

23 (C) START OF OPERATIONS.—The Sec-  
24 retary shall, to the maximum extent practicable,  
25 ensure that the start of full operations of the

1 upgrade under this paragraph occurs before De-  
2 cember 31, 2025.

3 (D) FUNDING.—Out of funds authorized  
4 to be appropriated under section 209 for Basic  
5 Energy Science, there shall be made available to  
6 the Secretary to carry out the upgrade under  
7 this paragraph—

8 (i) \$65,000,000 for fiscal year 2020;

9 (ii) \$44,000,000 for fiscal year 2021;

10 and

11 (iii) \$35,000,000 for fiscal year 2022.

12 (3) SPALLATION NEUTRON SOURCE SECOND  
13 TARGET STATION.—

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

17 (B) DEFINITION OF SECOND TARGET STA-  
18 TION.—For the purposes of this paragraph, the  
19 term “second target station” means the Spall-  
20 ation Neutron Source second target station de-  
21 scribed in—

22 (i) the publication of the Office of  
23 Science of the Department of Energy titled  
24 “Facilities for the Future of Science: A

1 Twenty-Year Outlook”, published Decem-  
2 ber 2003;

3 (ii) the publication of the Office of  
4 Science of the Department of Energy titled  
5 “Four Years Later: An Interim Report on  
6 Facilities for the Future of Science: A  
7 Twenty-Year Outlook”, published August  
8 2007; and

9 (iii) the publication approved by the  
10 Basic Energy Sciences Advisory Committee  
11 on June 9, 2016, titled “Report on Facil-  
12 ity Upgrades”.

13 (C) START OF OPERATIONS.—The Sec-  
14 retary shall, to the maximum extent practicable,  
15 ensure that the start of full operations of the  
16 second target station under this paragraph oc-  
17 curs before December 31, 2030, with the option  
18 for early operation in 2028.

19 (D) FUNDING.—Out of funds authorized  
20 to be appropriated under section 209 for Basic  
21 Energy Science, there shall be made available to  
22 the Secretary to carry out activities, including  
23 construction, under this paragraph—

24 (i) \$15,000,000 for fiscal year 2020;

25 (ii) \$25,000,000 for fiscal year 2021;

- 1 (iii) \$50,000,000 for fiscal year 2022;  
2 (iv) \$200,000,000 for fiscal year  
3 2023;  
4 (v) \$275,000,000 for fiscal year 2024;  
5 (vi) \$275,000,000 for fiscal year  
6 2025;  
7 (vii) \$275,000,000 for fiscal year  
8 2026;  
9 (viii) \$250,000,000 for fiscal year  
10 2027; and  
11 (ix) \$120,000,000 for fiscal year  
12 2028.

13 (4) ADVANCED LIGHT SOURCE UPGRADE.—

14 (A) IN GENERAL.—The Secretary shall  
15 provide for the upgrade to the Advanced Light  
16 Source described in the publication approved by  
17 the Basic Energy Sciences Advisory Committee  
18 on June 9, 2016, titled “Report on Facility Up-  
19 grades”, including the development of a multi-  
20 bend achromat lattice to produce a high flux of  
21 coherent x-rays within the soft x-ray energy re-  
22 gion.

23 (B) DEFINITIONS.—In this paragraph:

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

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

4 (C) START OF OPERATIONS.—The Sec-  
5 retary shall, to the maximum extent practicable,  
6 ensure that the start of full operations of the  
7 upgrade under this paragraph occurs before De-  
8 cember 31, 2026.

9 (D) FUNDING.—Out of funds authorized  
10 to be appropriated under section 209 for Basic  
11 Energy Science, there shall be made available to  
12 the Secretary to carry out the upgrade under  
13 this paragraph—

14 (i) \$53,000,000 for fiscal year 2020;

15 (ii) \$67,000,000 for fiscal year 2021;

16 (iii) \$67,000,000 for fiscal year 2022;

17 (iv) \$60,000,000 for fiscal year 2023;

18 (v) \$59,200,000 for fiscal year 2024;

19 and

20 (vi) \$2,000,000 for fiscal year 2025.

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

23 (A) IN GENERAL.—The Secretary shall  
24 provide for the upgrade to the Linac Coherent  
25 Light Source II facility described in the publi-

1 cation approved by the Basic Energy Sciences  
2 Advisory Committee on June 9, 2016, titled  
3 “Report on Facility Upgrades”, including the  
4 development of experimental capabilities for  
5 high energy x-rays to reveal fundamental sci-  
6 entific discoveries. The Secretary shall ensure  
7 the upgrade under this paragraph enables the  
8 production and use of high energy, ultra-short  
9 pulse x-rays delivered at a high repetition rate.

10 (B) DEFINITIONS.—In this paragraph:

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

15 (ii) HIGH REPETITION RATE.—The  
16 term “high repetition rate” means the de-  
17 livery of x-ray pulses up to 1 million pulses  
18 per second.

19 (iii) ULTRA-SHORT PULSE X-RAYS.—  
20 The term “ultra-short pulse x-rays” means  
21 x-ray bursts capable of durations of less  
22 than 100 femtoseconds.

23 (C) START OF OPERATIONS.—The Sec-  
24 retary shall, to the maximum extent practicable,  
25 ensure that the start of full operations of the

1 upgrade under this paragraph occurs before De-  
2 cember 31, 2025.

3 (D) FUNDING.—Out of funds authorized  
4 to be appropriated under section 209 for Basic  
5 Energy Science, there shall be made available to  
6 the Secretary to carry out the upgrade under  
7 this paragraph—

8 (i) \$54,000,000 for fiscal year 2020;

9 (ii) \$64,000,000 for fiscal year 2021;

10 (iii) \$70,000,000 for fiscal year 2022;

11 (iv) \$80,000,000 for fiscal year 2023;

12 (v) \$79,000,000 for fiscal year 2024;

13 and

14 (vi) \$37,000,000 for fiscal year 2025.

15 (d) ARTIFICIAL PHOTOSYNTHESIS.—Subtitle G of  
16 title IX of the Energy Policy Act of 2005 (42 U.S.C.  
17 16311 et seq. ) is amended—

18 (1) in section 973(b), by striking paragraph (4)  
19 and inserting:

20 “(4)(A) FUNDING.—From within funds author-  
21 ized to be appropriated under section 209 of the Se-  
22 curing American Leadership in Science and Tech-  
23 nology Act of 2020 for Basic Energy Science, the  
24 Secretary shall make available for carrying out ac-

1 activities under this subsection \$50,000,000 for each  
2 of fiscal years 2020 through 2029.

3 “(B) 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.”; and

7 (2) in section 975(c), by striking paragraph (4)  
8 and inserting:

9 “(4)(A) FUNDING.—From within funds author-  
10 ized to be appropriated under section 209 of the Se-  
11 curing American Leadership in Science and Tech-  
12 nology Act of 2020 for Basic Energy Science and  
13 Biological and Environmental Research, the Sec-  
14 retary shall make available for carrying out activities  
15 under this subsection \$50,000,000 for each of fiscal  
16 years 2020 through 2029.

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

21 (e) ELECTRICITY STORAGE RESEARCH INITIATIVE.—  
22 Section 975 of the Energy Policy Act of 2005 (42 U.S.C.  
23 16315) is amended—

24 (1) in subsection (b), by striking paragraph (4)  
25 and inserting:



1           “(4)(A) FUNDING.—From within funds author-  
2           ized to be appropriated under section 209 of the Se-  
3           curing American Leadership in Science and Tech-  
4           nology Act of 2020 for Basic Energy Science, the  
5           Secretary shall make available for carrying out ac-  
6           tivities under this subsection \$50,000,000 for each  
7           of fiscal years 2020 through 2029.

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

12          (2) in subsection (c), by striking paragraph (4)  
13          and inserting:

14          “(4)(A) FUNDING.—From within funds author-  
15          ized to be appropriated under section 209 of the Se-  
16          curing American Leadership in Science and Tech-  
17          nology Act of 2020 for Basic Energy Science and  
18          Advanced Scientific Computing Research, the Sec-  
19          retary shall make available for carrying out activities  
20          under this subsection \$30,000,000 for each of fiscal  
21          years 2020 through 2029.

22          “(B) PROHIBITION.—No funds allocated to the  
23          program described in paragraph (1) may be obli-  
24          gated or expended for commercial application of en-  
25          ergy technology.”; and

1           (3) in subsection (d), by striking paragraph (4)  
2           and inserting:

3           “(4)(A) FUNDING.—From within funds author-  
4           ized to be appropriated under section 209 of the Se-  
5           curing American Leadership in Science and Tech-  
6           nology Act of 2020 for Basic Energy Science and  
7           Biological and Environmental Research, the Sec-  
8           retary shall make available for carrying out activities  
9           under this subsection \$20,000,000 for each of fiscal  
10          years 2020 through 2029.

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

15          (f) COMPUTATIONAL MATERIALS AND CHEMISTRY.—

16                (1) IN GENERAL.—The Director shall support a  
17                program of fundamental research for the application  
18                of advanced computing practices to foundational and  
19                emerging research problems in chemistry and mate-  
20                rials science.

21                (2) COMPUTATIONAL MATERIALS AND CHEM-  
22                ISTRY SCIENCE CENTERS.—

23                    (A) IN GENERAL.—In carrying out the ac-  
24                    tivities authorized under paragraph (1), the Di-  
25                    rector shall select and establish up to four com-

1           putational materials and chemistry science cen-  
2           ters to develop open-source, robust, and vali-  
3           dated computational codes and user-friendly  
4           software, coupled with innovative use of experi-  
5           mental and theoretical data, to enable the de-  
6           sign, discovery, and development of new mate-  
7           rials and chemical systems including chemical  
8           catalysis research and development. These cen-  
9           ters shall also focus on overcoming challenges  
10          and maximizing the benefits of exascale and  
11          other high performance computing systems.

12                   (B) SELECTION.—The Director shall select  
13           centers under paragraph (1) on a competitive,  
14           merit-reviewed basis. The Director shall con-  
15           sider applications from the National Labora-  
16           tories, institutes of higher education, multi-in-  
17           stitutional collaborations, and other appropriate  
18           entities.

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

23                   (D) RENEWAL.—Upon the expiration of  
24           any period of support of a center under this  
25           subsection, the Director may renew support for

1 the center, on a merit-reviewed basis, for a pe-  
2 riod of not more than 5 years.

3 (E) TERMINATION.—Consistent with the  
4 existing authorities of the Department, the Di-  
5 rector may terminate an underperforming cen-  
6 ter for cause during the performance period.

7 (3) MATERIALS RESEARCH DATABASE.—

8 (A) IN GENERAL.—The Director shall sup-  
9 port the development of a web-based platform  
10 to provide access to a database of computed in-  
11 formation on known and predicted materials  
12 properties and computational tools to accelerate  
13 breakthroughs in materials discovery and de-  
14 sign.

15 (B) PROGRAM.—In carrying out this sec-  
16 tion, the Director shall—

17 (i) conduct cooperative research with  
18 industry, academia, and other research in-  
19 stitutions to facilitate the design of novel  
20 materials;

21 (ii) leverage existing high performance  
22 computing systems to conduct high-  
23 throughput calculations, and develop com-  
24 putational and data mining algorithms for  
25 the prediction of material properties;

1 (iii) advance understanding, pre-  
2 diction, and manipulation of materials;

3 (iv) strengthen the foundation for new  
4 technologies and advanced manufacturing;  
5 and

6 (v) drive the development of advanced  
7 materials for applications that span the  
8 Department's missions in energy, environ-  
9 ment, and national security.

10 (C) COORDINATION.—In carrying out this  
11 section, the Director shall leverage programs  
12 and activities across the Department.

13 **SEC. 203. ADVANCED SCIENTIFIC COMPUTING RESEARCH.**

14 (a) PROGRAM.—The Director shall carry out a re-  
15 search, development, and demonstration program to ad-  
16 vance computational and networking capabilities to ana-  
17 lyze, model, simulate, and predict complex phenomena rel-  
18 evant to the development of new energy technologies and  
19 the competitiveness of the United States.

20 (b) BEYOND EXASCALE COMPUTING PROGRAM.—

21 (1) IN GENERAL.—The Secretary shall establish  
22 a program to develop and implement a strategy for  
23 achieving computing systems with capabilities be-  
24 yond exascale computing systems. In establishing  
25 this program, the Secretary shall—

1           (A) maintain foundational research pro-  
2           grams in mathematical, computational, and  
3           computer sciences focused on new and emerging  
4           computing needs within the mission of the De-  
5           partment, including but not limited to post-  
6           Moore’s law computing architectures, novel ap-  
7           proaches to modeling and simulation, artificial  
8           intelligence and scientific machine learning,  
9           quantum computing, and extreme heterogeneity;  
10          and

11          (B) retain best practices and maintain sup-  
12          port for essential hardware and software ele-  
13          ments of the Exascale Computing Project that  
14          are necessary for sustaining the vitality of a  
15          long-term exascale ecosystem.

16          (2) REPORT.—Not later than one year after the  
17          date of the enactment of this Act, the Secretary  
18          shall submit to the Committee on Science, Space,  
19          and Technology of the House of Representatives,  
20          and the Committee on Energy and Natural Re-  
21          sources of the Senate, a report on the development  
22          and implementation of the strategy outlined in para-  
23          graph (1).

1 (c) APPLIED MATHEMATICS AND SOFTWARE DEVEL-  
2 OPMENT FOR HIGH-END COMPUTING SYSTEMS, COM-  
3 PUTATIONAL, AND COMPUTER SCIENCES RESEARCH.—

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

6 (A) mathematics, models, statistics, and al-  
7 gorithms for modeling complex systems on ad-  
8 vanced computing architectures; and

9 (B) tools, languages, programming envi-  
10 ronments, and operations for high-end com-  
11 puting systems (as defined in section 2 of the  
12 American Super Computing Leadership Act (15  
13 U.S.C. 5541), as renamed by this section).

14 (2) PORTFOLIO BALANCE.—The Director shall  
15 maintain a balanced portfolio within the advanced  
16 scientific computing research and development pro-  
17 gram established under section 976 of the Energy  
18 Policy Act of 2005 (42 U.S.C. 16316) that supports  
19 robust investment in—

20 (A) applied mathematical, computational,  
21 and computer sciences research needs relevant  
22 to the mission of the Department, including ac-  
23 tivities related to data science, artificial intel-  
24 ligence, scientific machine learning, quantum

1 information science, and other emerging areas;  
2 and

3 (B) associated high-performance com-  
4 puting hardware and facilities.

5 (d) ENERGY EFFICIENT COMPUTING PROGRAM.—

6 (1) IN GENERAL.—The Secretary shall support  
7 a program of fundamental research, development,  
8 and demonstration of energy efficient computing  
9 technologies relevant to advanced computing applica-  
10 tions in high performance computing, artificial intel-  
11 ligence, and scientific machine learning.

12 (2) EXECUTION.—

13 (A) PROGRAM.—In carrying out the pro-  
14 gram, the Secretary shall—

15 (i) establish a partnership for Na-  
16 tional Laboratories, industry partners, and  
17 institutions of higher education for co-  
18 design of energy efficient hardware, tech-  
19 nology, software, and applications across  
20 all applicable program offices of the De-  
21 partment;

22 (ii) develop hardware and software  
23 technologies that decrease the energy needs  
24 of advanced computing practices;



1 (iii) consider multiple heterogeneous  
2 computing architectures, including  
3 neuromorphic computing, persistent com-  
4 puting, and ultrafast networking; and

5 (iv) provide, as appropriate, on a com-  
6 petitive, merit-reviewed basis, access for re-  
7 searchers from institutions of higher edu-  
8 cation, National Laboratories, industry,  
9 and other Federal agencies to the energy  
10 efficient computing technologies developed  
11 pursuant to clause (i).

12 (B) SELECTION OF PARTNERS.—In select-  
13 ing participants for the partnership established  
14 under subparagraph (A)(i), the Secretary shall  
15 select participants through a competitive, merit-  
16 review process.

17 (3) REPORT.—Not later than one year after the  
18 date of the enactment of this Act, the Secretary  
19 shall submit to the Committee on Science, Space,  
20 and Technology of the House of Representatives,  
21 and the Committee on Energy and Natural Re-  
22 sources of the Senate, a report on—

23 (A) the activities conducted under subpara-  
24 graph (A); and

1 (B) the coordination and management of  
2 the Program to ensure an integrated research  
3 program across the Department.

4 (e) ARTIFICIAL INTELLIGENCE, DATA ANALYTICS,  
5 AND COMPUTATIONAL RESEARCH.—

6 (1) IN GENERAL.—The Secretary shall carry  
7 out a program to develop tools for big data analytics  
8 by utilizing data sets generated by Federal agencies,  
9 institutions of higher education, nonprofit research  
10 organizations, and industry in order to advance arti-  
11 ficial intelligence technologies to solve complex, big  
12 data challenges. The Secretary shall carry out this  
13 program through a competitive, merit-reviewed proc-  
14 ess, and consider applications from National Labora-  
15 tories, institutions of higher education, multi-institu-  
16 tional collaborations, and other appropriate entities.

17 (2) PROGRAM COMPONENTS.—In carrying out  
18 the program established under paragraph (1), the  
19 Secretary shall—

20 (A) establish a cross-cutting research ini-  
21 tiative to prevent duplication and coordinate re-  
22 search efforts in artificial intelligence and data  
23 analytics across the Department;

24 (B) conduct basic research in modeling  
25 and simulation, artificial intelligence, machine

1 learning, large-scale data analytics, natural lan-  
2 guage processing, and predictive analysis in  
3 order to develop novel or optimized predictive  
4 algorithms suitable for high-performance com-  
5 puting systems and large biomedical data sets;

6 (C) develop multivariate optimization mod-  
7 els to accommodate large data sets with vari-  
8 able quality and scale in order to visualize com-  
9 plex systems;

10 (D) establish multiple scientific computing  
11 user facilities to serve as data enclaves capable  
12 of securely storing data sets created by Federal  
13 agencies, institutions of higher education, non-  
14 profit organizations, or industry at National  
15 Laboratories; and

16 (E) promote collaboration and data shar-  
17 ing between National Laboratories, research en-  
18 tities, and user facilities of the Department by  
19 providing the necessary access and secure data  
20 transfer capabilities.

21 (3) REPORT.—Not later than 2 years after the  
22 date of the enactment of this Act, the Secretary  
23 shall submit to the Committee on Science, Space,  
24 and Technology of the House of Representatives and  
25 the Committee on Energy and Natural Resources of

1 the Senate a report evaluating the effectiveness of  
2 the pilot program under paragraph (1), including  
3 basic research discoveries achieved in the course of  
4 the program and potential opportunities to expand  
5 the technical capabilities of the Department through  
6 the development of artificial intelligence and data  
7 analytics technologies.

8 (f) ENERGY SCIENCES NETWORK.—

9 (1) IN GENERAL.—The Secretary shall provide  
10 for an upgrade to the Energy Sciences Network user  
11 facility in order to meet Federal research needs for  
12 highly reliable data transport capabilities optimized  
13 for the requirements of large-scale science.

14 (2) CAPABILITIES.—In carrying out paragraph  
15 (1), the Secretary shall ensure the following capabili-  
16 ties:

17 (A) To provide high bandwidth scientific  
18 networking across the continental United States  
19 and the Atlantic Ocean.

20 (B) To maximize network reliability.

21 (C) To protect the network and data from  
22 cyber-attacks.

23 (D) To support exponentially increasing  
24 levels of data from the Department's scientific  
25 user facilities, experiments, and sensors.

1                   (E) To integrate heterogeneous computing  
2                   frameworks and systems.

3           (g) QUANTUM SCIENCE NETWORK.—The Secretary  
4 shall provide for a program to support the research, devel-  
5 opment, and demonstration of a quantum computing net-  
6 work, which shall operate as a national user facility.

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

11                   (1) facilitates collaboration between university  
12                   students and researchers at the National Labora-  
13                   tories; and

14                   (2) endeavors to advance science in areas rel-  
15                   evant to the mission of the Department through the  
16                   application of computational science.

17 **SEC. 204. HIGH ENERGY PHYSICS.**

18           (a) PROGRAM.—The Director shall carry out a re-  
19 search program on the fundamental constituents of matter  
20 and energy and the nature of space and time in order to  
21 support theoretical and experimental research in both ele-  
22 mentary particle physics and fundamental accelerator  
23 science and technology and understand fundamental prop-  
24 erties of the universe.

1 (b) LONG-BASELINE NEUTRINO FACILITY FOR DEEP  
2 UNDERGROUND NEUTRINO EXPERIMENT.—

3 (1) IN GENERAL.—The Secretary shall provide  
4 for a Long-Baseline Neutrino Facility to facilitate  
5 the international Deep Underground Neutrino Ex-  
6 periment to enable a program in neutrino physics to  
7 measure the fundamental properties of neutrinos, ex-  
8 plore physics beyond the Standard Model, and better  
9 clarify the nature of matter and antimatter.

10 (2) FACILITY CAPABILITIES.—The Secretary  
11 shall ensure that the facility described in paragraph  
12 (1) will provide, at a minimum, the following capa-  
13 bilities:

14 (A) A neutrino beam with wideband capa-  
15 bility of 1.2 megawatts (MW) of beam power  
16 and upgradable to 2.4 MW of beam power.

17 (B) Four caverns excavated for a 70 kil-  
18 oton fiducial detector mass and supporting sur-  
19 face buildings and utilities.

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

24 (D) Cryogenic systems to support neutrino  
25 detectors.

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

5           (4) FUNDING.—Out of funds authorized to be  
6 appropriated under section 209 for High Energy  
7 Physics, there shall be made available to the Sec-  
8 retary to carry out activities, including construction  
9 of the facility, under this subsection—

- 10                   (A) \$175,000,000 for fiscal year 2020;  
11                   (B) \$225,000,000 for fiscal year 2021;  
12                   (C) \$250,000,000 for fiscal year 2022;  
13                   (D) \$250,000,000 for fiscal year 2023;  
14                   (E) \$250,000,000 for fiscal year 2024;  
15                   (F) \$250,000,000 for fiscal year 2025;  
16                   (G) \$250,000,000 for fiscal year 2026;  
17                   (H) \$250,000,000 for fiscal year 2027;  
18                   (I) \$194,000,000 for fiscal year 2028; and  
19                   (J) \$82,000,000 for fiscal year 2029.

20           (c) PROTON IMPROVEMENT PLAN-II ACCELERATOR  
21 UPGRADE PROJECT.—

22           (1) IN GENERAL.—The Secretary of Energy  
23 shall provide for the Proton Improvement Plan II  
24 (PIP-II), an upgrade to the Fermilab accelerator  
25 complex identified in the 2014 Particle Physics

1 Project Prioritization Panel (P5) report titled  
2 “Building for Discovery”, to provide the world’s  
3 most intense beam of neutrinos to the international  
4 LBNF/DUNE experiment as well as a broad range  
5 of future high energy physics experiments. The Sec-  
6 retary of Energy shall work with international part-  
7 ners to provide key contributions.

8 (2) FACILITY CAPABILITIES.—The Secretary  
9 shall ensure that the facility described in paragraph  
10 (1) will provide, at a minimum, the following capa-  
11 bilities:

12 (A) A state-of-the-art 800 megaelectron  
13 volt (MeV) superconducting linear accelerator.

14 (B) Proton beam power of 1.2 MW at the  
15 start of LBNF/DUNE, upgradeable to 2.4 MW  
16 of beam power.

17 (C) A flexible design to enable high power  
18 beam delivery to multiple users simultaneously  
19 and customized beams tailored to specific sci-  
20 entific needs.

21 (D) Sustained high reliability operation of  
22 the Fermilab accelerator complex.

23 (3) START OF OPERATIONS.—The Secretary  
24 shall, to the maximum extent practicable, ensure



1 that the start of full operations of the facility under  
2 this section occurs before December 31, 2027.

3 (4) FUNDING.—Out of funds authorized to be  
4 appropriated under section 209 for High Energy  
5 Physics, there shall be made available to the Sec-  
6 retary to carry out activities, including construction  
7 of the facility, under this subsection—

8 (A) \$60,000,000 for fiscal year 2020;

9 (B) \$120,000,000 for fiscal year 2021;

10 (C) \$120,000,000 for fiscal year 2022;

11 (D) \$120,000,000 for fiscal year 2023;

12 (E) \$120,000,000 for fiscal year 2024;

13 (F) \$115,000,000 for fiscal year 2025;

14 (G) \$85,000,000 for fiscal year 2026; and

15 (H) \$45,000,000 for fiscal year 2027.

16 (d) INTERNATIONAL COLLABORATION.—Section  
17 305(b) of the Department of Energy Research and Inno-  
18 vation Act (42 U.S.C. 18643(b)) is amended to read as  
19 follows:

20 “(b) INTERNATIONAL COLLABORATION.—The Direc-  
21 tor shall—

22 “(1) as practicable and in coordination with  
23 other appropriate Federal agencies as necessary, en-  
24 sure the access of United States researchers to the  
25 most advanced accelerator facilities and research ca-

1 pabilities in the world, including the Large Hadron  
2 Collider;

3 “(2) to the maximum extent practicable, con-  
4 tinue to leverage United States participation in the  
5 Large Hadron Collider, and prioritize expanding  
6 international partnerships and investments in the  
7 Long-Baseline Neutrino Facility/Deep Underground  
8 Neutrino Experiment; and

9 “(3) to the maximum extent practicable,  
10 prioritize engagement in collaborative efforts in sup-  
11 port of future international facilities that would pro-  
12 vide access to United States researchers of the most  
13 advanced accelerator facilities in the world.”.

14 (e) ACCELERATOR AND DETECTOR UPGRADES.—The  
15 Director shall upgrade accelerator facilities and detectors,  
16 as necessary and appropriate, to increase beam power,  
17 sustain high reliability, and improve precision measure-  
18 ment to advance the highest priority particle physics re-  
19 search programs. In carrying out facility upgrades, the Di-  
20 rector shall continue to work with international partners,  
21 when appropriate and in the United States interest, to le-  
22 verage investments and expertise in critical technologies  
23 to maintain leading facilities in the United States.

24 (f) ACCELERATOR AND DETECTOR RESEARCH AND  
25 DEVELOPMENT.—The Director shall carry out a program

1 in accelerator and detector research and development, in  
2 order to develop and deploy next generation technologies  
3 to support discovery science in particle physics.

4 (g) RESEARCH COLLABORATIONS.—In developing ac-  
5 celerator technologies under the program authorized in  
6 subsection (e), the Director shall—

7 (1) consider the requirements necessary to sup-  
8 port translational research and development for  
9 medical, industrial, security, and defense applica-  
10 tions; and

11 (2) leverage investments in accelerator tech-  
12 nologies and basic research in particle physics by  
13 partnering with institutes of higher education, indus-  
14 try, and other Federal agencies to help commer-  
15 cialize technologies with promising applications.

16 **SEC. 205. BIOLOGICAL AND ENVIRONMENTAL RESEARCH.**

17 (a) PROGRAM.—The Director shall carry out a pro-  
18 gram of basic research in the areas of biological systems  
19 science and environmental science relevant to the develop-  
20 ment of new energy technologies and to support Depart-  
21 ment missions in energy, environment, and national secu-  
22 rity.

23 (b) BIOENERGY RESEARCH CENTERS.—

24 (1) IN GENERAL.—In carrying out activities  
25 under subsection (a), the Director shall select and

1 establish up to four bioenergy research centers to  
2 conduct basic and fundamental research in plant  
3 and microbial systems biology, bio imaging and anal-  
4 ysis, and genomics to inform the production of fuels,  
5 chemicals from sustainable biomass resources, and  
6 to facilitate the translation of basic research results  
7 to industry.

8 (2) SELECTION.—The Director shall select cen-  
9 ters under paragraph (1) on a competitive, merit-re-  
10 viewed basis. The Director shall consider applica-  
11 tions from National Laboratories, multi-institutional  
12 collaborations, and other appropriate entities.

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

17 (4) EXISTING CENTERS.—The Director may se-  
18 lect a center for participation under this subsection  
19 that is in existence, or undergoing a renewal process,  
20 on the date of enactment of this Act. Such center  
21 shall be eligible to receive support for the duration  
22 the 5-year period beginning on the date of establish-  
23 ment of such center.

24 (5) RENEWAL.—Upon the expiration of any pe-  
25 riod of support of a center under this subsection, the

1 Director may renew support for the center, on a  
2 merit-reviewed basis, for a period of not more than  
3 5 years.

4 (6) TERMINATION.—Consistent with the exist-  
5 ing authorities of the Department, the Director may  
6 terminate an underperforming center for cause dur-  
7 ing the performance period.

8 (c) LOW DOSE RADIATION RESEARCH PROGRAM.—

9 (1) IN GENERAL.—The Secretary shall carry  
10 out a basic research program on low-dose and low  
11 dose-rate radiation to—

12 (A) enhance the scientific understanding  
13 of, and reduce uncertainties associated with, the  
14 effects of exposure to low-dose and low dose-  
15 rate radiation; and

16 (B) inform improved risk-assessment and  
17 risk-management methods with respect to such  
18 radiation.

19 (2) PROGRAM COMPONENTS.—In carrying out  
20 the program required under paragraph (1), the Sec-  
21 retary shall—

22 (A) formulate scientific goals for low-dose  
23 radiation and low dose-rate radiation basic re-  
24 search in the United States;

1 (B) identify ongoing scientific challenges  
2 for understanding the long-term effects of ion-  
3 izing radiation on biological systems;

4 (C) develop a long-term strategic and  
5 prioritized basic research agenda to address  
6 such scientific challenges in coordination with  
7 other research efforts;

8 (D) identify and, to the extent possible,  
9 quantify, potential monetary and health-related  
10 benefits to Federal agencies, the general public,  
11 industry, research communities, and other users  
12 of information produced by such research pro-  
13 gram;

14 (E) leverage the collective body of knowl-  
15 edge from existing low-dose and low dose-rate  
16 radiation research; and

17 (F) engage with other Federal agencies,  
18 research communities, and potential users of in-  
19 formation produced under this section, includ-  
20 ing institutions concerning radiation research,  
21 medical physics, radiology, health physics, and  
22 emergency response.

23 (3) COORDINATION.—In carrying out the pro-  
24 gram required under paragraph (1), the Secretary,  
25 in coordination with the Physical Science Sub-

1 committee of the National Science and Technology  
2 Council, shall—

3 (A) support the directives under section  
4 106 of the American Innovation and Competi-  
5 tiveness Act (42 U.S.C. 6601 note);

6 (B) ensure that the Office of Science of  
7 the Department of Energy consults and coordi-  
8 nates with the National Aeronautics and Space  
9 Administration, the National Institutes of  
10 Health, the Environmental Protection Agency,  
11 the Department of Defense, the Nuclear Regu-  
12 latory Commission, and the Department of  
13 Homeland Security;

14 (C) advise and assist the National Science  
15 and Technology Council on policies and initia-  
16 tives in radiation biology, including enhancing  
17 scientific knowledge of the effects of low-dose  
18 and low dose-rate radiation on biological sys-  
19 tems to improve radiation risk-assessment and  
20 risk-management methods; and

21 (D) identify opportunities to stimulate  
22 international cooperation relating to low-dose  
23 and low dose-rate radiation and leverage re-  
24 search and knowledge from sources outside of  
25 the United States.

1           (4) RESEARCH PLAN.—Not later than 180 days  
2 after the date of enactment of this Act, the Sec-  
3 retary shall transmit to the Committee on Science,  
4 Space, and Technology of the House of Representa-  
5 tives and the Committee on Energy and Natural Re-  
6 sources of the Senate a 4-year research plan that  
7 identifies and prioritizes basic research needs relat-  
8 ing to low-dose and low dose-rate radiation. In devel-  
9 oping such plan, the Secretary shall incorporate the  
10 components described in paragraph (2).

11           (5) LOW-DOSE RADIATION DEFINED.—In this  
12 section, the term “low-dose radiation” means a radi-  
13 ation dose of less than 100 millisieverts.

14           (6) LOW DOSE-RATE RADIATION DEFINED.—In  
15 this section, the term “low dose-rate radiation”  
16 means a radiation dose rate of less than 5  
17 millisieverts per hour.

18           (7) RULE OF CONSTRUCTION.—Nothing in this  
19 section shall be construed to subject any research  
20 carried out by the Secretary for the program under  
21 this section to any limitations described in section  
22 977(e).

23           (8) FUNDING.—For purposes of carrying out  
24 this section, the Secretary is authorized to make



1 available from funds provided to the Biological and  
2 Environmental Research Program—

3 (A) \$20,000,000 for fiscal year 2020;

4 (B) \$20,000,000 for fiscal year 2021;

5 (C) \$30,000,000 for fiscal year 2022;

6 (D) \$30,000,000 for fiscal year 2023;

7 (E) \$40,000,000 for fiscal year 2024;

8 (F) \$40,000,000 for fiscal year 2025;

9 (G) \$50,000,000 for fiscal year 2026;

10 (H) \$50,000,000 for fiscal year 2027;

11 (I) \$60,000,000 for fiscal year 2028; and

12 (J) \$60,000,000 for fiscal year 2029.

13 (d) EARTH AND ENVIRONMENTAL SYSTEMS RE-  
14 SEARCH.—

15 (1) IN GENERAL.—The Director shall carry out  
16 a program of fundamental research to develop high-  
17 resolution Earth system modeling, analysis, and  
18 intercomparison capabilities, in order to further the  
19 understanding of the biological, biogeochemical, and  
20 physical processes across the multiple scales that  
21 control the flux of environmentally-relevant com-  
22 pounds between the terrestrial surface and the at-  
23 mosphere.

1           (2) **PRIORITIZATION.**—In carrying out the pro-  
2           gram authorized under paragraph (1), the Director  
3           shall prioritize—

4                   (A) the development of software and algo-  
5                   rithms to enable the productive application of  
6                   environmental systems models in high perform-  
7                   ance computing systems; and

8                   (B) capabilities that support the Depart-  
9                   ment’s mission needs for energy and infrastruc-  
10                  ture security, resilience, and reliability.

11          (3) **USER FACILITIES.**—

12                   (A) **IN GENERAL.**—In carrying out the ac-  
13                   tivities authorized under paragraph (1), the Di-  
14                   rector shall establish and operate user facilities  
15                   to advance the collection, validation, and anal-  
16                   ysis of atmospheric data, including activities to  
17                   advance knowledge and improve model rep-  
18                   resentations and measure the impact of atmos-  
19                   pheric gases, aerosols, and clouds on earth and  
20                   environmental systems.

21                   (B) **EXISTING FACILITIES.**—To the max-  
22                   imum extent practicable, the Director shall uti-  
23                   lize existing facilities to carry out this sub-  
24                   section.

1 (C) SELECTION.—The Director shall select  
2 user facilities under paragraph (1) on a com-  
3 petitive, merit-reviewed basis. The Director  
4 shall consider applications from the National  
5 Laboratories, institutes of higher education,  
6 multi-institutional collaborations, and other ap-  
7 propriate entities.

8 (D) TERMINATION.—Consistent with the  
9 existing authorities of the Department, the Di-  
10 rector may terminate an underperforming user  
11 facility for cause during the performance pe-  
12 riod.

13 (4) COORDINATION.—In carrying out the pro-  
14 gram authorized in paragraph (1), the Director shall  
15 ensure that the Office of Science—

16 (A) consults and coordinates with the Na-  
17 tional Oceanic Atmospheric Administration, the  
18 Environmental Protection Agency, and any  
19 other relevant Federal agency on the collection,  
20 validation, and analysis of atmospheric data;  
21 and

22 (B) coordinates with relevant stakeholders,  
23 including institutes of higher education, non-  
24 profit research institutions, industry, State,  
25 local, and tribal governments, and other appro-

1           priate entities to ensure access to the best avail-  
2           able relevant atmospheric and historical weath-  
3           er data.

4           (f) COASTAL ZONE RESEARCH INITIATIVE.—

5           (1) IN GENERAL.—The Director shall carry out  
6           a basic research program to enhance the under-  
7           standing of coastal ecosystems. In carrying out this  
8           program, the Director shall prioritize efforts to en-  
9           hance the collection of observational data, and shall  
10          develop models to analyze the ecological, biogeo-  
11          chemical, hydrological and physical processes that  
12          interact in coastal zones.

13          (2) NATIONAL SYSTEM FOR COASTAL DATA  
14          COLLECTION.—The Director shall establish an inte-  
15          grated system of field research sites in order to im-  
16          prove the quantity and quality of observational data,  
17          and that encompass at least three of the major land-  
18          water interfaces of the United States, including—

19                 (A) the Great Lakes region;

20                 (B) the Pacific coast;

21                 (C) the Atlantic coast;

22                 (D) the Arctic; and

23                 (E) the Gulf coast.

24          (3) EXISTING INFRASTRUCTURE.—In carrying  
25          out the programs and establishing the field research

1 sites under paragraph (1) and (2), the Secretary  
2 shall leverage existing Department of Energy R&D  
3 infrastructure, including the Department's existing  
4 marine sciences lab.

5 (4) COORDINATION.—For the purposes of car-  
6 rying out the programs and establishing the field re-  
7 search sites under the Initiative, the Secretary may  
8 enter into agreements with Federal Departments  
9 and agencies with complementary capabilities.

10 (5) REPORT.—Not less than 2 years after the  
11 date of the enactment of this Act, the Director shall  
12 provide to the Committee on Science, Space, and  
13 Technology and the Committee on Appropriations of  
14 the House of Representatives and the Committee on  
15 Energy and Natural Resources and the Committee  
16 on Appropriations of the Senate a report examining  
17 whether the system described in this section should  
18 be established as a National User Facility.

19 (g) BIOLOGICAL AND ENVIRONMENTAL RESEARCH  
20 USER FACILITIES.—

21 (1) IN GENERAL.—The Director shall carry out  
22 a program for the development, construction, oper-  
23 ation, and maintenance of user facilities to enhance  
24 the collection and analysis of observational data re-

1       lated to complex biological, earth, and environmental  
2       systems.

3           (2) FACILITY REQUIREMENTS.—To the max-  
4       imum extent practicable, the user facilities devel-  
5       oped, constructed, operated, or maintained under  
6       paragraph (1) shall include—

7           (A) distributed field research and observa-  
8       tion platforms for understanding earth system  
9       processes;

10          (B) instruments and modeling resources  
11       for understanding the physical, chemical, and  
12       cellular processes of biological and environ-  
13       mental systems;

14          (C) integrated high-throughput sequencing,  
15       DNA design and synthesis, metabolomics and  
16       computational analysis; and

17          (D) such other facilities as the Director  
18       considers appropriate, consistent with section  
19       209 of the Department of Energy Organization  
20       Act (42 U.S.C. 7139).

21          (3) EXISTING FACILITIES.—In carrying out the  
22       program established in paragraph (1), the Director  
23       is encouraged to evaluate the capabilities of existing  
24       user facilities and, to the maximum extent prac-

1            ticable, invest in modernization of those capabilities  
2            to address emerging research priorities.

3    **SEC. 206. FUSION ENERGY.**

4            (a) PROGRAM.—The Director shall carry out a fusion  
5    energy sciences research program to expand the under-  
6    standing of plasmas and matter at very high temperatures  
7    and densities and build the science and engineering foun-  
8    dation needed to develop a fusion energy source.

9            (b) PUBLIC-PRIVATE PARTNERSHIPS.—

10            (1) IN GENERAL.—In carrying out the program  
11    authorized in subsection (a), the Secretary shall, to  
12    the maximum extent practicable, make available fu-  
13    sion energy science infrastructure to industry part-  
14    ners in order to achieve faster and cost-effective de-  
15    velopment of fusion energy technologies toward com-  
16    mercial readiness. In carrying out this subsection,  
17    the Secretary shall make available—

18            (A) experimental capabilities and testing  
19    facilities;

20            (B) computational capabilities, modeling  
21    and simulation tools;

22            (C) access to existing datasets and data  
23    validation tools; and

24            (D) land use and site information for dem-  
25    onstration facilities.

1 (2) SELECTION.—

2 (A) IN GENERAL.—The Secretary shall se-  
3 lect industry partners for awards on a competi-  
4 tive, merit-reviewed basis.

5 (B) CONSIDERATIONS.—In selecting indus-  
6 try stakeholders under subparagraph (A), the  
7 Secretary shall consider—

8 (i) the information disclosed by the  
9 Department under this subsection; and

10 (ii) any existing facilities the Depart-  
11 ment will provide for public-private part-  
12 nership activities.

13 (3) TERM.—An award made to an industry  
14 partner under this section shall be for a period of  
15 not more than 5 years, subject to the availability of  
16 appropriations, after which the award may be re-  
17 newed, subject to a rigorous merit review.

18 (c) HIGH PERFORMANCE COMPUTATION COLLABO-  
19 RATIVE RESEARCH PROGRAM.—

20 (1) IN GENERAL.—The Secretary shall carry  
21 out a program to conduct and support collaborative  
22 research, development, and demonstration of fusion  
23 energy technologies, through high-performance com-  
24 putation modeling and simulation techniques, in  
25 order to—



1 (A) support basic science research in plas-  
2 mas and matter at very high temperatures and  
3 densities;

4 (B) inform the development of a broad  
5 range of fusion energy systems; and

6 (C) facilitate the translation of basic re-  
7 search results in fusion energy science to indus-  
8 try.

9 (2) COORDINATION.—In carrying out the pro-  
10 gram under paragraph (1), the Secretary shall co-  
11 ordinate with relevant Federal agencies, and  
12 prioritize the following objectives:

13 (A) Using expertise from the private sec-  
14 tor, institutions of higher education, and the  
15 National Laboratories to develop computational  
16 software and capabilities that prospective users  
17 may accelerate research and development of fu-  
18 sion energy systems.

19 (B) Developing computational tools to sim-  
20 ulate and predict fusion energy science phe-  
21 nomena that may be validated through physical  
22 experimentation.

23 (C) Increasing the utility of the research  
24 infrastructure of the Department by coordi-

1 nating with the Advanced Scientific Computing  
2 Research program within the Office of Science.

3 (D) Leveraging experience from existing  
4 modeling and simulation entities sponsored by  
5 the Department.

6 (E) Ensuring that new experimental and  
7 computational tools are accessible to relevant  
8 research communities, including private sector  
9 entities engaged in fusion energy technology de-  
10 velopment.

11 (3) DUPLICATION.—The Secretary shall ensure  
12 the coordination of, and avoid unnecessary duplica-  
13 tion of, the activities of this program with the activi-  
14 ties of—

15 (A) other research entities of the Depart-  
16 ment, including the National Laboratories, the  
17 Advanced Research Projects Agency—Energy,  
18 the Advanced Scientific Computing Research  
19 program; and

20 (B) industry.

21 (4) HIGH PERFORMANCE COMPUTING FOR FU-  
22 SION INNOVATION HUB.—In carrying out the pro-  
23 gram under paragraph (1), the Secretary shall es-  
24 tablish and operate a national High Performance  
25 Computing for Fusion Innovation Hub (referred to

1 in this section as the “Hub”), which shall focus on  
2 the early stage research and development activities  
3 described under paragraph (1).

4 (d) SELECTION.—The Secretary shall select the Hub  
5 under this subsection on a competitive, merit-reviewed  
6 basis. The Secretary shall consider applications from Na-  
7 tional Laboratories, institutions of higher education,  
8 multi-institutional collaborations, and other appropriate  
9 entities.

10 (e) DURATION.—The Hub established under this sub-  
11 section shall receive support for a period of not more than  
12 5 years, subject to the availability of appropriations.

13 (f) RENEWAL.—Upon the expiration of any period of  
14 support of the Hub, the Secretary may renew support for  
15 the Hub, on a merit-reviewed basis, for a period of not  
16 more than 5 years.

17 (g) TERMINATION.—Consistent with the existing au-  
18 thorities of the Department, the Secretary may terminate  
19 the Hub for cause during the performance period.

20 (h) TOKAMAK RESEARCH AND DEVELOPMENT.—Sec-  
21 tion 307(b) of the Department of Energy Research and  
22 Innovation Act (42 U.S.C. 18645(b)) is amended to read  
23 as follows:

24 “(b) TOKAMAK RESEARCH AND DEVELOPMENT.—

1           “(1) IN GENERAL.—The Director shall support  
2           research and development activities and facility oper-  
3           ations to optimize the tokamak approach to fusion  
4           energy.

5           “(2) INTERNATIONAL THERMONUCLEAR EXPER-  
6           IMENTAL REACTOR CONSTRUCTION.—

7           “(A) IN GENERAL.—There is authorized  
8           United States participation in the construction  
9           and operations of the ITER project, as agreed  
10          to under the April 25, 2007 ‘Agreement on the  
11          Establishment of the ITER International Fu-  
12          sion Energy Organization for the Joint Imple-  
13          mentation of the ITER Project’.

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

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

22                 “(ii) Capable of creating and sus-  
23                 taining a 15-million-Ampere plasma cur-  
24                 rent for greater than 300 seconds.

1           “(C) AUTHORIZATION OF APPROPRIA-  
2           TIONS.—From within funds authorized to be  
3           appropriated under section 209 of the Securing  
4           American Leadership in Science and Tech-  
5           nology Act of 2020 for Fusion Energy Sciences,  
6           there are authorized to carry out this para-  
7           graph—

8                   “(i) \$242,000,000 for fiscal year  
9                   2020;

10                   “(ii) \$290,400,000 for fiscal year  
11                   2021;

12                   “(iii) \$338,800,000 for fiscal year  
13                   2022;

14                   “(iv) \$387,200,000 for fiscal year  
15                   2023;

16                   “(v) \$435,600,000 for fiscal year  
17                   2024;

18                   “(vi) \$484,000,000 for fiscal year  
19                   2025;

20                   “(vii) \$435,600,000 for fiscal year  
21                   2026;

22                   “(viii) \$387,200,000 for fiscal year  
23                   2027;

24                   “(ix) \$338,800,000 for fiscal year  
25                   2028; and

1                   “(x) \$290,400,000 for fiscal year  
2                   2029.”.

3           (i) INERTIAL FUSION ENERGY RESEARCH AND DE-  
4 VELOPMENT PROGRAM.—Section 307(c) of the Depart-  
5 ment of Energy Research and Innovation Act (42 U.S.C.  
6 18645(c)) is amended to read as follows:

7           “(c) INERTIAL FUSION RESEARCH AND DEVELOP-  
8 MENT.—

9                   “(1) IN GENERAL.—The Director shall carry  
10 out a program of research and technology develop-  
11 ment in inertial fusion for energy applications, in-  
12 cluding ion beam, laser, and pulsed power fusion  
13 systems.

14                   “(2) LASER RESEARCH INITIATIVE.—The Di-  
15 rector shall establish a high intensity laser research  
16 program consistent with the recommendations of the  
17 National Academy of Science Report, ‘Opportunities  
18 in Intense Ultrafast Lasers: Reaching for the  
19 Brightest Light’ and the Brightest Light Initiative  
20 workshop report. This program shall include re-  
21 search to develop petawatt-scale laser technologies  
22 necessary to facilitate discovery science and to ad-  
23 vance energy technologies, and to restore U.S. lead-  
24 ership in high intensity laser facilities.”.

1 (j) ALTERNATIVE AND ENABLING CONCEPTS.—Sec-  
2 tion 307(d) of the Department of Energy Research and  
3 Innovation Act (42 U.S.C. 18645(d)) is amended as fol-  
4 lows:

5 “(d) ALTERNATIVE AND ENABLING CONCEPTS.—

6 “(2) IN GENERAL.—As part of the program de-  
7 scribed in subsection (a), the Director shall support  
8 research and development activities and facility oper-  
9 ations at United States universities, national labora-  
10 tories, and private facilities for a portfolio of alter-  
11 native and enabling fusion energy concepts that may  
12 provide solutions to significant challenges to the es-  
13 tablishment of a commercial magnetic fusion power  
14 plant, prioritized based on the ability of the United  
15 States to play a leadership role in the international  
16 fusion research community.

17 “(3) ACTIVITIES.—Fusion energy concepts and  
18 activities explored under this paragraph may in-  
19 clude—

20 “(A) high magnetic field approaches facili-  
21 tated by high temperature superconductors;

22 “(B) advanced stellarator concepts;

23 “(C) non-tokamak confinement configura-  
24 tions operating at low magnetic fields;

1           “(D) magnetized target fusion energy con-  
2           cepts;

3           “(E) liquid metals to address issues associ-  
4           ated with fusion plasma interactions with the  
5           inner wall of the encasing device;

6           “(F) immersion blankets for heat manage-  
7           ment and fuel breeding;

8           “(G) advanced scientific computing activi-  
9           ties; and

10           “(H) other promising fusion energy con-  
11           cepts identified by the Director.”.

12 **SEC. 207. NUCLEAR PHYSICS.**

13           Section 308 of the Department of Energy Research  
14           and Innovation Act (42 U.S.C. 18646) is amended by in-  
15           serting at the end the following:

16           “(c) FACILITY FOR RARE ISOTOPE BEAMS.—

17           “(1) IN GENERAL.—The Secretary shall provide  
18           for a Facility for Rare Isotope Beams to advance the  
19           understanding of rare nuclear isotopes and the evo-  
20           lution of the cosmos.

21           “(2) FACILITY CAPABILITY.—In carrying out  
22           paragraph (1), the Secretary shall provide for, at a  
23           minimum, a rare isotope beam facility capable of  
24           400 kW of beam power.



1           “(3) START OF OPERATIONS.—The Secretary  
2 shall, to the maximum extent practicable, ensure  
3 that the start of full operations of the facility under  
4 this subsection occurs before June 30, 2022.

5           “(4) FUNDING.—Out of funds authorized to be  
6 appropriated under section 209 of the Securing  
7 American Leadership in Science and Technology Act  
8 of 2020 for Nuclear Physics, there shall be made  
9 available to the Secretary to carry out activities, in-  
10 cluding construction of the facility, under this sub-  
11 section—

12                   “(A) \$64,00,000 for fiscal year 2020;

13                   “(B) \$36,300,000 for fiscal year 2021;

14                   “(C) \$24,000,000 for fiscal year 2022;

15                   “(D) \$15,000,000 for fiscal year 2023;

16           and

17                   “(E) \$15,000,000 for fiscal year 2024.

18           “(d) ELECTRON-ION COLLIDER.—

19           “(1) IN GENERAL.—The Secretary shall provide  
20 for an Electron Ion Collider as described in the  
21 2015 Nuclear Science Advisory Committee’s Long  
22 Range Plan and endorsed by the report from the  
23 National Academies of Science, Engineering, and  
24 Medicine report titled ‘An Assessment of U.S.-Based  
25 Electron-Ion Collider Science’, in order to measure

1 the internal structure of the proton and the nucleus  
2 and answer fundamental questions about the nature  
3 of visible matter.

4 “(2) FACILITY CAPABILITY.—The Secretary  
5 shall ensure that the facility meets the requirements  
6 in the 2015 Long Range Plan, including—

7 “(A) at least 70 percent polarized beams  
8 of electrons and light ions;

9 “(B) ion beams from deuterium to the  
10 heaviest nuclei;

11 “(C) variable center of mass energy from  
12 20 to 140 GeV; high luminosity of  $10^{33}$ - $10^{34}$   
13  $\text{cm}^{-2}\text{s}^{-1}$ ; and

14 “(D) the possibility of more than one  
15 interaction region.

16 “(3) START OF OPERATIONS.—The Secretary  
17 shall, to the maximum extent practicable, ensure  
18 that the start of full operations of the facility under  
19 this section occurs before December 31, 2030.”.

20 **SEC. 208. SCIENCE LABORATORIES INFRASTRUCTURE PRO-**  
21 **GRAM.**

22 Section 309 of the Department of Energy Research  
23 and Innovation Act of 2018 (42 U.S.C. 18647) is amend-  
24 ed by adding at the end the following:

1           “(c) USE OF AVAILABLE APPROACHES AND MECHA-  
2 NISMS.—In carrying out this section, the Director shall  
3 utilize all available approaches and mechanisms, including  
4 capital line items, minor construction projects, energy sav-  
5 ings performance contracts, utility energy service con-  
6 tracts, alternative financing, and expense funding, as ap-  
7 propriate.

8           “(d) MID-SCALE INSTRUMENTATION PROGRAM.—  
9 The Director shall establish a mid-scale instrumentation  
10 program to enable the development and acquisition of  
11 novel, state-of-the-art instruments that would significantly  
12 accelerate scientific breakthroughs at national laboratory  
13 user facilities.”.

14 **SEC. 209. AUTHORIZATION OF APPROPRIATIONS.**

15           (a) FISCAL YEAR 2020.—There are authorized to be  
16 appropriated to the Secretary for the Office of Science for  
17 fiscal year 2020 \$7,000,000,000, of which—

18                   (1) \$2,213,000,000 shall be for Basic Energy  
19           Science;

20                   (2) \$1,045,000,000 shall be for High Energy  
21           Physics;

22                   (3) \$750,000,000 shall be for Biological and  
23           Environmental Research;

24                   (4) \$713,000,000 shall be for Nuclear Physics;

1           (5) \$980,000,000 shall be for Advanced Sci-  
2           entific Computing Research;

3           (6) \$671,000,000 shall be for Fusion Energy  
4           Sciences;

5           (7) \$301,000,000 shall be for Science Labora-  
6           tories Infrastructure;

7           (8) \$186,300,000 shall be for Science Program  
8           Direction;

9           (9) \$112,700,000 shall be for Safeguards and  
10          Security; and

11          (10) \$28,000,000 shall be for Workforce Devel-  
12          opment for Teachers and Scientists.

13          (b) FISCAL YEAR 2021.—There are authorized to be  
14          appropriated to the Secretary for the Office of Science for  
15          fiscal year 2021 \$7,900,940,874, of which—

16           (1) \$2,685,840,000 shall be for Basic Energy  
17           Science;

18           (2) \$1,135,584,317 shall be for High Energy  
19           Physics;

20           (3) \$816,925,453 shall be for Biological and  
21           Environmental Research;

22           (4) \$799,544,060 shall be for Nuclear Physics;

23           (5) \$1,160,020,000 shall be for Advanced Sci-  
24           entific Computing Research;

1           (6) \$699,360,000 shall be for Fusion Energy  
2        Sciences;

3           (7) \$279,468,000 shall be for Science Labora-  
4        tories Infrastructure;

5           (8) \$190,393,200 shall be for Science Program  
6        Direction;

7           (9) \$110,396,844 shall be for Safeguards and  
8        Security; and

9           (10) \$23,409,000 shall be for Workforce Devel-  
10       opment for Teachers and Scientists.

11       (c) FISCAL YEAR 2022.—There are authorized to be  
12       appropriated to the Secretary for the Office of Science for  
13       fiscal year 2022 \$8,559,100,770, of which—

14           (1) \$2,945,760,000 shall be for Basic Energy  
15        Science;

16           (2) \$1,213,376,476 shall be for High Energy  
17        Physics;

18           (3) \$872,888,179 shall be for Biological and  
19        Environmental Research;

20           (4) \$854,316,090 shall be for Nuclear Physics;

21           (5) \$1,272,280,000 shall be for Advanced Sci-  
22        entific Computing Research;

23           (6) \$767,040,000 shall be for Fusion Energy  
24        Sciences;

1           (7) \$302,757,000 shall be for Science Labora-  
2           tories Infrastructure;

3           (8) \$194,201,064 shall be for Science Program  
4           Direction;

5           (9) \$112,604,781 shall be for Safeguards and  
6           Security; and

7           (10) \$23,877,180 shall be for Workforce Devel-  
8           opment for Teachers and Scientists.

9           (d) FISCAL YEAR 2023.—There are authorized to be  
10          appropriated to the Secretary for the Office of Science for  
11          fiscal year 2023 \$9,217,390,345, of which—

12           (1) \$3,205,680,000 shall be for Basic Energy  
13           Science;

14           (2) \$1,291,168,634 shall be for High Energy  
15           Physics;

16           (3) \$928,850,905 shall be for Biological and  
17           Environmental Research;

18           (4) \$909,088,120 shall be for Nuclear Physics;

19           (5) \$1,384,540,000 shall be for Advanced Sci-  
20           entific Computing Research;

21           (6) \$834,720,000 shall be for Fusion Energy  
22           Sciences;

23           (7) \$326,046,000 shall be for Science Labora-  
24           tories Infrastructure;

1 (8) \$198,085,085 shall be for Science Program

2 Direction;

3 (9) \$114,856,876 shall be for Safeguards and

4 Security; and

5 (10) \$24,354,724 shall be for Workforce Devel-

6 opment for Teachers and Scientists.

7 (e) FISCAL YEAR 2024.—There are authorized to be

8 appropriated to the Secretary for the Office of Science for

9 fiscal year 2024 \$9,875,812,193, of which—

10 (1) \$3,465,600,000 shall be for Basic Energy

11 Science;

12 (2) \$1,368,960,793 shall be for High Energy

13 Physics;

14 (3) \$984,813,632 shall be for Biological and

15 Environmental Research;

16 (4) \$963,860,150 shall be for Nuclear Physics;

17 (5) \$1,496,800,000 shall be for Advanced Sci-

18 entific Computing Research;

19 (6) \$902,400,000 shall be for Fusion Energy

20 Sciences;

21 (7) \$349,335,000 shall be for Science Labora-

22 tories Infrastructure;

23 (8) \$202,046,787 shall be for Science Program

24 Direction;

1           (9) \$117,154,014 shall be for Safeguards and  
2 Security; and

3           (10) \$24,841,818 shall be for Workforce Devel-  
4 opment for Teachers and Scientists.

5           (f) FISCAL YEAR 2025.—There are authorized to be  
6 appropriated to the Secretary for the Office of Science for  
7 fiscal year 2025 \$10,534,368,961, of which—

8           (1) \$3,725,520,000 shall be for Basic Energy  
9 Science;

10           (2) \$1,446,752,951 shall be for High Energy  
11 Physics;

12           (3) \$1,040,776,358 shall be for Biological and  
13 Environmental Research;

14           (4) \$1,018,632,180 shall be for Nuclear Phys-  
15 ics;

16           (5) \$1,609,060,000 shall be for Advanced Sci-  
17 entific Computing Research;

18           (6) \$970,080,000 shall be for Fusion Energy  
19 Sciences;

20           (7) \$372,624,000 shall be for Science Labora-  
21 tories Infrastructure;

22           (8) \$206,087,723 shall be for Science Program  
23 Direction;

24           (9) \$119,497,094 shall be for Safeguards and  
25 Security; and



1           (10) \$25,338,654 shall be for Workforce Devel-  
2           opment for Teachers and Scientists.

3           (g) FISCAL YEAR 2026.—There are authorized to be  
4           appropriated to the Secretary for the Office of Science for  
5           fiscal year 2026 \$11,193,063,345, of which—

6           (1) \$3,985,440,000 shall be for Basic Energy  
7           Science;

8           (2) \$1,524,545,110 shall be for High Energy  
9           Physics;

10          (3) \$1,096,739,084 shall be for Biological and  
11          Environmental Research;

12          (4) \$1,073,404,210 shall be for Nuclear Phys-  
13          ics;

14          (5) \$1,721,320,000 shall be for Advanced Sci-  
15          entific Computing Research;

16          (6) \$1,037,760,000 shall be for Fusion Energy  
17          Sciences;

18          (7) \$395,913,000 shall be for Science Labora-  
19          tories Infrastructure;

20          (8) \$210,209,477 shall be for Science Program  
21          Direction;

22          (9) \$121,887,036 shall be for Safeguards and  
23          Security; and

24          (10) \$25,845,428 shall be for Workforce Devel-  
25          opment for Teachers and Scientists.

1 (h) FISCAL YEAR 2027.—There are authorized to be  
2 appropriated to the Secretary for the Office of Science for  
3 fiscal year 2027 \$11,851,898,099, of which—

4 (1) \$4,245,360,000 shall be for Basic Energy  
5 Science;

6 (2) \$1,602,337,268 shall be for High Energy  
7 Physics;

8 (3) \$1,152,701,810 shall be for Biological and  
9 Environmental Research;

10 (4) \$1,128,176,240 shall be for Nuclear Phys-  
11 ics;

12 (5) \$1,833,580,000 shall be for Advanced Sci-  
13 entific Computing Research;

14 (6) \$1,105,440,000 shall be for Fusion Energy  
15 Sciences;

16 (7) \$419,202,000 shall be for Science Labora-  
17 tories Infrastructure;

18 (8) \$214,413,667 shall be for Science Program  
19 Direction;

20 (9) \$124,324,777 shall be for Safeguards and  
21 Security; and

22 (10) \$26,362,336 shall be for Workforce Devel-  
23 opment for Teachers and Scientists.

1 (i) FISCAL YEAR 2028.—There are authorized to be  
2 appropriated to the Secretary for the Office of Science for  
3 fiscal year 2028 \$12,510,876,029, of which—

4 (1) \$4,505,280,000 shall be for Basic Energy  
5 Science;

6 (2) \$1,680,129,427 shall be for High Energy  
7 Physics;

8 (3) \$1,208,664,537 shall be for Biological and  
9 Environmental Research;

10 (4) \$1,182,948,270 shall be for Nuclear Phys-  
11 ics;

12 (5) \$1,945,840,000 shall be for Advanced Sci-  
13 entific Computing Research;

14 (6) \$1,173,120,000 shall be for Fusion Energy  
15 Sciences;

16 (7) \$442,491,000 shall be for Science Labora-  
17 tories Infrastructure;

18 (8) \$218,701,940 shall be for Science Program  
19 Direction;

20 (9) \$126,811,272 shall be for Safeguards and  
21 Security; and

22 (10) \$26,889,583 shall be for Workforce Devel-  
23 opment for Teachers and Scientists.

1 (j) FISCAL YEAR 2029.—There are authorized to be  
2 appropriated to the Secretary for the Office of Science for  
3 fiscal year 2029 \$13,170,000,000, of which—

4 (1) \$4,765,200,000 shall be for Basic Energy  
5 Science;

6 (2) \$1,757,921,586 shall be for High Energy  
7 Physics;

8 (3) \$1,264,627,263 shall be for Biological and  
9 Environmental Research;

10 (4) \$1,237,720,300 shall be for Nuclear Phys-  
11 ics;

12 (5) \$2,058,100,000 shall be for Advanced Sci-  
13 entific Computing Research;

14 (6) \$1,240,800,000 shall be for Fusion Energy  
15 Sciences;

16 (7) \$465,780,000 shall be for Science Labora-  
17 tories Infrastructure;

18 (8) \$223,075,979 shall be for Science Program  
19 Direction;

20 (9) \$129,347,498 shall be for Safeguards and  
21 Security; and

22 (10) \$27,427,374 shall be for Workforce Devel-  
23 opment for Teachers and Scientists.

1       **Subtitle B—Advanced Research**  
2               **Projects Agency—Energy**

3       **SEC. 211. ADVANCED RESEARCH PROJECTS AGENCY-EN-**  
4               **ERGY.**

5           (a) ESTABLISHMENT.—Section 5012(b) of the Amer-  
6       ica COMPETES Act (42 U.S.C. 16538(b)) is amended  
7       by striking “development of energy technologies” and in-  
8       serting “development of transformative science and tech-  
9       nology solutions to address energy, environmental, eco-  
10      nomic, and national security challenges”.

11          (b) GOALS.—Section 5012(c) of the America COM-  
12      PETES Act (42 U.S.C. 16538(c)) is amended—

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

15                       “(A) to enhance the economic and energy  
16                       security of the United States through the devel-  
17                       opment of energy technologies that—

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

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

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

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

4 “(I) low-level radioactive waste;

5 “(II) spent nuclear fuel; and

6 “(III) high-level radioactive  
7 waste;

8 “(v) improve efficiency and reduce the  
9 environmental impact of all forms of en-  
10 ergy production;

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

13 “(vii) address other challenges within  
14 the mission of the Department as deter-  
15 mined by the Secretary; and”;

16 (2) in paragraph (2), in the matter preceding  
17 subparagraph (A), by striking “energy technology  
18 projects” and inserting “advanced technology  
19 projects”.

20 (c) RESPONSIBILITIES.—Section 5012(e)(3)(A) of  
21 the America COMPETES Act (42 U.S.C.  
22 16538(e)(3)(A)) is amended by striking “energy”.

23 (d) REPORTS AND ROADMAPS.—Section 5012(h) of  
24 the America COMPETES Act (42 U.S.C. 16538(h)) is  
25 amended to read as follows:

1 “(h) ANNUAL REPORT.—

2 “(1) IN GENERAL.—As part of the annual  
3 budget request submitted for each fiscal year, the  
4 Director shall provide to the relevant authorizing  
5 and appropriations committees of Congress a report  
6 that—

7 “(A) describes projects supported by  
8 ARPA–E during the previous fiscal year;

9 “(B) identifies and includes an analysis of  
10 projects supported by ARPA–E during the pre-  
11 vious fiscal year that demonstrate duplication of  
12 other activities funded by the Department; and

13 “(C) describes current, proposed, and  
14 planned projects to be carried out pursuant to  
15 subsection (e)(3)(D).

16 “(2) STRATEGIC VISION ROADMAP.—Beginning  
17 with the report submitted with respect to fiscal year  
18 2020, and every 4 fiscal years thereafter, the report  
19 required under paragraph (1) shall include a road-  
20 map describing the strategic vision that ARPA–E  
21 will use to guide the choices of ARPA–E for future  
22 technology investments over the following 4 fiscal  
23 years.”.

1 (e) COORDINATION AND NONDUPLICATION.—Section  
2 5012(i)(1) of the America COMPETES Act (42 U.S.C.  
3 16538(i)(1)) is amended to read as follows:

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

6 “(A) the activities of ARPA–E are coordi-  
7 nated with, and do not duplicate the efforts of,  
8 programs and laboratories within the Depart-  
9 ment and other relevant research agencies; and

10 “(B) ARPA–E does not provide funding  
11 for a project unless the prospective grantee  
12 demonstrates sufficient attempts to secure pri-  
13 vate financing or indicates that the project is  
14 not independently commercially viable.”.

15 (f) EVALUATION.—Section 5012(l) of the America  
16 COMPETES Act (42 U.S.C. 16538(l)) is amended—

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

19 “(1) IN GENERAL.—Not later than 3 years  
20 after the date of enactment of the Securing Amer-  
21 ican Leadership in Science and Technology Act of  
22 2020, the Secretary is authorized to enter into a  
23 contract with a third party entity to conduct an eval-  
24 uation of how well ARPA–E is achieving the goals  
25 and mission of ARPA–E.”; and



1 (2) in paragraph (2)—

2 (A) by striking “shall” and inserting  
3 “may”; and

4 (B) by striking “the recommendation of  
5 the National Academy of Sciences” and insert-  
6 ing “a recommendation”.

7 (g) AUTHORIZATION OF APPROPRIATIONS.—Para-  
8 graph (2) of section 5012(o) of the America COMPETES  
9 Act (42 U.S.C. 16538(o)) is amended to read as follows:

10 “(2) AUTHORIZATION OF APPROPRIATIONS.—

11 Subject to paragraph (4), there are authorized to be  
12 appropriated to the Director for deposit in the Fund  
13 without fiscal year limitation—

14 “(A) \$392,800,000 for fiscal year 2020;

15 “(B) \$419,600,000 for fiscal year 2021;

16 “(C) \$446,400,000 for fiscal year 2022;

17 “(D) \$473,200,000 for fiscal year 2023;

18 “(E) \$500,000,000 for fiscal year 2024;

19 “(F) \$600,000,000 for fiscal year 2025;

20 “(G) \$700,000,000 for fiscal year 2026;

21 “(H) \$800,000,000 for fiscal year 2027;

22 “(I) \$900,000,000 for fiscal year 2028;

23 and

24 “(J) \$1,000,000,000 for fiscal year  
25 2029.”.

1 (h) TECHNICAL AMENDMENTS.—Section  
2 5012(g)(3)(A)(iii) of the America COMPETES Act (42  
3 U.S.C. 16538(g)(3)(A)(iii)) is amended by striking “sub-  
4 part” each place it appears and inserting “subparagraph”.

5 **Subtitle C—DOE Clean Energy**  
6 **Infrastructure**

7 **SEC. 221. REGIONAL ENERGY INNOVATION CENTERS.**

8 (a) DEFINITIONS.—In this section:

9 (1) ADVANCED ENERGY TECHNOLOGY.—The  
10 term “advanced energy technology” means—

11 (A) an innovative technology—

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

15 (ii) that produces nuclear energy;

16 (iii) for carbon capture and sequestra-  
17 tion;

18 (iv) that enables advanced vehicles,  
19 vehicle components, and related tech-  
20 nologies that result in significant energy  
21 savings;

22 (v) that generates, transmits, distrib-  
23 utes, uses, or stores energy more efficiently  
24 than conventional technologies, including  
25 through Smart Grid technologies; or

1 (vi) that enhances the energy inde-  
2 pendence and security of the United States  
3 by enabling improved or expanded supply  
4 and production of domestic energy re-  
5 sources, including coal, oil, and natural  
6 gas;

7 (B) a research, development, demonstra-  
8 tion, or commercial application activity nec-  
9 essary to ensure the long-term, secure, and sus-  
10 tainable supply of an energy critical element; or

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

13 (2) QUALIFYING ENTITY.—The term “quali-  
14 fying entity” means—

15 (A) an institution of higher education;

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

19 (C) a non-profit research institution;

20 (D) a multi-institutional collaboration; or

21 (E) any other relevant entity the Secretary  
22 determines appropriate.

23 (b) AUTHORIZATION OF PROGRAM.—

24 (1) IN GENERAL.—

1           (A) The Secretary shall carry out a pro-  
2           gram to enhance the economic, environmental,  
3           and energy security of the United States by es-  
4           tablishing and operating Regional Energy Inno-  
5           vation Centers in diverse regions of the United  
6           States, in order to provide, to the maximum ex-  
7           tent practicable, one centralized location for  
8           multidisciplinary, collaborative research, devel-  
9           opment, and demonstration of advanced energy  
10          technologies most suited to commercial applica-  
11          tion in each region of the United States.

12          (B) In establishing the centers authorized  
13          in subparagraph (A), the Secretary shall con-  
14          sider the diverse natural resources available  
15          throughout the United States, and maximize  
16          the opportunities for cooperation between insti-  
17          tutes of higher education, industry, state and  
18          local governments, and non-profit research in-  
19          stitutions with shared areas of energy expertise.

20          (2) TECHNOLOGY DEVELOPMENT FOCUS.—The  
21          Secretary shall designate for each center a unique  
22          advanced energy technology or basic research focus.  
23          In establishing focus areas for each center, the Sec-  
24          retary shall consider the energy needs, resources,

1 and expertise available in each region of the United  
2 States.

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

7 (A) other research entities of the Depart-  
8 ment, including the National Laboratories, the  
9 Advanced Research Projects Agency—Energy,  
10 Energy Innovation Hubs, and Energy Frontier  
11 Research Centers; and

12 (B) industry.

13 (c) APPLICATION PROCESS.—

14 (1) ELIGIBILITY.—To be eligible to receive an  
15 award for the establishment and operation of a cen-  
16 ter established under subsection (b)(1)(A), a consor-  
17 tium shall—

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

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

23 (i) the proposed partnership agree-  
24 ment, including the governance and man-  
25 agement structure of the center;

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

5 (iii) a proposed budget, including fi-  
6 nancial contributions from non-Federal  
7 sources; and

8 (C) operate as a nonprofit organization.

9 (2) SELECTION.—The Secretary shall consider  
10 applications from qualifying entities, and select cen-  
11 ters authorized under subsection (b)(1)(A) on a  
12 competitive, merit-reviewed basis.

13 (3) DURATION.—A center established under  
14 this section shall receive support for a period of not  
15 more than 5 years, subject to the availability of ap-  
16 propriations.

17 (4) RENEWAL.—Upon the expiration of any pe-  
18 riod of support of a center under this section, the  
19 Director may renew support for the center, on a  
20 merit-reviewed basis, for a period of not more than  
21 5 years.

22 (5) TERMINATION.—Consistent with the exist-  
23 ing authorities of the Department, the Director may  
24 terminate an underperforming center for cause dur-  
25 ing the performance period.

1 (d) CENTER OPERATIONS.—

2 (1) IN GENERAL.—Each center shall conduct or  
3 provide for multidisciplinary, collaborative research,  
4 development, demonstration of advanced energy  
5 technologies within the technology development focus  
6 designated under subsection (b)(2).

7 (2) ACTIVITIES.—Each center shall—

8 (A) encourage collaboration and commu-  
9 nication among the member qualifying entities  
10 of the consortium and awardees;

11 (B) develop and make publically available  
12 proposed plans and programs; and

13 (C) submit an annual report to the De-  
14 partment summarizing the activities of the cen-  
15 ter, including—

16 (i) detailing organizational expendi-  
17 tures; and

18 (ii) describing each project under-  
19 taken by the center.

20 (3) CONFLICTS OF INTEREST.—Each center  
21 shall maintain conflict of interest procedures, con-  
22 sistent with the conflict of interest procedures of the  
23 Department.

24 (4) PROHIBITION ON CONSTRUCTION.—

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

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

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

10 (B) TEST BED AND RENOVATION EXCEP-  
11 TION.—Nothing in this paragraph prohibits the  
12 use of funds provided under this section or non-  
13 Federal cost share funds for the construction of  
14 a test bed or renovations to existing user facili-  
15 ties if the Secretary determines such facilities  
16 are necessary and applicable to conduct re-  
17 search within the focus areas identified for each  
18 center.

19 **SEC. 222. VERSATILE NEUTRON SOURCE.**

20 (a) IN GENERAL.—The Secretary of Energy shall  
21 construct a versatile reactor-based fast neutron source,  
22 which shall operate as a national user facility. The Sec-  
23 retary shall consult with the private sector, universities,  
24 National Laboratories, and relevant Federal agencies to  
25 ensure that the versatile neutron source is capable of



1 meeting Federal research needs for neutron irradiation  
2 services.

3 (b) FACILITY CAPABILITIES.—

4 (1) CAPABILITIES.—The Secretary shall ensure  
5 that the facility described in subsection (a) will pro-  
6 vide, at a minimum, the following capabilities:

7 (A) Fast neutron spectrum irradiation ca-  
8 pability.

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

11 (2) CONSIDERATIONS.—In carrying out para-  
12 graph (1), the Secretary shall consider the following:

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

15 (B) Providing a source of fast neutrons at  
16 a neutron flux higher than that at which exist-  
17 ing research facilities operate, sufficient to en-  
18 able research for an optimal base of prospective  
19 users.

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

23 (D) Capabilities for irradiation with neu-  
24 trons of a lower energy spectrum.

1 (E) Multiple loops for fuels and materials  
2 testing of different coolants.

3 (F) Capabilities that support irradiating  
4 and processing targets for isotope production.

5 (G) Additional pre-irradiation and post-ir-  
6 radiation examination capabilities.

7 (H) Lifetime operating costs and lifecycle  
8 costs.

9 (c) START OF OPERATIONS.—The Secretary shall, to  
10 the maximum extent practicable, ensure that the start of  
11 full operations of the facility under this section occurs be-  
12 fore December 31, 2025.

13 (d) FUNDING.—There are authorized to be appro-  
14 priated to the Secretary for the Office of Nuclear Energy  
15 to carry out to completion the construction of the facility  
16 under this section—

17 (1) \$200,000,000 for fiscal year 2020;

18 (2) \$260,000,000 for fiscal year 2021;

19 (3) \$340,000,000 for fiscal year 2022;

20 (4) \$350,000,000 for fiscal year 2023;

21 (5) \$350,000,000 for fiscal year 2024;

22 (6) \$350,000,000 for fiscal year 2025;

23 (7) \$200,000,000 for fiscal year 2026;

24 (8) \$150,000,000 for fiscal year 2027;

25 (9) \$100,000,000 for fiscal year 2028; and

1 (10) \$50,000,000 for fiscal year 2029.

2 **SEC. 223. CARBON UTILIZATION RESEARCH AND DEVELOP-**  
3 **MENT INFRASTRUCTURE.**

4 (a) IN GENERAL.—The Secretary shall carry out a  
5 program to conduct basic and fundamental research in  
6 materials science, chemistry, subsurface instrumentation,  
7 and data analysis to inform the research, development,  
8 and demonstration of carbon capture, storage, and utiliza-  
9 tion technologies and techniques, and to facilitate the  
10 translation of basic research results to industry.

11 (b) COORDINATION.—In carrying out program under  
12 subsection (a), the Secretary shall leverage expertise and  
13 resources and facilitate collaboration and coordination be-  
14 tween—

15 (1) the Office of Fossil Energy; and

16 (2) the Office of Science.

17 (c) CARBON UTILIZATION ENERGY INNOVATION  
18 HUB.—In carrying out the program under subsection (a),  
19 the Secretary shall establish and operate a national Car-  
20 bon Utilization Energy Innovation Hub (referred to in this  
21 section as the “Hub”), which shall focus on early stage  
22 research and development activities including—

23 (1) post-combustion and pre-combustion cap-  
24 ture of carbon dioxide;

1           (2) advanced compression technologies for new  
2           and existing fossil fuel-fired power plants;

3           (3) technologies to convert carbon dioxide to  
4           valuable products and commodities; and

5           (4) advanced carbon dioxide storage tech-  
6           nologies that consider a range of storage regimes.

7           (d) **SELECTION.**—The Secretary shall select the Hub  
8           under this section on a competitive, merit-reviewed basis.  
9           The Secretary shall consider applications from National  
10           Laboratories, institutions of higher education, multi-insti-  
11           tutional collaborations, and other appropriate entities.

12          (e) **DURATION.**—The Hub established under this sec-  
13           tion shall receive support for a period of not more than  
14           5 years, subject to the availability of appropriations.

15          (f) **RENEWAL.**—Upon the expiration of any period of  
16           support of the Hub, the Secretary may renew support for  
17           the Hub, on a merit-reviewed basis, for a period of not  
18           more than 5 years.

19          (g) **TERMINATION.**—Consistent with the existing au-  
20           thorities of the Department, the Secretary may terminate  
21           the Hub for cause during the performance period.

22           **SEC. 224. FRONTIER OBSERVATORY FOR RESEARCH IN**  
23                            **GEO THERMAL ENERGY.**

24          (a) **IN GENERAL.**—The Secretary shall support the  
25           establishment and construction of up to 3 field research

1 sites operated by public or academic entities, which shall  
2 each be known as a “Frontier Observatory for Research  
3 in Geothermal Energy” or “FORGE” site to develop, test,  
4 and enhance techniques and tools for enhanced geothermal  
5 energy.

6 (b) DUTIES.—The Secretary shall—

7 (1) award grants in support of research and de-  
8 velopment projects focused on advanced monitoring  
9 technologies, new technologies and approaches for  
10 implementing multi-zone stimulations, and dynamic  
11 reservoir modeling that incorporates all available  
12 high-fidelity characterization data; and

13 (2) seek opportunities to coordinate efforts and  
14 share information with domestic and international  
15 partners engaged in research and development of  
16 geothermal systems and related technology.

17 (c) SITE SELECTION.—Of the FORGE sites referred  
18 to in subsection (a), the Secretary shall—

19 (1) consider applications through a competitive,  
20 merit-reviewed process, from National Laboratories,  
21 multi-institutional collaborations, institutes of higher  
22 education and other appropriate entities best suited  
23 to provide national leadership on geothermal related  
24 issues and perform the duties enumerated under  
25 subsection (b); and

1           (2) prioritize existing field sites and facilities  
2           with capabilities relevant to the duties enumerated  
3           under subsection (b).

4           (d) FUNDING.—There is authorized to be appro-  
5           priated to the Secretary to carry out the FORGE activities  
6           under this section—

7           (1) \$45,000,000 for fiscal year 2020;

8           (2) \$55,000,000 for fiscal year 2021;

9           (3) \$65,000,000 for fiscal year 2022;

10          (4) \$70,000,000 for fiscal year 2023;

11          (5) \$70,000,000 for fiscal year 2024;

12          (6) \$70,000,000 for fiscal year 2025;

13          (7) \$70,000,000 for fiscal year 2026;

14          (8) \$70,000,000 for fiscal year 2027;

15          (9) \$70,000,000 for fiscal year 2028; and

16          (10) \$70,000,000 for fiscal year 2029.

17          (e) PORTFOLIO BALANCE.—In carrying out this sec-  
18          tion, the Secretary shall consider the balance between  
19          funds dedicated to construction and operations and re-  
20          search activities to reflect the state of site development.

21       **SEC. 225. ADVANCED ENERGY STORAGE INITIATIVE.**

22          (a) IN GENERAL.—The Secretary shall carry out a  
23          research initiative to be known as the “Advanced Energy  
24          Storage Initiative” (referred to in this section as the “Ini-  
25          tiative”) to support and accelerate the research, develop-

1 ment, and demonstration of advanced energy storage tech-  
2 nologies, in order to—

3 (1) support basic research in capabilities that  
4 enable temporal flexibility in the conversion of en-  
5 ergy resources to useful energy services;

6 (2) inform the development of a broad range of  
7 energy storage systems; and

8 (3) facilitate the translation of basic research  
9 results in energy storage to industry.

10 (b) LEVERAGING.—In carrying out programs and ac-  
11 tivities under the Initiative, the Secretary shall leverage  
12 expertise and resources and facilitate collaboration be-  
13 tween—

14 (1) the Office of Electricity;

15 (2) the Office of Energy Efficiency and Renew-  
16 able Energy;

17 (3) the Office of Fossil Energy;

18 (4) the Office of Nuclear Energy; and

19 (5) the Basic Energy Sciences Program and  
20 Advanced Scientific Computing Program of the Of-  
21 fice of Science.

22 The Secretary may organize additional activities under  
23 this subsection through Energy Frontier Research Cen-  
24 ters, Energy Innovation Hubs, or cross-cutting research  
25 programs.

1 (c) GRID SCALE ENERGY STORAGE USER FACILI-  
2 TIES.—Not later than 180 days after the date of enact-  
3 ment of this Act, the Secretary shall transmit to the Com-  
4 mittee on Science, Space, and Technology of the House  
5 of Representatives and the Committee on Energy and  
6 Natural Resources of the Senate a 4-year research plan  
7 that identifies and prioritizes basic research needs relating  
8 to the development, construction, operation, and mainte-  
9 nance of grid scale energy storage technology demonstra-  
10 tion projects, which shall operate as national user facili-  
11 ties.

12 **SEC. 226. CRITICAL INFRASTRUCTURE RESEARCH AND**  
13 **CONSTRUCTION.**

14 (a) IN GENERAL.—The Secretary shall carry out a  
15 program of fundamental research, development, and early-  
16 stage demonstration of innovative engineered systems and  
17 tools to help ensure the resilience and security of critical  
18 integrated grid infrastructures.

19 (b) COORDINATION.—In carrying out the program  
20 under subsection (a), the Secretary shall leverage expertise  
21 and resources and facilitate collaboration and coordination  
22 between—

- 23 (1) the Office of Electricity;  
24 (2) the Office of Cybersecurity, Energy Secu-  
25 rity, and Emergency Response;



1 (3) the Office of Science;

2 (4) the Department of Defense; and

3 (5) the Department of Homeland Security.

4 (c) CRITICAL INFRASTRUCTURE TEST RANGE.—In  
5 carrying out the program under subsection (a), the Sec-  
6 retary shall establish and operate a Critical Infrastructure  
7 Test Range (referred to in this section as the “Test  
8 Range”) that allows for scalable physical and cyber per-  
9 formance testing to be conducted on industry-scale infra-  
10 structure systems. This facility shall include a focus on—

11 (1) cyber security test beds; and

12 (2) electric grid test beds.

13 (d) SELECTION.—The Secretary shall select the Test  
14 Range under this section on a competitive, merit-reviewed  
15 basis. The Secretary shall consider applications from Na-  
16 tional Laboratories, institutions of higher education,  
17 multi-institutional collaborations, and other appropriate  
18 entities.

19 (e) DURATION.—The Test Range established under  
20 this section shall receive support for a period of not more  
21 than 5 years, subject to the availability of appropriations.

22 (f) RENEWAL.—Upon the expiration of any period of  
23 support of the Test Range, the Secretary may renew sup-  
24 port for the Test Range, on a merit-reviewed basis, for  
25 a period of not more than 5 years.

1 (g) TERMINATION.—Consistent with the existing au-  
2 thorities of the Department, the Secretary may terminate  
3 the Test Range for cause during the performance period.

4 **TITLE III—NATIONAL INSTITUTE**  
5 **OF STANDARDS AND TECH-**  
6 **NOLOGY**

7 **SEC. 301. FINDINGS.**

8 Congress finds the following:

9 (1) The Nation Institute of Standards and  
10 Technology (NIST) promotes United States innova-  
11 tion and industrial competitiveness by advancing  
12 measurement science, standards and technology in  
13 ways that enhance economic security and improve  
14 Americans' quality of life.

15 (2) NIST's leadership in a broad range of cut-  
16 ting-edge scientific endeavors including but not lim-  
17 ited to quantum science and engineering, cybersecu-  
18 rity, biologics, artificial intelligence (AI), machine  
19 learning, additive manufacturing, disaster resilience,  
20 and international standards development is critical  
21 to America's leadership in the industries of the fu-  
22 ture.

23 (3) NIST's role as the Nation's laboratory for  
24 industry is critical to maintaining the economic and  
25 national security of the United States.

1 **SEC. 302. AUTHORIZATION OF APPROPRIATIONS.**

2 (a) FISCAL YEAR 2020.—

3 (1) IN GENERAL.—There are authorized to be  
4 appropriated to the Secretary of Commerce  
5 \$1,034,000,000 for the National Institute of Stand-  
6 ards and Technology for fiscal year 2020.

7 (2) SPECIFIC ALLOCATIONS.—Of the amount  
8 authorized by paragraph (1)—

9 (A) \$754,000,000 shall be for scientific  
10 and technical research and services laboratory  
11 activities, of which \$9,000,000 may be trans-  
12 ferred to the Working Capital Fund;

13 (B) \$118,000,000 shall be for the con-  
14 struction and maintenance of facilities, of which  
15 \$75,000,000 shall be for Safety, Capacity,  
16 Maintenance, and Major Repairs; and

17 (C) \$162,000,000 shall be for industrial  
18 technology services activities, of which  
19 \$146,000,000 shall be for the Manufacturing  
20 Extension Partnership program under sections  
21 25 and 26 of the National Institute of Stand-  
22 ards and Technology Act (15 U.S.C. 278k and  
23 278l) and \$16,000,000 shall be for the Network  
24 for Manufacturing Innovation Program under  
25 section 34 of the National Institute of Stand-  
26 ards and Technology Act (15 U.S.C. 278s).

1 (b) FISCAL YEAR 2021.—

2 (1) IN GENERAL.—There are authorized to be  
3 appropriated to the Secretary of Commerce  
4 \$1,240,400,000 for the National Institute of Stand-  
5 ards and Technology for fiscal year 2021.

6 (2) SPECIFIC ALLOCATIONS.—Of the amount  
7 authorized by paragraph (1)—

8 (A) \$869,400,000 shall be for scientific  
9 and technical research and services laboratory  
10 activities, of which \$10,800,000 may be trans-  
11 ferred to the Working Capital Fund;

12 (B) \$200,000,000 shall be for the con-  
13 struction and maintenance of facilities, of which  
14 \$120,000,000 shall be for Safety, Capacity,  
15 Maintenance, and Major Repairs, including  
16 \$20,000,000 for IT infrastructure; and

17 (C) \$171,000,000 shall be for industrial  
18 technology services activities, of which  
19 \$146,000,000 shall be for the Manufacturing  
20 Extension Partnership program under sections  
21 25 and 26 of the National Institute of Stand-  
22 ards and Technology Act (15 U.S.C. 278k and  
23 278I) and \$25,000,000 shall be for the Net-  
24 work for Manufacturing Innovation Program  
25 under section 34 of the National Institute of

1 Standards and Technology Act (15 U.S.C.  
2 278s).

3 (c) FISCAL YEAR 2022.—

4 (1) IN GENERAL.—There are authorized to be  
5 appropriated to the Secretary of Commerce  
6 \$1,315,250,000 for the National Institute of Stand-  
7 ards and Technology for fiscal year 2022.

8 (2) SPECIFIC ALLOCATIONS.—Of the amount  
9 authorized by paragraph (1)—

10 (A) \$941,850,000 shall be for scientific  
11 and technical research and services laboratory  
12 activities, of which \$11,700,000 may be trans-  
13 ferred to the Working Capital Fund;

14 (B) \$200,000,000 shall be for the con-  
15 struction and maintenance of facilities, of which  
16 \$120,000,000 shall be for Safety, Capacity,  
17 Maintenance, and Major Repairs, including  
18 \$20,000,000 for IT infrastructure; and

19 (C) \$173,400,000 shall be for industrial  
20 technology services activities, of which  
21 \$148,400,000 shall be for the Manufacturing  
22 Extension Partnership program under sections  
23 25 and 26 of the National Institute of Stand-  
24 ards and Technology Act (15 U.S.C. 278k and  
25 278I) and \$25,000,000 shall be for the Net-

1 work for Manufacturing Innovation Program  
2 under section 34 of the National Institute of  
3 Standards and Technology Act (15 U.S.C.  
4 278s).

5 (d) FISCAL YEAR 2023.—

6 (1) IN GENERAL.—There are authorized to be  
7 appropriated to the Secretary of Commerce  
8 \$1,390,500,000 for the National Institute of Stand-  
9 ards and Technology for fiscal year 2023.

10 (2) SPECIFIC ALLOCATIONS.—Of the amount  
11 authorized by paragraph (1)—

12 (A) \$1,014,300,000 shall be for scientific  
13 and technical research and services laboratory  
14 activities, of which \$12,600,000 may be trans-  
15 ferred to the Working Capital Fund;

16 (B) \$200,000,000 shall be for the con-  
17 struction and maintenance of facilities of which  
18 \$120,000,000 shall be for Safety, Capacity,  
19 Maintenance, and Major Repairs, including  
20 \$10,000,000 for IT infrastructure; and

21 (C) \$176,200,000 shall be for industrial  
22 technology services activities, of which  
23 \$151,200,000 shall be for the Manufacturing  
24 Extension Partnership program under sections  
25 25 and 26 of the National Institute of Stand-

1           ards and Technology Act (15 U.S.C. 278k and  
2           278I) and \$25,000,000 shall be for the Net-  
3           work for Manufacturing Innovation Program  
4           under section 34 of the National Institute of  
5           Standards and Technology Act (15 U.S.C.  
6           278s).

7           (e) FISCAL YEAR 2024.—

8           (1) IN GENERAL.—There are authorized to be  
9           appropriated to the Secretary of Commerce  
10          \$1,465,750,000 for the National Institute of Stand-  
11          ards and Technology for fiscal year 2024.

12          (2) SPECIFIC ALLOCATIONS.—Of the amount  
13          authorized by paragraph (1)—

14               (A) \$1,086,750,000 shall be for scientific  
15               and technical research and services laboratory  
16               activities, of which \$13,500,000 may be trans-  
17               ferred to the Working Capital Fund;

18               (B) \$200,000,000 shall be for the con-  
19               struction and maintenance of facilities, of which  
20               \$120,000,000 shall be for Safety, Capacity,  
21               Maintenance, and Major Repairs, including  
22               \$10,000,000 for IT infrastructure; and

23               (C) \$179,000,000 shall be for industrial  
24               technology services activities, of which  
25               \$154,000,000 shall be for the Manufacturing

1           Extension Partnership program under sections  
2           25 and 26 of the National Institute of Stand-  
3           ards and Technology Act (15 U.S.C. 278k and  
4           278I) and \$25,000,000 shall be for the Net-  
5           work for Manufacturing Innovation Program  
6           under section 34 of the National Institute of  
7           Standards and Technology Act (15 U.S.C.  
8           278s).

9           (f) FISCAL YEAR 2025.—

10           (1) IN GENERAL.—There are authorized to be  
11           appropriated to the Secretary of Commerce  
12           \$1,541,000,000 for the National Institute of Stand-  
13           ards and Technology for fiscal year 2025.

14           (2) SPECIFIC ALLOCATIONS.—Of the amount  
15           authorized by paragraph (1)—

16           (A) \$1,159,200,000 shall be for scientific  
17           and technical research and services laboratory  
18           activities, of which \$14,400,000 may be trans-  
19           ferred to the Working Capital Fund;

20           (B) \$200,000,000 shall be for the con-  
21           struction and maintenance of facilities, of which  
22           \$120,000,000 shall be for Safety, Capacity,  
23           Maintenance, and Major Repairs, including  
24           \$10,000,000 for IT infrastructure; and



1 (C) \$181,800,000 shall be for industrial  
2 technology services activities, of which  
3 \$156,800,000 shall be for the Manufacturing  
4 Extension Partnership program under sections  
5 25 and 26 of the National Institute of Stand-  
6 ards and Technology Act (15 U.S.C. 278k and  
7 278I) and \$25,000,000 shall be for the Net-  
8 work for Manufacturing Innovation Program  
9 under section 34 of the National Institute of  
10 Standards and Technology Act (15 U.S.C.  
11 278s).

12 (g) FISCAL YEAR 2026.—

13 (1) IN GENERAL.—There are authorized to be  
14 appropriated to the Secretary of Commerce  
15 \$1,616,250,000 for the National Institute of Stand-  
16 ards and Technology for fiscal year 2026.

17 (2) SPECIFIC ALLOCATIONS.—Of the amount  
18 authorized by paragraph (1)—

19 (A) \$1,213,650,000 shall be for scientific  
20 and technical research and services laboratory  
21 activities, of which \$15,300,000 may be trans-  
22 ferred to the Working Capital Fund;

23 (B) \$200,000,000 shall be for the con-  
24 struction and maintenance of facilities, of which  
25 \$120,000,000 shall be for Safety, Capacity,

1 Maintenance, and Major Repairs, including  
2 \$10,000,000 for IT infrastructure; and

3 (C) \$184,600,000 shall be for industrial  
4 technology services activities, of which  
5 \$159,600,000 shall be for the Manufacturing  
6 Extension Partnership program under sections  
7 25 and 26 of the National Institute of Stand-  
8 ards and Technology Act (15 U.S.C. 278k and  
9 278I) and \$25,000,000 shall be for the Net-  
10 work for Manufacturing Innovation Program  
11 under section 34 of the National Institute of  
12 Standards and Technology Act (15 U.S.C.  
13 278s).

14 (h) FISCAL YEAR 2027.—

15 (1) IN GENERAL.—There are authorized to be  
16 appropriated to the Secretary of Commerce  
17 \$1,691,500,000 for the National Institute of Stand-  
18 ards and Technology for fiscal year 2027.

19 (2) SPECIFIC ALLOCATIONS.—Of the amount  
20 authorized by paragraph (1)—

21 (A) \$1,304,100,000 shall be for scientific  
22 and technical research and services laboratory  
23 activities, of which \$16,200,000 may be trans-  
24 ferred to the Working Capital Fund;

1 (B) \$200,000,000 shall be for the con-  
2 struction and maintenance of facilities, of which  
3 \$120,000,000 shall be for Safety, Capacity,  
4 Maintenance, and Major Repairs, including  
5 \$10,000,000 for IT infrastructure; and

6 (C) \$187,400,000 shall be for industrial  
7 technology services activities, of which  
8 \$162,400,000 shall be for the Manufacturing  
9 Extension Partnership program under sections  
10 25 and 26 of the National Institute of Stand-  
11 ards and Technology Act (15 U.S.C. 278k and  
12 278I) and \$25,000,000 shall be for the Net-  
13 work for Manufacturing Innovation Program  
14 under section 34 of the National Institute of  
15 Standards and Technology Act (15 U.S.C.  
16 278s).

17 (i) FISCAL YEAR 2028.—

18 (1) IN GENERAL.—There are authorized to be  
19 appropriated to the Secretary of Commerce  
20 \$1,766,750,000 for the National Institute of Stand-  
21 ards and Technology for fiscal year 2028.

22 (2) SPECIFIC ALLOCATIONS.—Of the amount  
23 authorized by paragraph (1)—

24 (A) \$1,376,550,000 shall be for scientific  
25 and technical research and services laboratory

1 activities, of which \$17,100,000 may be trans-  
2 ferred to the Working Capital Fund;

3 (B) \$200,000,000 shall be for the con-  
4 struction and maintenance of facilities, of which  
5 \$120,000,000 shall be for Safety, Capacity,  
6 Maintenance, and Major Repairs, including  
7 \$10,000,000 for IT infrastructure; and

8 (C) \$190,200,000 shall be for industrial  
9 technology services activities, of which  
10 \$165,200,000 shall be for the Manufacturing  
11 Extension Partnership program under sections  
12 25 and 26 of the National Institute of Stand-  
13 ards and Technology Act (15 U.S.C. 278k and  
14 278I) and \$25,000,000 shall be for the Net-  
15 work for Manufacturing Innovation Program  
16 under section 34 of the National Institute of  
17 Standards and Technology Act (15 U.S.C.  
18 278s).

19 (j) FISCAL YEAR 2029.—

20 (1) IN GENERAL.—There are authorized to be  
21 appropriated to the Secretary of Commerce  
22 \$1,842,000,000 for the National Institute of Stand-  
23 ards and Technology for fiscal year 2029.

24 (2) SPECIFIC ALLOCATIONS.—Of the amount  
25 authorized by paragraph (1)—

1 (A) \$1,449,000,000 shall be for scientific  
2 and technical research and services laboratory  
3 activities, of which \$18,000,000 may be trans-  
4 ferred to the Working Capital Fund;

5 (B) \$200,000,000 shall be for the con-  
6 struction and maintenance of facilities, of which  
7 \$120,000,000 shall be for Safety, Capacity,  
8 Maintenance, and Major Repairs, including  
9 \$10,000,000 for IT infrastructure; and

10 (C) \$193,000,000 shall be for industrial  
11 technology services activities, of which  
12 \$168,000,000 shall be for the Manufacturing  
13 Extension Partnership program under sections  
14 25 and 26 of the National Institute of Stand-  
15 ards and Technology Act (15 U.S.C. 278k and  
16 278I) and \$25,000,000 shall be for the Net-  
17 work for Manufacturing Innovation Program  
18 under section 34 of the National Institute of  
19 Standards and Technology Act (15 U.S.C.  
20 278s).

21 **SEC. 303. NIST FACILITIES MODERNIZATION FUND.**

22 (a) ESTABLISHMENT.—There is established in the  
23 Treasury of the United States a fund to be known as the  
24 “NIST Facilities Modernization Fund” (hereafter in this  
25 section referred to as the “Fund”).

1 (b) USE OF FUNDS.—Amounts in the Fund shall be  
2 available to Secretary, acting through the Director, for  
3 Capital Projects on the National Institute of Standards  
4 and Technology’s campuses for the modernization and  
5 construction of research facilities needed to conduct lead-  
6 ing edge scientific and technical research.

7 (c) CONTENTS OF FUND.—The Funds shall consist  
8 of the following amounts:

9 (1) Such amounts as may be appropriated by  
10 law.

11 (2) Interest earned on the balance of the Fund.

12 (d) AUTHORIZATION OF FUNDS.—Of the funds au-  
13 thorized to be appropriated in section 302 of this Act for  
14 the construction and maintenance of facilities,  
15 \$80,000,000 for each of the fiscal years 2021 through  
16 2029 shall be provided for the Fund established in sub-  
17 section (a).

18 (e) CONTINUING AVAILABILITY OF FUNDS.—  
19 Amounts in the Fund are available without regard to fiscal  
20 year limitation.

21 (f) NOTIFICATION TO COMMITTEES.—Upon making  
22 any obligation or expenditure of any amount in the Fund,  
23 the Secretary, through the Director, shall notify the House  
24 of Representatives’ Science, Space, and Technology Com-  
25 mittee, the Senate Committee on Commerce, Science, and

1 Transportation, the Committee on Appropriations of the  
2 House of Representatives and the Committee on Appro-  
3 priations of the Senate of the amount and purpose of the  
4 obligation or expenditure.

5 (g) NIST FACILITIES MODERNIZATION AND MAIN-  
6 TENANCE PLAN.—

7 (1) IN GENERAL.—To carry out the program  
8 authorized in subsection (a), the Secretary, acting  
9 through the Director, shall develop and submit to  
10 Congress a 5-year modernization and maintenance  
11 plan for the National Institute of Standards and  
12 Technology's campuses.

13 (2) TIMING.—The modernization and mainte-  
14 nance plan required in paragraph (1) shall be sub-  
15 mitted to Congress within 30 days of enactment of  
16 this Act, and updated on an annual basis.

17 (3) PLAN ELEMENTS.—The Plan required in  
18 paragraph (1) shall include the following:

19 (A) A list of Capitol Construction Projects  
20 expected to be undertaken in the next 5 years,  
21 the core capabilities these facilities will provide,  
22 anticipated schedule of construction, and antici-  
23 pated funding requirements.

24 (B) A list of planned utility infrastructure  
25 projects expected to be undertaken in the next

1           5 years, anticipated schedule of construction,  
2           and anticipated funding requirements.

3           (C) A list of planned IT infrastructure  
4           projects expected to be undertaken in the next  
5           5 years, anticipated schedule of construction,  
6           and anticipated funding requirements.

7           (D) A list of the deferred maintenance, a  
8           list of deferred maintenance projects expected  
9           to be undertaken in the next 5 years, antici-  
10          pated schedule of construction, anticipated  
11          funding requirements, and an evaluation of  
12          progress made in reducing the deferred mainte-  
13          nance backlog.

14 **SEC. 304. QUANTUM INFORMATION SCIENCE.**

15          The Director shall—

16           (1) continue to support and expand basic quan-  
17          tum information science and technology research  
18          and development of measurement and standards in-  
19          frastructure necessary to advance commercial devel-  
20          opment of quantum applications;

21           (2) use its existing programs, in collaboration  
22          with other agencies, as appropriate, to train sci-  
23          entists in quantum information science and tech-  
24          nology to increase participation in the quantum  
25          fields; and



1           (3) establish or expand collaborative ventures or  
2           consortia with other public or private sector entities,  
3           including other Federal agencies engaged in quan-  
4           tum information science research and development,  
5           academia, National Laboratories, and industry for  
6           the purpose of advancing the field of quantum infor-  
7           mation science and engineering.

8   **SEC. 305. CYBERSECURITY RESEARCH.**

9           (a) RESEARCH.—The Secretary, acting through the  
10          Director, shall expand the fundamental and applied re-  
11          search carried out by the Institute to address key ques-  
12          tions relating the measurement of privacy, security, and  
13          vulnerability of software tools and communications net-  
14          works, including through—

15                 (1) the development of research and engineering  
16                 capabilities to provide practical solutions, including  
17                 measurement techniques and engineering toolkits, to  
18                 solve cybersecurity challenges such as human fac-  
19                 tors, identity management, network security, pri-  
20                 vacy, and software;

21                 (2) investment in tools to help private and pub-  
22                 lic sector organizations, including institutions of  
23                 higher education and research organizations, meas-  
24                 ure and manage cybersecurity risks and ensure

1 workforce preparedness for new cybersecurity chal-  
2 lenges; and

3 (3) investment in programs to prepare the  
4 United States with strong cybersecurity and  
5 encryption technologies to apply to emerging tech-  
6 nologies such as artificial intelligence, the internet of  
7 things, and quantum computing.

8 (b) ASSISTANCE TO FEDERAL AGENCIES.—The Di-  
9 rector shall enhance and expand the Institute’s guidance  
10 and assistance to Federal Agencies to help agencies effec-  
11 tively implement the Framework for Improving Critical  
12 Infrastructure Cybersecurity, including—

13 (1) technical guidance on the requirements in  
14 Executive Order;

15 (2) technical guidance and education and train-  
16 ing of agency staff responsible for cyber security,  
17 consultative services, and other assistance at indi-  
18 vidual Federal agencies; and

19 (3) technical guidance and education and train-  
20 ing of individual Federal agency Inspectors General  
21 and staff who are responsible for the annual inde-  
22 pendent evaluation they are required to perform of  
23 the information security program and practices of  
24 Federal Agencies under section 3555 of title 44,  
25 United States Code.

1 (c) REPORT.—The Director shall provide the House  
2 Science, Space and Technology Committee and Senate  
3 Committee on Commerce, Science and Transportation a  
4 report, not later than 12 months after the date of the en-  
5 actment of this Act, describing how the National Institute  
6 of Standards and Technology carried out the activities de-  
7 scribed in subsection (b) in as much detail as possible,  
8 including identification of agencies assisted and the types  
9 of consultative services, education, guidance, assistance,  
10 and training provided to individual agencies and Inspec-  
11 tors General.

12 **SEC. 306. ARTIFICIAL INTELLIGENCE AND DATA SCIENCE.**

13 The Secretary, acting through the Director, shall con-  
14 tinue to support the development of artificial intelligence  
15 and data science, including through—

16 (1) the expansion of the Institute’s capabilities,  
17 including scientific staff and research infrastructure;

18 (2) the implementation of rigorous scientific  
19 testing to support the development of trustworthy  
20 and safe artificial intelligence and data systems;

21 (3) the development of machine learning and  
22 other artificial intelligence applications to support  
23 measurement science research programs and take  
24 steps to modernize the Institute’s research infra-  
25 structure; and

1 (4) the development and publication of new cy-  
2 bersecurity tools, encryption methods, and best prac-  
3 tices for artificial intelligence and data science.

4 **SEC. 307. INTERNET OF THINGS.**

5 The Secretary, acting through the Director, shall con-  
6 tinue to conduct research with respect to and support the  
7 expanded connectivity, interoperability, and security of  
8 interconnected systems and other aspects of the internet  
9 of things, including through—

10 (1) the development of new tools and meth-  
11 odologies for cybersecurity of the internet of things;

12 (2) the development of technologies to address  
13 network congestion and device interference, such as  
14 the development of testing tools for next generation  
15 wireless communications, internet of things proto-  
16 cols, coexistence of wireless communications systems,  
17 and spectrum sharing;

18 (3) convening experts in the public and private  
19 sectors to develop recommendations for accelerating  
20 the adoption of sound interoperability standards,  
21 guidelines, and best practices for the internet of  
22 things; and

23 (4) the development and publication of new cy-  
24 bersecurity tools, encryption methods, and best prac-  
25 tices for internet of things security.

1 **SEC. 308. COMPOSITES RESEARCH.**

2 (a) RESEARCH.—The Secretary, acting through the  
3 Director, shall implement the recommendations contained  
4 in the December 2017 report entitled “Road Mapping  
5 Workshop Report on Overcoming Barriers to Adoption of  
6 Composites in Sustainable Infrastructure”, as appro-  
7 priate, to help facilitate the adoption of composite tech-  
8 nology in infrastructure in the United States. In imple-  
9 menting such recommendations, the Secretary, acting  
10 through the Director shall, with respect to the use of com-  
11 posite technology in infrastructure—

12 (1) not later than 6 months after the date of  
13 enactment of this Act, initiate the establishment of  
14 a design data clearinghouse to identify, gather, vali-  
15 date, and disseminate existing design criteria, tools,  
16 guidelines, and standards; and

17 (2) develop methods and resources required for  
18 testing an evaluation of safe and appropriate uses of  
19 composite materials for infrastructure, including—

20 (A) conditioning protocols, procedures and  
21 models;

22 (B) screening and acceptance tools; and

23 (C) minimum allowable design data sets  
24 that can be converted into design tools.

25 (b) STANDARDS COORDINATION.—The Secretary,  
26 acting through the Director, shall assure that the appro-

1 p r i a t e I n s t i t u t e s t a f f c o n s u l t r e g u l a r l y w i t h s t a n d a r d s d e -  
2 v e l o p e r s , m e m b e r s o f t h e c o m p o s i t e s i n d u s t r y , i n s t i t u t i o n s  
3 o f h i g h e r e d u c a t i o n , a n d o t h e r s t a k e h o l d e r s i n o r d e r t o f a -  
4 c i l i t a t e t h e a d o p t i o n o f s t a n d a r d s f o r u s e o f c o m p o s i t e m a -  
5 t e r i a l s i n i n f r a s t r u c t u r e t h a t a r e b a s e d o n t h e r e s e a r c h a n d  
6 t e s t i n g r e s u l t s a n d o t h e r i n f o r m a t i o n d e v e l o p e d b y t h e I n -  
7 s t i t u t e .

8 **SEC. 309. ENABLING THE FUTURE BIOECONOMY.**

9       The Secretary, acting through the Director, shall con-  
10 t i n u e t o s u p p o r t t h e r e s e a r c h a n d d e v e l o p m e n t o f e n g i -  
11 n e e r i n g b i o l o g y , i n c l u d i n g t h r o u g h —

12           (1) building up NIST's core capabilities in  
13 m e a s u r e m e n t s c i e n c e s u p p o r t i n g s y n t h e t i c b i o l o g y b y  
14 i n v e s t i n g i n f o u n d a t i o n a l m e a s u r e m e n t t o o l s ;

15           (2) delivering the necessary measurement meth-  
16 o d s , s t a n d a r d s a n d r e l a t e d s e r v i c e s r e q u i r e d t o i m -  
17 p a r t c o n f i d e n c e i n e m e r g i n g e n g i n e e r i n g b i o l o g y c a -  
18 p a b i l i t i e s ; a n d

19           (3) developing and evaluating computation tools  
20 i n o r d e r t o d e v e l o p a n d d e p l o y p r e d i c t i v e m o d e l s t h a t  
21 w i l l i n k b i o l o g i c a l b l u e p r i n t s w i t h b i o l o g i c a l o u t -  
22 c o m e s .

23 **SEC. 310. INTERNATIONAL STANDARDS DEVELOPMENT.**

24       (a) FINDINGS.—Congress finds the following:

1           (1) Widespread use of standards facilitates  
2           technology advancement by defining and establishing  
3           common foundations for product differentiation,  
4           technological innovation, and other value-added serv-  
5           ices.

6           (2) Standards also promote an expanded, more  
7           interoperable, and efficient marketplace.

8           (2) Global cooperation and coordination on  
9           standards for emerging technologies will be critical  
10          for having a consistent set of rules to enable market  
11          competition, preclude barriers to trade, and allow in-  
12          novation to flourish.

13          (3) United States position on standardization in  
14          emerging technologies will be critical to United  
15          States economic competitiveness.

16          (4) NIST is in a unique position to strengthen  
17          United States leadership in standards development,  
18          particularly for emerging technologies, to ensure  
19          continuing United States economic competitiveness  
20          and national security.

21          (b) SENSE OF CONGRESS.—It is the sense of Con-  
22          gress that—

23                (1) While United States experts have histori-  
24                cally been leaders in international standards develop-

1       ment activities, there is concern that the United  
2       States is losing its edge.

3           (2) Strengthening the unique United States  
4       public-private partnerships approach to standards  
5       development is critical to United States economic  
6       competitiveness.

7           (3) The United States Government should en-  
8       sure cooperation and coordination across Federal  
9       agencies and partner with private sector stake-  
10      holders to continue to shape international dialogues  
11      in regard to standards development for emerging  
12      technologies.

13      (c) RESEARCH ACTIVITIES AND ENGAGEMENT.—The  
14      Secretary, acting through the Director, shall—

15           (1) build capacity and training opportunities to  
16      help create a pipeline of talent and leadership in key  
17      standards development positions, including stand-  
18      ards education and training related activities tar-  
19      geted at integrating standards content into under-  
20      graduate and graduate curricula in science, engi-  
21      neering, business, public policy, and law;

22           (2) partner with private sector entities to sup-  
23      port strategically increased engagement and leader-  
24      ship in the development of international standards  
25      for digital economy technologies, including



1 partnering with industry to incentivize private sector  
2 partners to develop standards strategies and support  
3 engagement and participation in the relevant stand-  
4 ards activities; and

5 (3) develop approaches to prioritize standard-  
6 ization for emerging technologies, identify organiza-  
7 tion in which to develop these standards, identify  
8 leadership positions of interest to the United States,  
9 and identify key contributors for technical and lead-  
10 ership expertise in these areas.

11 **SEC. 311. REVIEW OF THE CENTER FOR NEUTRON RE-**  
12 **SEARCH.**

13 Not later than 1 year after the date of enactment  
14 of this Act, the Comptroller of the United States shall con-  
15 duct an evaluation of NIST's Center for Neutron Re-  
16 search, including the following:

17 (1) An assessment of what progress NIST has  
18 made in planning for the future of the Center for  
19 Neutron Research's nuclear reactor since the release  
20 of the 2018 National Academies report, and what  
21 steps NIST has taken to implement the Academies  
22 report;

23 (2) An analysis of the extent to which NIST's  
24 planning efforts align with leading practices;

1           (3) An assessment of the extent to which NIST  
2           has worked with the Department of Energy to iden-  
3           tify the scientific community's long-term needs for  
4           neutron research facilities and discuss the coordina-  
5           tion of future facilities, and how these agencies are  
6           factoring these needs into their decision-making  
7           process; and

8           (4) Recommendations for NIST and the De-  
9           partment of Energy on how best to continue to sup-  
10          port civilian nuclear research reactors.

11 **SEC. 312. HIRING AND MANAGEMENT.**

12          (a) **DIRECT HIRE AUTHORITY.**—The Secretary, act-  
13          ing through the Director, may—

14               (1) appoint, without regard to the provisions of  
15               subchapter I of chapter 33 of title 5, United States  
16               Code (other than sections 3303, 3328, and 3330e of  
17               such chapter), qualified candidates to scientific, en-  
18               gineering, and professional positions for carrying out  
19               research and development functions which require  
20               the services of specially qualified personnel relating  
21               to cybersecurity and quantum information science  
22               and technology and such other areas of national re-  
23               search priorities as the Secretary, acting through the  
24               Director, may determine; and

1           (2) fix the rate of basic pay of any individual  
2 appointed under paragraph (1), at a rate not in ex-  
3 cess of the basic rate of pay of the Vice President  
4 under section 104 of title 3, United States Code,  
5 without regard to title 5, United States Code.

6           (b) LIMITATION.—The Director may appoint not  
7 more than 10 individuals under subsection (a).

8           (c) SUNSET.—The authority under subsection (a)  
9 shall expire on the date that is 10 years after the date  
10 of enactment of this Act.

11          (d) OTHER TRANSACTION AUTHORITY.—Section  
12 2(b)(4) of the National Institute of Standards and Tech-  
13 nology Act (15 U.S.C. 272(b)(4)) is amended to read as  
14 follows:

15           “(4) to enter into and perform such contracts,  
16 including cooperative research and development ar-  
17 rangements and grants and cooperative agreements  
18 or other transactions, as may be necessary in the  
19 conduct of its work and on such terms as it may  
20 deem appropriate, in furtherance of the purposes of  
21 this Act;”.

22 **SEC. 313. NATIONAL INSTITUTE OF STANDARDS AND TECH-**  
23 **NOLOGY FOUNDATION.**

24          (a) IN GENERAL.—The Secretary of Commerce, act-  
25 ing through the Director, may establish or enter into an

1 agreement with a nonprofit organization to establish a Na-  
2 tional Institute of Standards and Technology Foundation.  
3 The Foundation shall not be an agency or instrumentality  
4 of the United States Government.

5 (b) PURPOSE.—The purpose of the Foundation shall  
6 be to support the National Institute of Standards and  
7 Technology in its mission.

8 (c) ACTIVITIES.—Activities of the Foundation may  
9 include the solicitation and acceptance of funds—

10 (1) to support international metrology and  
11 standards engagement activities;

12 (2) to conduct education and outreach activi-  
13 ties; and

14 (3) to offer direct support to NIST associates,  
15 including through activities such as the provision of  
16 fellowships, grants, and occupational safety and  
17 awareness training.

18 (d) TRANSFER OF FUNDS.—The Director may au-  
19 thorize, under the agreement under subsection (a), the  
20 transfer of funds from the National Institute of Standards  
21 and Technology to the nonprofit organization to offset any  
22 administrative costs of the Foundation.

23 (e) LIABILITY.—The United States shall not be liable  
24 for any debts, defaults, acts, or omissions of the Founda-

1 tion. The full faith and credit of the United States shall  
2 not extend to any obligations of the Foundation.

3 **SEC. 314. MEP OUTREACH.**

4 Section 25 of the National Institute of Standards and  
5 Technology Act (15 U.S.C. 278k) is amended—

6 (1) in subsection (c)—

7 (A) in paragraph (6), by striking “commu-  
8 nity colleges and area career and technical edu-  
9 cation schools” and inserting the following:  
10 “secondary schools (as defined in section 8101  
11 of the Elementary and Secondary Education  
12 Act of 1965 (20 U.S.C. 7801)), community col-  
13 leges, and area career and technical education  
14 schools, including those in underserved and  
15 rural communities,”; and

16 (B) in paragraph (7)—

17 (i) by striking “and local colleges”  
18 and inserting the following: “local high  
19 schools and local colleges, including those  
20 in underserved and rural communities,”;  
21 and

22 (ii) by inserting “or other applied  
23 learning opportunities” after “apprentice-  
24 ships”; and

1           (2) in subsection (d)(3), by striking “, commu-  
2           nity colleges, and area career and technical edu-  
3           cation schools,” and inserting the following: “and  
4           local high schools, community colleges, and area ca-  
5           reer and technical education schools, including those  
6           in underserved and rural communities.”.

7 **SEC. 315. DEFINITIONS.**

8           In this title:

9           (1) DIRECTOR.—The term “Director” means  
10          the Director of the National Institute of Standards  
11          and Technology.

12          (2) FRAMEWORK.—The term “Framework”  
13          means the Framework for Improving Critical Infra-  
14          structure Cybersecurity developed by the National  
15          Institute of Standards and Technology and referred  
16          to in Executive Order 13800 issued on May 11,  
17          2017 (82 Fed. Reg. 22391 et seq.).

18          (3) INSTITUTE.—The term “Institute” means  
19          the National Institute of Standards and Technology.

20          (4) INSTITUTION OF HIGHER EDUCATION.—The  
21          term “institution of higher education” has the  
22          meaning given such term in section 101 of the High-  
23          er Education Act of 1965 (20 U.S.C. 1001).

24          (5) NIST ASSOCIATE.—The term “NIST asso-  
25          ciate” means any guest researcher, research asso-

1 ciate, facility user, or volunteer who conducts re-  
2 search at a National Institute of Standards and  
3 Technology facility, but is not an employee of the  
4 National Institute of Standards and Technology or  
5 of another Federal department or agency.

6 (6) SECRETARY.—The term “Secretary” means  
7 the Secretary of Commerce.

8 **TITLE IV—NATIONAL OCEANIC**  
9 **AND ATMOSPHERIC ADMINIS-**  
10 **TRATION**

11 **SEC. 401. ESTABLISHMENT OF A TECHNOLOGY TRANSFER**  
12 **OFFICE.**

13 (a) TECHNOLOGY TRANSFER OFFICE.—The Admin-  
14 istrator shall establish a technology transfer office at the  
15 corporate agency level.

16 (b) TECHNOLOGY TRANSFER COORDINATOR.—The  
17 Administrator shall appoint a Technology Transfer Coor-  
18 dinator to be the principal advisor to the Administrator  
19 on all matters relating to technology transfer and commer-  
20 cialization and will serve as director of the technology  
21 transfer office.

22 (c) QUALIFICATIONS.—The Coordinator shall be an  
23 individual who, by reason of professional background and  
24 experience, is specially qualified to advise the Adminis-

1 trator on matters pertaining to technology transfer at the  
2 Agency.

3 (d) DUTIES OF THE COORDINATOR.—The Coordi-  
4 nator shall oversee—

5 (1) the expenditure of funds allocated for tech-  
6 nology transfer within the Agency;

7 (2) efforts to improve research to operations  
8 within the Office of Oceanic and Atmospheric Re-  
9 search and other Agency line offices;

10 (3) efforts to engage private sector entities, in-  
11 cluding venture capital companies;

12 (4) efforts to engage State and local govern-  
13 ments;

14 (5) coordinate efforts across the Agency; and

15 (6) facilitate knowledge transfer from Agency/  
16 Federal standards to commercial, State, local gov-  
17 ernments.

18 (e) TECHNOLOGY TRANSFER RESPONSIBILITY.—

19 Nothing in this section affects the technology transfer re-  
20 sponsibilities of Federal employees under the Stevenson-  
21 Wydler Technology Innovation Act of 1980 (15 U.S.C.  
22 3701 et seq.).

23 (f) PLANNING AND REPORTING.—

24 (1) IN GENERAL.—Not later than 180 days  
25 after the date of enactment of this Act, the Adminis-



1 trator shall submit to Congress a technology transfer  
2 execution plan.

3 (2) UPDATES.—Each year after the submission  
4 of the plan under paragraph (1), the Administrator  
5 shall submit to Congress an updated execution plan  
6 and reports that describe progress toward meeting  
7 goals set forth in the execution plan and the funds  
8 expended under subsection (e).

9 **SEC. 402. TECHNOLOGY TRANSFER AND TRANSITIONS AS-**  
10 **SESSMENT.**

11 Not later than 1 year after the date of enactment  
12 of this Act, and annually thereafter, the administrator  
13 shall transmit to the Committee on Science, Space, and  
14 Technology of the House of Representatives and the Com-  
15 mittee on Commerce, Space, and Transportation of the  
16 Senate a report which shall include—

17 (1) report on the Agency's research to oper-  
18 ations activities during the previous fiscal year; and

19 (2) recommended agency policy changes to in-  
20 crease research to operations activities in the coming  
21 fiscal year.

22 **SEC. 403. NATIONAL MESONET PROGRAM.**

23 (a) FINDINGS.—Congress finds that—

24 (1) since the initial establishment of a private-  
25 public partnership demonstration program, the Na-

1 tional Mesonet Program has leveraged data collected  
2 by existing weather station networks to—

3 (A) provide accurate, real-time observation  
4 for weather forecasters and emergency response  
5 personnel in metropolitan areas across the  
6 United States;

7 (B) address persistent impediments, identi-  
8 fied in a National Academy of Sciences Report  
9 released in 2009, to fulfill the need for broader  
10 and denser weather observation networks to im-  
11 prove severe weather lead-times;

12 (C) achieve major improvements for the  
13 National Oceanic and Atmospheric Administra-  
14 tion and the broader American Weather Enter-  
15 prise, despite some significant development  
16 issues and cost overruns, according to a Na-  
17 tional Academy of Sciences Report released in  
18 2011;

19 (D) increase the amount of non-Federal  
20 weather data available to government by orders  
21 of magnitude; and

22 (E) improve understanding of the impact,  
23 the size and duration of mesoscale weather  
24 events; and

1           (2) as a joint collaboration between the Na-  
2           tional Oceanic and Atmospheric Administration and  
3           the National Weather Service, the National Mesonet  
4           Program is a critical component of agency oper-  
5           ations and provides reliable, real-time prediction and  
6           observation capabilities for the physical environment  
7           that enhances response and prevention strategies to  
8           severe weather events.

9           (b) PROGRAM.—The National Weather Service shall  
10          carry out the National Mesonet Program under law to im-  
11          prove understanding of and forecast capabilities for at-  
12          mospheric events, placing priority on leveraging available  
13          commercial and other non-Federal weather data to en-  
14          hance coordination across the private, public, and aca-  
15          demic sectors of the American weather enterprise.

16          (c) PROGRAM ELEMENTS.—The program described  
17          in subsection (b) shall focus on the following activities:

18               (1) Improving the National Oceanic and Atmos-  
19               pheric Administration and the National Weather  
20               Service’s ability to provide the baseline forecasts and  
21               warnings that protect the nation’s citizens, busi-  
22               nesses, military, and government agencies and en-  
23               able them to operate and perform in safe, efficient,  
24               and orderly manners.

1           (2) Yielding significant amounts of boundary-  
2           layer data to result in dramatic improvements in nu-  
3           merical weather prediction performance.

4           (3) Providing the critical technical and adminis-  
5           trative infrastructure needed to facilitate rapid inte-  
6           gration of new and emerging surface, boundary  
7           layer, and space-based networks anticipated in com-  
8           ing years.

9           (4) Leveraging existing networks of environ-  
10          mental monitoring stations to dramatically increase  
11          the quantity and density of weather observations  
12          available to the National Weather Service at a highly  
13          cost-effective price.

14          (5) Supporting the National Weather Service in  
15          reaching its target of a 30-minute warning time for  
16          severe weather through better predictive algorithms  
17          driven by increasingly effective observations.

18          (d) AUTHORIZATION OF APPROPRIATIONS.—Of  
19          amounts otherwise made available to the National Weath-  
20          er Service, there are authorized to carry out this section  
21          \$25,000,000 for fiscal year 2021, \$26,000,000 for fiscal  
22          year 2022, \$27,000,000 for fiscal year 2023, \$28,000,000  
23          for fiscal year 2024 and \$29,000,000 for fiscal year 2025,  
24          and \$30,000,000 for fiscal year 2026.

1 **SEC. 404. SEVERE WEATHER EXTRAMURAL TESTBEDS.**

2 (a) FINDINGS.—Congress finds the following:

3 (1) The Weather Research and Forecasting In-  
4 novation Act of 2017 instructs NOAA to prioritize  
5 improving weather data, modeling, computing, fore-  
6 casting and warnings for the protection of life and  
7 property and for the enhancement of the national  
8 economy.

9 (2) The Weather Research and Forecasting In-  
10 novation Act of 2017 has also mandated that the  
11 NOAA Office of Oceanic and Atmospheric Research  
12 prioritize involving extramural partners to leverage  
13 existing public and private resources to expand and  
14 improve weather forecasting and modeling as quickly  
15 and efficiently as possible.

16 (3) There is a need for additional weather re-  
17 search and forecasting innovation given the increas-  
18 ing number of severe weather events and their in-  
19 creasing effect on public health, safety and national  
20 and regional economic well-being.

21 (b) PROGRAM.—Not later than 180 days after the en-  
22 actment of this Act, the Assistant Administrator for the  
23 Office of Oceanic and Atmospheric Research shall estab-  
24 lish a program to create one or more weather research  
25 testbeds, hosted by extramural university based partners,  
26 to develop improved understanding of and forecast capa-

1 bilities for atmospheric events and their impacts. Re-  
2 sources for such testbeds shall not be taken from the exist-  
3 ing NOAA cooperative institutes.

4 (c) PROGRAM ELEMENTS.—The program described  
5 in subsection (b) shall focus on the following activities:

6 (1) Improving the fundamental understanding  
7 of weather, including the boundary layer and other  
8 processes affecting high impact weather events.

9 (2) Improving the understanding of how the  
10 public receives, interprets, and responds to warnings  
11 and forecasts of high impact weather events that en-  
12 danger life and property.

13 (3) Research and development, and transfer of  
14 knowledge, technologies, and applications to the Na-  
15 tional Weather Service and other appropriate agen-  
16 cies and entities, including the United States weath-  
17 er industry and academic partners.

18 (d) EXTRAMURAL RESEARCH.—

19 (1) IN GENERAL.—In carrying out the program  
20 under this section, the Assistant Administrator for  
21 Oceanic and Atmospheric Research shall collaborate  
22 with and support the non-Federal weather research  
23 community, which includes institutions of higher  
24 education, private entities, and nongovernmental or-  
25 ganizations, by making funds available through com-

1       petitive grants, contracts, and cooperative agree-  
2       ments. Preference shall be given to applicants with  
3       significant expertise in severe weather research that  
4       are co-located with existing NOAA intramural  
5       weather related laboratories.

6               (2) **EXTRAMURAL ACADEMIC PARTNERS.**—Of  
7       the funds authorized in subsection (e), not less than  
8       80 percent shall be dedicated to research of extra-  
9       mural academic partners.

10          (e) **AUTHORIZATION OF APPROPRIATIONS.**—For each  
11       of fiscal years 2021 and 2022, there are authorized out  
12       of funds appropriated to the National Oceanic and Atmos-  
13       pheric Administration, \$10,000,000 to carry out the ac-  
14       tivities of this section.

15       **SEC. 405. NEXT GENERATION DIGITAL RADAR.**

16          (a) **FINDINGS.**—Congress finds that—

17               (1) the national weather radar network is  
18       aging, and procurement and replacement must begin  
19       by early in the decade commencing with the year  
20       2030;

21               (2) research by the National Oceanic and At-  
22       mospheric Administration on next generation radar  
23       systems has largely focused on the development of a  
24       phased array radar for severe weather forecasting;

1           (3) a phased array radar system can achieve  
2           precise measurements of precipitation rates and con-  
3           ditions through a rapid scan of the atmosphere to  
4           reveal critical weather thumbprints that point to the  
5           potential of severe weather;

6           (4) though initially established through the  
7           joint collaboration between the Federal Aviation Ad-  
8           ministration and the National Oceanic and Atmos-  
9           pheric Administration, the potential for use of the  
10          phased array radar for severe weather observations  
11          has emerged as the focus;

12          (5) lifetime operations and maintenance costs  
13          will be significant reduced due to the simple, digital  
14          process for updating the digital array radar system;  
15          and

16          (6) the National Oceanic and Atmospheric Ad-  
17          ministration must continue to conduct crucial tech-  
18          nical risk reduction research to be ready for the  
19          next-generation of radar networks.

20          (b) PROGRAM.—The Under Secretary of Commerce  
21          for Oceans and Atmosphere shall develop, in collaboration  
22          with the Assistant Administrators for Weather Services  
23          and Oceanic and Atmospheric Research, and utilizing  
24          NOAA’s existing academic partners for implementation,  
25          a technical risk reduction program, that will lead to the



1 baseline requirements to procure an all-digital ground  
2 based phased array radar system for initial deployment  
3 by no later than 2032. At a minimum, such a program  
4 must demonstrate the ability to significantly improve the  
5 accuracy of severe weather forecasts while lowering long  
6 term Federal operating costs.

7 (c) PROGRAM ELEMENTS.—The program described  
8 in subsection (b) shall focus on the following activities:

9 (1) Definition of key system requirements need-  
10 ed to cost effectively lead to significant improve  
11 weather forecasting accuracy and precision through  
12 a nationwide all-digital ground based phased array  
13 weather radar system.

14 (2) Identification of critical technologies and  
15 subsystems on the critical path to the development  
16 of an all-digital phased array system, and an invest-  
17 ment schedule to reduce risk in each designated  
18 area.

19 (3) Development of a full-scale digital phased  
20 array radar demonstrator that will meet require-  
21 ments set in paragraph (1).

22 (4) Development of a multi-year effort to  
23 strengthen ties between NOAA and its public univer-  
24 sity based academic partners so as to maintain an  
25 ongoing reservoir of science and technology talent to

1 help to guide and advise Federal program managers  
2 on the implementation and use of an all-digital  
3 phased array radar system.

4 (d) **AUTHORIZATION OF APPROPRIATIONS.**—Of the  
5 amounts otherwise made available to the National Oceanic  
6 and Atmospheric Administration’s Operations, Research,  
7 and Facilities Action, there are authorized to carry out  
8 this section \$20,000,000 for each of fiscal years 2021  
9 through 2025.

10 **SEC. 406. FELLOWSHIPS.**

11 (a) **IN GENERAL.**—To carry out the educational and  
12 training objectives of this Act, the Administrator shall  
13 support a program of weather fellowships for qualified in-  
14 dividuals at the graduate and postgraduate level. The fel-  
15 lowships shall be related to meteorology, atmospheric  
16 science, space weather, and climatology and awarded pur-  
17 suant to guidelines established by the Administrator.

18 (b) **WEATHER FELLOWSHIP.**—The Administrator  
19 may award weather fellowships to support the placement  
20 of individuals at the graduate level of education in fields  
21 related to meteorology, atmospheric science, space weath-  
22 er, and climatology within NOAA. A fellowship awarded  
23 under this subsection shall be for a period of not more  
24 than 1 year.

1 **SEC. 407. AUTHORIZATION OF APPROPRIATIONS.**

2 (a) FINDINGS.—Congress finds the following:

3 (1) The National Oceanic and Atmospheric Ad-  
4 ministration promotes United States science and in-  
5 novation by providing weather forecasts, severe  
6 storm warnings, and climate monitoring that sup-  
7 port and affect more than one-third of the national  
8 gross domestic product.

9 (2) The Office of Oceanic and Atmospheric Re-  
10 search provides science that enables better forecasts,  
11 earlier warnings for natural disasters, and a greater  
12 understanding of the Earth.

13 (3) The cutting-edge research conducted at  
14 OAR provides citizens, planners, and emergency  
15 managers reliable information that is critical to daily  
16 life.

17 (b) AUTHORIZATION OF APPROPRIATIONS.—Of  
18 amounts otherwise available to the National Oceanic and  
19 Atmospheric Administration, there are authorized to be  
20 appropriated for the Office of Oceanic and Atmospheric  
21 Research—

- 22 (1) \$590,000,000 for fiscal year 2020;  
23 (2) \$655,555,555 for fiscal year 2021;  
24 (3) \$721,111,110 for fiscal year 2022;  
25 (4) \$786,666,665 for fiscal year 2023;  
26 (5) \$852,222,220 for fiscal year 2024;

- 1 (6) \$917,777,775 for fiscal year 2025;  
2 (7) \$983,333,330 for fiscal year 2026;  
3 (8) \$1,048,888,885 for fiscal year 2027;  
4 (9) \$1,114,444,440 for fiscal year 2028; and  
5 (10) \$1,180,000,000 for fiscal year 2029.

6 **TITLE V—NATIONAL SCIENCE**  
7 **FOUNDATION**

8 **SEC. 501. AUTHORIZATION OF APPROPRIATIONS.**

9 (a) FISCAL YEAR 2020.—

10 (1) IN GENERAL.—There are authorized to be  
11 appropriated to the Foundation \$8,278,330,000 for  
12 fiscal year 2020.

13 (2) SPECIFIC ALLOCATION.—Of the amount au-  
14 thorized by paragraph (1)—

15 (A) \$6,737,200,000 shall be made avail-  
16 able for research and related activities;

17 (B) \$940,000,000 shall be made available  
18 for education and human resources including—

19 (i) \$75,000,000 for the Advanced  
20 Technical Education Program;

21 (ii) \$313,500,000 for the Graduate  
22 Research Fellowship Program;

23 (iii) \$67,000,000 for the Robert  
24 Noyce Teacher Scholarship Program; and

1 (iv) \$68,750,000 for the CyberCorps  
2 Scholarship for Service Program;

3 (C) \$243,230,000 shall be made available  
4 for major research equipment and facilities con-  
5 struction, of which \$65,000,000 shall be for  
6 mid-scale projects;

7 (D) \$336,900,000 shall be made available  
8 for agency operations and award management;

9 (E) \$4,500,000 shall be made available for  
10 the Office of the National Science Board; and

11 (F) \$16,500,000 shall be made available  
12 for the Office of the Inspector General.

13 (b) FISCAL YEAR 2021.—

14 (1) IN GENERAL.—There are authorized to be  
15 appropriated to the Foundation \$9,422,160,000 for  
16 fiscal year 2021.

17 (2) SPECIFIC ALLOCATION.—Of the amount au-  
18 thorized by paragraph (1)—

19 (A) \$7,824,000,000 shall be made avail-  
20 able for research and related activities;

21 (B) \$980,000,000 shall be made available  
22 for education and human resources including—

23 (i) \$79,200,000 for the Advanced  
24 Technical Education Program;

1 (ii) \$342,000,000 for the Graduate  
2 Research Fellowship Program;

3 (iii) \$97,500,000 for the Robert  
4 Noyce Teacher Scholarship Program; and

5 (iv) \$82,500,000 for the CyberCorps  
6 Scholarship for Service Program;

7 (C) \$255,000,000 shall be made available  
8 for major research equipment and facilities con-  
9 struction, of which \$90,000,000 shall be for  
10 mid-scale projects;

11 (D) \$343,000,000 shall be made available  
12 for agency operations and award management;

13 (E) \$4,500,000 shall be made available for  
14 the Office of the National Science Board; and

15 (F) \$15,660,000 shall be made available  
16 for the Office of the Inspector General.

17 (c) FISCAL YEAR 2022.—

18 (1) IN GENERAL.—There are authorized to be  
19 appropriated to the Foundation \$10,106,500,000 for  
20 fiscal year 2022.

21 (2) SPECIFIC ALLOCATION.—Of the amount au-  
22 thorized by paragraph (1)—

23 (A) \$8,476,000,000 shall be made avail-  
24 able for research and related activities;

1 (B) \$1,005,000,000 shall be made avail-  
2 able for education and human resources includ-  
3 ing—

4 (i) \$85,800,000 for the Advanced  
5 Technical Education Program;

6 (ii) \$370,500,000 for the Graduate  
7 Research Fellowship Program;

8 (iii) \$113,750,000 for the Robert  
9 Noyce Teacher Scholarship Program; and

10 (iv) \$96,250,000 for the CyberCorps  
11 Scholarship for Service Program—

12 (C) \$255,000,000 shall be made available  
13 for major research equipment and facilities con-  
14 struction, of which \$90,000,000 shall be for  
15 mid-scale projects;

16 (D) \$350,000,000 shall be made available  
17 for agency operations and award management;

18 (E) \$4,500,000 shall be made available for  
19 the Office of the National Science Board; and

20 (F) \$16,000,000 shall be made available  
21 for the Office of the Inspector General.

22 (d) FISCAL YEAR 2023.—

23 (1) IN GENERAL.—There are authorized to be  
24 appropriated to the Foundation \$10,790,800,000 for  
25 fiscal year 2023.

1           (2) SPECIFIC ALLOCATION.—Of the amount au-  
2           thorized by paragraph (1)—

3           (A) \$9,128,000,000 shall be made avail-  
4           able for research and related activities;

5           (B) \$1,029,000,000 shall be made avail-  
6           able for education and human resources includ-  
7           ing—

8           (i) \$92,400,000 for the Advanced  
9           Technical Education Program

10          (ii) \$399,000,000 for the Graduate  
11          Research Fellowship Program;

12          (iii) \$130,000,000 for the Robert  
13          Noyce Teacher Scholarship Program; and

14          (iv) \$110,000,000 for the CyberCorps  
15          Scholarship for Service Program;

16          (C) \$255,000,000 shall be made available  
17          for major research equipment and facilities con-  
18          struction, of which \$90,000,000 shall be for  
19          mid-scale projects;

20          (D) \$358,000,000 shall be made available  
21          for agency operations and award management;

22          (E) \$4,500,000 shall be made available for  
23          the Office of the National Science Board; and

24          (F) \$16,300,000 shall be made available  
25          for the Office of the Inspector General.



1 (e) FISCAL YEAR 2024.—

2 (1) IN GENERAL.—There are authorized to be  
3 appropriated to the Foundation \$11,501,100,000 for  
4 fiscal year 2024.

5 (2) SPECIFIC ALLOCATION.—Of the amount au-  
6 thorized by paragraph (1)—

7 (A) \$9,780,000,000 shall be made avail-  
8 able for research and related activities;

9 (B) \$1,050,000,000 shall be made avail-  
10 able for education and human resources includ-  
11 ing—

12 (i) \$99,000,000 for the Advanced  
13 Technical Education Program

14 (ii) \$427,500,000 for the Graduate  
15 Research Fellowship Program;

16 (iii) \$132,600,000 for the Robert  
17 Noyce Teacher Scholarship Program; and

18 (iv) \$112,200,000 for the CyberCorps  
19 Scholarship for Service Program;

20 (C) \$285,000,000 shall be made available  
21 for major research equipment and facilities con-  
22 struction, of which \$120,000,000 shall be for  
23 mid-scale projects;

24 (D) \$365,000,000 shall be made available  
25 for agency operations and award management;

1 (E) \$4,500,000 shall be made available for  
2 the Office of the National Science Board; and

3 (F) \$16,600,000 shall be made available  
4 for the Office of the Inspector General.

5 (f) FISCAL YEAR 2025.—

6 (1) IN GENERAL.—There are authorized to be  
7 appropriated to the Foundation \$12,182,500,000 for  
8 fiscal year 2025.

9 (2) SPECIFIC ALLOCATION.—Of the amount au-  
10 thorized by paragraph (1)—

11 (A) \$10,432,000,000 shall be made avail-  
12 able for research and related activities;

13 (B) \$1,072,000,000 shall be made avail-  
14 able for education and human resources includ-  
15 ing—

16 (i) \$105,600,000 for the Advanced  
17 Technical Education Program;

18 (ii) \$456,000,000 for the Graduate  
19 Research Fellowship Program;

20 (iii) \$135,300,000 for the Robert  
21 Noyce Teacher Scholarship Program; and

22 (iv) \$114,400,000 for the CyberCorps  
23 Scholarship for Service Program;

24 (C) \$285,000,000 shall be made available  
25 for major research equipment and facilities con-

1           struction, of which \$205,000,000 shall be for  
2           mid-scale projects;

3           (D) \$372,000,000 shall be made available  
4           for agency operations and award management;

5           (E) \$4,500,000 shall be made available for  
6           the Office of the National Science Board; and

7           (F) \$17,000,000 shall be made available  
8           for the Office of the Inspector General.

9           (g) FISCAL YEAR 2026.—

10           (1) IN GENERAL.—There are authorized to be  
11           appropriated to the Foundation \$12,863,800,000 for  
12           fiscal year 2026.

13           (2) SPECIFIC ALLOCATION.—Of the amount au-  
14           thorized by paragraph (1)—

15           (A) \$11,084,000,000 shall be made avail-  
16           able for research and related activities;

17           (B) \$1,093,000,000 shall be made avail-  
18           able for education and human resources includ-  
19           ing—

20           (i) \$112,200,000 for the Advanced  
21           Technical Education Program

22           (ii) \$484,500,000 for the Graduate  
23           Research Fellowship Program;

24           (iii) \$138,000,000 for the Robert  
25           Noyce Teacher Scholarship Program; and

1 (iv) \$116,700,000 for the CyberCorps  
2 Scholarship for Service Program;

3 (C) \$285,000,000 shall be made available  
4 for major research equipment and facilities con-  
5 struction, of which \$225,000,000 shall be for  
6 mid-scale projects;

7 (D) \$380,000,000 shall be made available  
8 for agency operations and award management;

9 (E) \$4,500,000 shall be made available for  
10 the Office of the National Science Board; and

11 (F) \$17,300,000 shall be made available  
12 for the Office of the Inspector General.

13 (h) FISCAL YEAR 2027.—

14 (1) IN GENERAL.—There are authorized to be  
15 appropriated to the Foundation \$13,555,100,000 for  
16 fiscal year 2027.

17 (2) SPECIFIC ALLOCATION.—Of the amount au-  
18 thorized by paragraph (1)—

19 (A) \$11,736,000,000 shall be made avail-  
20 able for research and related activities;

21 (B) \$1,115,000,000 shall be made avail-  
22 able for education and human resources includ-  
23 ing—

24 (i) \$118,800,000 for the Advanced  
25 Technical Education Program;

1 (ii) \$513,000,000 for the Graduate  
2 Research Fellowship Program;

3 (iii) \$140,700,000 for the Robert  
4 Noyce Teacher Scholarship Program; and

5 (iv) \$119,000,000 for the CyberCorps  
6 Scholarship for Service Program;

7 (C) \$295,000,000 shall be made available  
8 for major research equipment and facilities con-  
9 struction, of which \$225,000,000 shall be for  
10 mid-scale projects;

11 (D) \$387,000,000 shall be made available  
12 for agency operations and award management;

13 (E) \$4,500,000 shall be made available for  
14 the Office of the National Science Board; and

15 (F) \$17,600,000 shall be made available  
16 for the Office of the Inspector General.

17 (i) FISCAL YEAR 2028.—

18 (1) IN GENERAL.—There are authorized to be  
19 appropriated to the Foundation \$14,237,500,000 for  
20 fiscal year 2028.

21 (2) SPECIFIC ALLOCATION.—Of the amount au-  
22 thorized by paragraph (1)—

23 (A) \$12,388,000,000 shall be made avail-  
24 able for research and related activities;

1 (B) \$1,137,000,000 shall be made avail-  
2 able for education and human resources includ-  
3 ing—

4 (i) \$125,400,000 for the Advanced  
5 Technical Education Program;

6 (ii) \$541,500,000 for the Graduate  
7 Research Fellowship Program;

8 (iii) \$143,500,000 for the Robert  
9 Noyce Teacher Scholarship Program; and

10 (iv) \$121,400,000 for the CyberCorps  
11 Scholarship for Service Program;

12 (C) \$295,000,000 shall be made available  
13 for major research equipment and facilities con-  
14 struction, of which \$225,000,000 shall be for  
15 mid-scale projects;

16 (D) \$395,000,000 shall be made available  
17 for agency operations and award management;

18 (E) \$4,500,000 shall be made available for  
19 the Office of the National Science Board; and

20 (F) \$18,000,000 shall be made available  
21 for the Office of the Inspector General.

22 (j) FISCAL YEAR 2029.—

23 (1) IN GENERAL.—There are authorized to be  
24 appropriated to the Foundation \$14,918,800,000 for  
25 fiscal year 2029.

1           (2) SPECIFIC ALLOCATION.—Of the amount au-  
2           thorized by paragraph (1)—

3           (A) \$13,040,000,000 shall be made avail-  
4           able for research and related activities;

5           (B) \$1,158,000,000 shall be made avail-  
6           able for education and human resources includ-  
7           ing—

8           (i) \$132,000,000 for the Advanced  
9           Technical Education Program;

10          (ii) \$570,000,000 for the Graduate  
11          Research Fellowship Program;

12          (iii) \$146,400,000 for the Robert  
13          Noyce Teacher Scholarship Program; and

14          (iv) \$123,800,000 for the CyberCorps  
15          Scholarship for Service Program

16          (C) \$295,000,000 shall be made available  
17          for major research equipment and facilities con-  
18          struction, of which \$225,000,000 shall be for  
19          mid-scale projects;

20          (D) \$403,000,000 shall be made available  
21          for agency operations and award management;

22          (E) \$4,500,000 shall be made available for  
23          the Office of the National Science Board; and

24          (F) \$18,300,000 shall be made available  
25          for the Office of the Inspector General.

1 **SEC. 502. NSF ORGANIZATIONAL REVIEW.**

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

4 (1) since its establishment in 1950, the Na-  
5 tional Science Foundation has been the gold stand-  
6 ard for the world in funding basic science and engi-  
7 neering research;

8 (2) the National Science Foundation should  
9 continue to fund competitive, merit-reviewed basic  
10 research across all fields of science and engineering  
11 to achieve its statutory mission;

12 (3) scientific research has become increasingly  
13 interdisciplinary, crossing the boundaries of indi-  
14 vidual fields and the divisions and directorates of the  
15 National Science Foundation that support research  
16 grants; and

17 (4) as the nature of scientific research changes,  
18 it is important for the institutions that support  
19 science like the National Science Foundation, to pe-  
20 riodically evaluate whether the organization needs to  
21 evolve to continue to fund the best science, the best  
22 scientists, and the most groundbreaking research.

23 (b) STUDY.—Not later than 60 days after the date  
24 of enactment of this Act, the Director shall contract with  
25 the National Academy of Public Administration (referred  
26 to in this section as the “National Academy”) to conduct



1 a study on the organizational and management structure  
2 of the Foundation, to—

3 (1) evaluate and make recommendations for the  
4 structure of the Foundation's directorates, divisions,  
5 and offices of the Foundation to efficiently and ef-  
6 fectively fund and oversee research grants and edu-  
7 cation and training programs;

8 (2) evaluate and make recommendations for  
9 any structural changes needed to improve the sup-  
10 port for cross-disciplinary and trans-disciplinary re-  
11 search;

12 (3) evaluate and make recommendations for the  
13 long-term planning and development of research in-  
14 frastructure projects; and

15 (4) make recommendations for the management  
16 of the Foundation's business practices, including  
17 personnel and financial management.

18 (c) REPORT TO CONGRESS.—Upon completion of the  
19 study under subsection (b), the Director shall transmit the  
20 study to Congress along with a summary of the Director's  
21 plans, if any, to implement the recommendations of the  
22 National Academy.

23 **SEC. 503. ETHICS AND SECURITY PLANS.**

24 (a) DEVELOPMENT OF ETHICS AND SECURITY POLI-  
25 CIES.—Not later than 6 months after the date of enact-

1 ment of this Act, the Director shall develop and implement  
2 a policy requiring that all proposals for research funding  
3 from the Foundation include, if applicable, a plan for  
4 managing the risk of any potential ethical or security im-  
5 plications resulting from such research.

6 (b) REQUIREMENTS.—The policy shall—

7 (1) include clear guidance of what constitutes  
8 ethical and security risks;

9 (2) include field specific guidance as appro-  
10 priate, which may include biology, artificial intel-  
11 ligence, or cybersecurity;

12 (3) include mechanisms to ensure appropriate  
13 evaluation of the submitted ethical and security  
14 plans required under this section;

15 (4) include mechanisms to ensure that research-  
16 ers comply with approved ethical and security plans;  
17 and

18 (5) to the extent practical be harmonized with  
19 existing ethical and security policies or requirements,  
20 including the Common Rule (Federal Policy for the  
21 Protection of Human Subjects, 45 C.F.R. 690).

22 (c) LIMITATION.—The policy developed under sub-  
23 section (a) shall not factor into award decisions unless  
24 deemed necessary by the merit review panel for each pro-  
25 gram.

1 **SEC. 504. MAJOR RESEARCH INSTRUMENTATION UPDATE.**

2 Section 7036(a) of the America COMPETES Act of  
3 2007 (42 U.S.C. 1862o-14) is amended by striking “The  
4 maximum award under the program shall be \$4,00,000  
5 except if the total amount appropriated for the program  
6 for a fiscal year exceeds \$125,000,000, in which case the  
7 maximum amount of an award shall be \$6,000,000” and  
8 inserting “The maximum amount of an award under the  
9 program shall be \$6,000,000”.

10 **SEC. 505. NSF MID-SCALE PROJECT INVESTMENTS.**

11 (a) FINDINGS.—Congress finds the following:

12 (1) The Foundation funds major research facili-  
13 ties, infrastructure, and instrumentation that pro-  
14 vide unique capabilities at the frontiers of science  
15 and engineering.

16 (2) Modern and effective research facilities, in-  
17 frastructure, and instrumentation are critical to  
18 maintaining United States leadership in science and  
19 engineering.

20 (3) The costs of some proposed research instru-  
21 mentation, equipment, and upgrades to major re-  
22 search facilities fall between programs currently  
23 funded by the Foundation, creating a gap between  
24 the established parameters of the Major Research  
25 Instrumentation and Major Research Equipment  
26 and Facilities Construction programs, including

1 projects that have been identified as cost-effective  
2 additions of high priority to the advancement of sci-  
3 entific understanding.

4 (4) The National Science Board in a 2018 re-  
5 port to Congress, “Bridging the Gap: Building a  
6 Sustained Approach to Mid-scale Research Infra-  
7 structure and Cyberinfrastructure at NSF” rec-  
8 ommended funding mid-scale projects in the  
9 \$20,000,000 to \$70,000,000 range through the  
10 major research equipment and facilities program.

11 (b) MID-SCALE PROJECTS.—

12 (1) IN GENERAL.—The Foundation may fund  
13 mid-scale projects through the major research equip-  
14 ment and facilities construction program.

15 (2) PROJECT OVERSIGHT UPDATE.—Section  
16 110 of the American Innovation and Competitive-  
17 ness Act (42 U.S.C. 1862s-2) is amended by strik-  
18 ing (g)(2) and inserting the following:

19 “(2) MAJOR MULTI-USER RESEARCH FACILITY  
20 PROJECT.—The term ‘major multi-user research fa-  
21 cility project’ means a science and engineering con-  
22 struction or acquisition project that exceeds  
23 \$100,000,000 in total project costs to the Founda-  
24 tion.”.

1 (c) DEFINITION OF MID-SCALE PROJECTS.—In this  
2 section, the term “mid-scale projects” means research in-  
3 strumentation, equipment, and upgrades to major re-  
4 search facilities or other research infrastructure invest-  
5 ments that exceed the maximum award funded by the  
6 major research instrumentation program and are below  
7 \$100,000,000 total project cost.

8 **SEC. 506. REPRODUCIBILITY IN SCIENCE.**

9 (a) IN GENERAL.—The Director shall award grants,  
10 on a competitive basis, to institutions of higher education  
11 or nonprofit organizations (or a consortia thereof) to—

12 (1) support research and development of open  
13 source, usable tools and infrastructure that support  
14 reproducibility for a broad range of studies across  
15 different disciplines;

16 (2) support research on computational repro-  
17 ducibility, including the limits of reproducibility and  
18 the consistency of computational results in the devel-  
19 opment of new computation hardware, tools, and  
20 methods;

21 (3) support the education and training of stu-  
22 dents, faculty, and researchers on computational  
23 methods and tools to improve the quality of data  
24 and code to produce reproducible research; and

1           (4) support the education and training of stu-  
2           dents, faculty, and researchers on the knowledge,  
3           skills, and tools needed to conduct research that ad-  
4           heres to the highest scientific standard and to be  
5           able to clearly communicate methods and results ac-  
6           curately and appropriately to reflect the uncertainty  
7           involved in the research.

8           (b) DATA REPOSITORIES.—Not later than 12 months  
9           after the date of enactment of this Act, the Director of  
10          the National Science Foundation shall coordinate with the  
11          heads of other Federal science agencies to develop a set  
12          of criteria for trusted open repositories to be used by the  
13          scientific community in order to facilitate the transparent  
14          sharing and availability of data and code for federally  
15          funded research studies.

16          (c) DEFINITION OF REPRODUCIBILITY.—For the  
17          purposes of this section, the term “reproducibility” means  
18          obtaining consistent results using the same input data,  
19          computational steps, methods and code, and conditions of  
20          analysis.

21       **SEC. 507. PUBLIC-PRIVATE PARTNERSHIPS.**

22          (a) IN GENERAL.—The Director shall pursue part-  
23          nerships with private industry, private foundations, and  
24          or other appropriate private entities to—

1           (1) enhance the impact of the Foundation's in-  
2           vestments and contributions to American economic  
3           competitiveness and security; and

4           (2) make available infrastructure, expertise, and  
5           financial resources to the United States scientific  
6           and engineering research and education enterprise.

7           (b) MERIT-REVIEW.—Nothing in this section shall be  
8           construed as altering any intellectual or broader impacts  
9           criteria at the Foundation for evaluating grant applica-  
10          tions.

11 **SEC. 508. EPSCOR.**

12          (a) SENSE OF CONGRESS.—

13           (1) IN GENERAL.—It is the sense of Congress  
14          that—

15           (A) since maintaining the Nation's sci-  
16           entific and economic leadership requires the  
17           participation of talented individuals nationwide,  
18           EPSCoR investments into State research and  
19           education capacities are in the Federal interest  
20           and should be sustained; and

21           (B) EPSCoR should maintain its experi-  
22           mental component by supporting innovative  
23           methods for improving research capacity and  
24           competitiveness.

1           (2) DEFINITION OF EPSCOR.—In this sub-  
2           section, the term “EPSCoR” has the meaning given  
3           the term in section 502 of the America COMPETES  
4           Reauthorization Act of 2010 (42 U.S.C. 1862p  
5           note).

6           (b) UPDATE OF EPSCOR.—Section 517(f)(2) of the  
7           America COMPETES Reauthorization Act of 2010 (42  
8           U.S.C. 1862p–9(f)(2)) is amended—

9           (1) in subparagraph (A), by striking “and” at  
10          the end; and

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

12                   “(C) to increase the capacity of rural com-  
13                   munities to provide quality STEM education  
14                   and STEM workforce development program-  
15                   ming to students, and teachers; and”.

16 **SEC. 509. COMPUTING ENCLAVE PILOT PROGRAM.**

17          (a) IN GENERAL.—The Director in consultation with  
18          the Director of the National Institute of Standards and  
19          Technology and the Secretary of Energy, shall award  
20          grants to establish a pilot program to ensure the security  
21          of federally supported research data and to assist regional  
22          institutions of higher education and their researchers in  
23          compliance with regulations regarding the safeguarding of  
24          sensitive information and other relevant regulations and  
25          Federal guidelines.



1 (b) STRUCTURE.—In carrying out the pilot program  
2 established pursuant to subsection (a), the Director shall  
3 select three institutions of higher education from among  
4 institutions classified under the Indiana University Center  
5 for Postsecondary Research Carnegie Classification as a  
6 doctorate-granting university with a very high level of re-  
7 search activity, and with a history of working with secure  
8 information for the development, installation, mainte-  
9 nance, or sustainment of secure computing enclaves.

10 (c) REGIONALIZATION.—

11 (1) In selecting universities pursuant to sub-  
12 section (b), the Director shall give preference to in-  
13 stitutions of higher education with the capability of  
14 serving other regional universities.

15 (2) The enclaves should be geographically dis-  
16 persed to better meet the needs of regional interests.

17 (d) PROGRAM ELEMENTS.—The Director shall work  
18 with Institutions of Higher Education selected pursuant  
19 to subsection (b) to—

20 (1) develop an approved design blueprint for  
21 compliance with Federal data protection protocols;

22 (2) develop a comprehensive and confidential  
23 list, or a bill of materials, of each binary component  
24 of the software, firmware, or product that is re-

1       required to deploy additional secure computing en-  
2       claves;

3           (3) develop templates for all policies and proce-  
4       dures required to operate the secure computing en-  
5       clave in a research setting;

6           (4) develop a system security plan template;  
7       and

8           (5) develop a process for managing a plan of  
9       action and milestones for the secure computing en-  
10      clave.

11      (e) DURATION.—The pilot program established pur-  
12     suant to subsection (a) shall operate for not less than 3  
13     years.

14      (f) REPORT.—

15           (1) IN GENERAL.—The Director shall report to  
16     Congress not later than 6 months after the comple-  
17     tion of the pilot program under subsection (a).

18           (2) CONTENTS.—The report required under  
19     paragraph (1) shall include—

20           (A) an assessment of the pilot program  
21     under subsection (a), including an assessment  
22     of the security benefits provided by such secure  
23     computing enclaves;

1 (B) recommendations related to the valued  
2 of expanding the network of secure computing  
3 enclaves; and

4 (C) recommendations on the efficacy of the  
5 use of secure computing enclaves by other Fed-  
6 eral agencies in a broader effort to expand se-  
7 curity of Federal research.

8 **SEC. 510. DEFINITIONS.**

9 In this title, unless expressly provided otherwise:

10 (1) DIRECTOR.—The term “Director” means  
11 the Director of the National Science Foundation.

12 (2) FEDERAL SCIENCE AGENCY.—The term  
13 “Federal science agency” has the meaning given the  
14 term in section 103 of the America COMPETES  
15 Reauthorization Act of 2010 (42 U.S.C. 6623).

16 (3) FOUNDATION.—The term “Foundation”  
17 means the National Science Foundation.

18 (4) INSTITUTION OF HIGHER EDUCATION.—The  
19 term “institution of higher education” has the  
20 meaning given the term in section 101(a) of the  
21 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

22 **TITLE VI—STEM WORKFORCE**  
23 **FOR THE 21ST CENTURY**

24 **SEC. 601. FINDINGS; SENSE OF CONGRESS.**

25 (a) FINDINGS.—Congress finds the following:

1           (1) Many reports over the past decade have  
2 found that it is critical to our Nation's economic  
3 leadership and global competitiveness that the  
4 United States educates and trains more scientists  
5 and engineers.

6           (2) According to the National Science Board's  
7 Science and Engineering Indicators, the science and  
8 engineering workforce has grown faster over time  
9 than the workforce overall and now represents 5 per-  
10 cent of all United States jobs, with a median salary  
11 more than double that of non-science and engineer-  
12 ing occupations.

13          (3) According to Bureau of Labor Statistics  
14 projections, the faster growth in STEM employment  
15 relative to overall employment is expected to con-  
16 tinue, and the United States will need one million  
17 additional STEM professionals than it is on track to  
18 produce in the coming decade.

19          (4) A recent report by ACT, the scholastic test-  
20 ing service, found that only 20 percent of United  
21 States students in the 2016 ACT-tested high school  
22 graduating class were ready for first-year STEM  
23 college courses.

24          (5) Out of the 70 countries that participate in  
25 the Organisation for Economic Co-operation and De-

1       velopment’s Programme for International Student  
2       Assessment, the United States ranks 25th in science  
3       and 40th in mathematics.

4           (6) The Federal Government spends over \$3  
5       billion annually on STEM education related re-  
6       search, programs and activities, but encouraging  
7       STEM education activities beyond the scope of the  
8       Federal Government is crucial to the future tech-  
9       nical and economic competitiveness of the United  
10      States.

11      (b) SENSE OF CONGRESS.—It is the sense of Con-  
12     gress that—

13           (1) the Nation’s future economic and national  
14      security relies on building a STEM-capable work-  
15      force in order to remain competitive in the global  
16      economy, foster greater innovation, and provide a  
17      foundation for shared prosperity;

18           (2) the Federal Government plays a key role in  
19      developing and sustaining a STEM-capable work-  
20      force by working with stakeholders at all levels, in-  
21      cluding researchers, practitioners, industry, and  
22      State and local governments to support and promote  
23      evidence-based approaches;

24           (3) applying a more holistic view of the STEM  
25      workforce that moves beyond academic degrees and

1 occupations will highlight the contributions and op-  
2 portunities for workers at all education levels;

3 (4) increasing the diversity and inclusion in the  
4 STEM workforce is needed to help address the  
5 STEM skills shortage;

6 (5) supporting an interdisciplinary approach to  
7 STEM learning, where academic concepts are cou-  
8 pled with real-world applications and students use  
9 STEM in contexts that make connections between  
10 school, community, work, and the wider world will  
11 improve outcomes for students in elementary, sec-  
12 ondary and post-secondary education and for skilled  
13 technical workers in different career stages;

14 (6) leveraging private and nonprofit invest-  
15 ments in STEM education will be essential to  
16 strengthening the Federal STEM portfolio; and

17 (7) coordinating STEM programs and activities  
18 across the Federal Government in order to limit du-  
19 plication and engage stakeholders in STEM pro-  
20 grams and related activities for which objective out-  
21 comes can be measured will bolster results of Fed-  
22 eral STEM education programs, improve the return  
23 on taxpayers' investments in STEM education pro-  
24 grams, and in turn strengthen the United States  
25 economy.

1 **SEC. 602. ADVANCED TECHNICAL EDUCATION AND**  
2 **SKILLED TECHNICAL WORKFORCE.**

3 (a) FINDINGS.—Congress finds the following:

4 (1) A National Academies of Science, Engineer-  
5 ing, and Medicine report predicts a shortfall of near-  
6 ly 3,400,000 skilled technical workers by 2022.

7 (2) The National Science Foundation’s Ad-  
8 vanced Technical Education program is critical to  
9 helping improve the training of the skilled technical  
10 workforce, with an emphasis on two-year Institutions  
11 of Higher Education (IHEs) and educating techni-  
12 cians for the high-technology fields that drive our  
13 nation’s economy.

14 (3) The National Science Board’s 2019 report  
15 on the skilled technical workforce called for  
16 strengthening partnerships between skilled technical  
17 workforce programs and business and industry.

18 (b) ADVANCED TECHNICAL EDUCATION PROGRAM  
19 UPDATE.—Section 3(b) of the Scientific and Advanced-  
20 Technology Act of 1992 (42 U.S.C. 1862i(b)) is amended  
21 to read as follows:

22 “(b) NATIONAL COORDINATION NETWORK FOR  
23 SCIENCE AND TECHNICAL EDUCATION.—The Director  
24 shall award grants to institutions of higher education,  
25 non-profit institutions, associate-degree granting colleges

1 (or consortia thereof) to establish a network of centers for  
2 science and technical education. The centers shall—

3 “(1) coordinate research, training and edu-  
4 cation activities funded by awards under subsection  
5 (a) and share information and best practices across  
6 the network of awardees;

7 “(2) serve as national and regional clearing-  
8 house and resource to communicate and coordinate  
9 research, training and educational activities across  
10 disciplinary, organizational, geographic and inter-  
11 national boundaries and disseminate best practices;  
12 and

13 “(3) develop national and regional partnerships  
14 between K-12 schools, two-year colleges, institutions  
15 of higher education, workforce development pro-  
16 grams, and industry to meet workforce needs.”.

17 (c) NSF PORTFOLIO REVIEW AND COORDINATION  
18 PLAN.—

19 (1) IN GENERAL.—Not later than 1 year after  
20 the date of enactment of this Act, the Director of  
21 the National Science Foundation shall conduct a full  
22 portfolio analysis of the Foundation’s skilled tech-  
23 nical workforce investments and develop a plan to  
24 improve coordination and collaboration of research  
25 and education investments and the communication



1 of those funding opportunities to the research and  
2 education community.

3 (2) SUBMISSION TO CONGRESS.—Not later than  
4 180 days after the date of the review and develop-  
5 ment of plan under paragraph (1) is complete, the  
6 Director of the National Science Foundation shall  
7 submit to Congress and make widely available to the  
8 public a summary of the portfolio review and plan.

9 **SEC. 603. GRADUATE RESEARCH FELLOWSHIP PROGRAM**

10 **UPDATE.**

11 (a) FINDINGS.—Congress finds the following:

12 (1) The National Science Foundation Graduate  
13 Research Fellowship Program is the nation’s oldest  
14 fellowship program that directly supports American  
15 graduate students in various STEM fields and is a  
16 model for training the best innovators in the United  
17 States.

18 (2) Since 1952, NSF has funded over 50,000  
19 Graduate Research Fellowships out of more than  
20 500,000 applicants, 42 Fellows have gone on to be-  
21 come Nobel laureates, and more than 450 have be-  
22 come members of the National Academy of Sciences.

23 (3) Foreign nations are increasingly investing  
24 in foreign talent programs to compete with the  
25 United States.

1 (b) SENSE OF CONGRESS.—It is the sense of Con-  
2 gress that the National Science Foundation should grow  
3 the number of new graduate research fellows supported  
4 annually over the next 10 years to no less than 2,500 fel-  
5 lows.

6 (c) PROGRAM UPDATE.—Section 10 of the National  
7 Science Foundation Act of 1950 (42 U.S.C. 1869) is  
8 amended—

9 (1) in subsection (a), by inserting “and as will  
10 address national workforce demand in critical STEM  
11 fields” after “throughout the United States”;

12 (2) in subsection (b), by striking “of \$12,000”  
13 and inserting “sufficient to cover full tuition and  
14 mandatory fees”; and

15 (3) by adding at the end the following:

16 “(c) OUTREACH.—The Director shall ensure program  
17 outreach to recruit fellowship applicants from fields of  
18 study that are in areas of critical national need, from all  
19 regions of the country, and from historically underrep-  
20 resented populations in STEM.”.

21 **SEC. 604. ROBERT NOYCE TEACHER SCHOLARSHIP PRO-**  
22 **GRAM SENSE OF CONGRESS.**

23 It is the sense of Congress that—

24 (1) the Robert Noyce Teacher Scholarship Pro-  
25 gram plays an important role in supporting the de-

1 velopment and dissemination of evidence-based  
2 teacher preparation models and the recruitment,  
3 preparation, and retention of STEM educators;

4 (2) the Robert Noyce Teacher Scholarship Pro-  
5 gram improves recruitment of underrepresented and  
6 STEM-trained students into teaching, encourages  
7 teachers to work in high-need areas, and can im-  
8 prove relationships between teacher preparation pro-  
9 grams and industry; and

10 (3) the Robert Noyce Teacher Scholarship Pro-  
11 gram which currently supports between 1,000 to  
12 1,500 new math and science teachers a year, includ-  
13 ing in high-need districts should be doubled over the  
14 next ten years to meet the growing demand for  
15 STEM capable educators.

16 **TITLE VII—ANTARCTIC SCIENCE**  
17 **AND CONSERVATION MOD-**  
18 **ERNIZATION**

19 **Subtitle A—Antarctic Nongovern-**  
20 **mental Activity Preparedness**  
21 **Act**

22 **SEC. 701. CONGRESSIONAL FINDINGS AND DECLARATION**  
23 **OF PURPOSE.**

24 (a) FINDINGS.—The Congress finds that—

1           (1) for over half a century, scientific investiga-  
2           tion and environmental protection has been the prin-  
3           cipal activity of the Federal Government and United  
4           States citizens in Antarctica;

5           (2) the National Science Foundation funds and  
6           manages the United States Antarctic Program, the  
7           national program of scientific research in Antarctica,  
8           together with associated logistical support activities,  
9           infrastructure, as well as broad environmental stew-  
10          ardship responsibilities in Antarctica;

11          (3) land- and ship-borne tourism in Antarctica,  
12          including tourism that United States-based compa-  
13          nies organize or originate, continues to increase at  
14          a significant rate;

15          (4) achievement of the United States Antarctic  
16          Program scientific objectives requires the full com-  
17          mitment of the operational and logistics capabilities  
18          of the Program;

19          (5) long-standing United States policy regard-  
20          ing private non-governmental expeditions to Antarc-  
21          tica has been not to offer support or other services  
22          to private expeditions in Antarctica, and, instead, to  
23          encourage complete operational and financial self-  
24          sufficiency on the part of non-governmental expedi-  
25          tions to Antarctica;

1           (6) in limited emergency situations the United  
2 States may attempt, at its discretion and in accord-  
3 ance with international law and humanitarian prin-  
4 ciples, the rescue of private individuals provided that  
5 no unacceptable risks are posed to United States  
6 personnel and the rescue can be accomplished by the  
7 United States within locally available means;

8           (7) increased tourism and other non-govern-  
9 mental activities could result in additional health  
10 and safety, search and rescue, medical care and  
11 evacuation costs. These costs could increase the fi-  
12 nancial burden on the United States Antarctic Pro-  
13 gram, increase the risks to the safety of those in-  
14 volved in search and rescue, and jeopardize scientific  
15 objectives through the diversion of resources; and

16           (8) in recognition of the growing potential for  
17 additional costs to be imposed on national Antarctic  
18 programs, the Antarctic Treaty Consultative Parties,  
19 including the United States, adopted Measure 4  
20 (2004), “Insurance and Contingency Planning for  
21 Tourism and Non-Governmental Activities in the  
22 Antarctic Treaty Area.” Measure 4 (2004), after it  
23 takes effect, will require the Parties to impose oper-  
24 ational and financial self-sufficiency requirements on  
25 non-governmental persons organizing expeditions to

1       Antarctica organized in or proceeding from their  
2       country.

3       (b) PURPOSE.—The purpose of this subtitle is to im-  
4       plement Measure 4 (2004), “Insurance and Contingency  
5       Planning for Tourism and Non-Governmental Activities in  
6       the Antarctic Treaty Area”.

7       **SEC. 702. DEFINITIONS.**

8       For purposes of this subtitle:

9           (1) The term “Antarctica” means the area  
10       south of 60 degrees south latitude.

11          (2) The term “Director” means the Director of  
12       the National Science Foundation.

13          (3) The term “expedition” means an activity  
14       undertaken by one or more nongovernmental persons  
15       organized within or proceeding from the United  
16       States to or within Antarctica for which advance no-  
17       tification is required under Paragraph 5 of Article  
18       VII of the Antarctic Treaty. The term “expedition”  
19       does not include fishing activities or the operation of  
20       fishing vessels.

21          (4) The term “person” has the meaning given  
22       that term in section 1 of title 1, United States Code,  
23       and includes any person subject to the jurisdiction  
24       of the United States except that the term does not

1 include any department, agency, or other instrumen-  
2 tality of the Federal Government.

3 **SEC. 703. OBLIGATION OF PERSONS ORGANIZING EXPEDI-**  
4 **TIONS TO PREPARE CONTINGENCY PLANS**  
5 **AND OBTAIN INSURANCE.**

6 (a) Persons organizing expeditions shall—

7 (1) prepare and establish appropriate contin-  
8 gency plans and sufficient arrangements for health  
9 and safety, search and rescue, medical care and  
10 evacuation of persons engaged in an expedition;

11 (2) obtain adequate insurance or other financial  
12 arrangements to cover all costs associated with  
13 search and rescue and medical care and possible  
14 evacuation of any persons engaged in an expedition;  
15 and

16 (3) establish or obtain the contingency plans,  
17 arrangements and insurance or other financial ar-  
18 rangements referred to in this subsection prior to  
19 the date on which an expedition commences.

20 (b) The contingency plans and other arrangements  
21 referred to in subsection (a) shall not rely on support from  
22 national Antarctic programs or other agencies of govern-  
23 ments conducting research or other activities in Antarctica  
24 without their express written agreement.

1 **SEC. 704. CERTIFICATION OF COMPLIANCE.**

2 (a) Persons organizing expeditions shall submit to the  
3 Director a written certification that confirms its compli-  
4 ance with the requirements of section 703 of this subtitle,  
5 including a statement that all such plans, arrangements  
6 and insurance or other financial arrangements meet all  
7 applicable international and domestic legal and regulatory  
8 requirements as well as clearly established industry stand-  
9 ards.

10 (b) Any certification filed pursuant to clause sub-  
11 section (a) of this section shall contain an acknowledgment  
12 that any knowing and willful false statement made in such  
13 certification is punishable under section 1001 of title 18,  
14 United States Code, by fine or imprisonment of not more  
15 than 5 years, or both. The Director may refer potential  
16 violations of section 1001 of such title to the Department  
17 of Justice for criminal prosecution, as appropriate.

18 **SEC. 705. COSTS AND ADMINISTRATIVE FEES.**

19 (a) If any person organizing an expedition receives  
20 any services covered by this subtitle from any department,  
21 agency, or instrumentality of the Federal government, or  
22 contractors working in support of such entities, absent an  
23 express written agreement for such services with the Na-  
24 tional Science Foundation, the Director may assess the  
25 costs, direct and indirect, of any such services incurred  
26 by the National Science Foundation, its contractors, or



1 other department, agency or instrumentality of the Fed-  
2 eral government, including all reasonable attorney's fees  
3 and costs associated with the collection of such sums. The  
4 Director may request the Attorney General to initiate a  
5 civil action for the recovery of such costs. The National  
6 Science Foundation is authorized to retain all monies col-  
7 lected pursuant to this subsection and shall distribute such  
8 monies to any department, agency or instrumentality of  
9 the Federal Government to the extent non- reimbursed  
10 costs were actually incurred by those entities. Such monies  
11 shall remain available for expenditure, without further ap-  
12 propriation, until expended.

13 (b) Beginning in fiscal year 2014 and thereafter, the  
14 Director may establish, modify, charge, and collect admin-  
15 istrative fees for the administration of the requirements  
16 of this subtitle. The National Science Foundation is au-  
17 thorized to retain all monies collected pursuant to this sec-  
18 tion. Such monies shall remain available for expenditure,  
19 without further appropriation, until expended.

20 **SEC. 706. FOREIGN EXPEDITIONS.**

21 A person organizing an expedition shall not be re-  
22 quired to comply with the provisions of this subtitle if the  
23 Secretary of State determines at any time, in writing, that  
24 another Party to the Antarctic Treaty has jurisdiction  
25 over that expedition and is exercising its authority with

1 regard to that expedition. However, to the extent the Na-  
2 tional Science Foundation, its contractors, or other de-  
3 partment, agency or instrumentality of the Federal gov-  
4 ernment incurs direct or indirect costs relating to services  
5 covered by this subtitle for an expedition, those costs re-  
6 main recoverable against persons subject to the jurisdic-  
7 tion of the United States pursuant to section 705.

8 **SEC. 707. CIVIL PENALTIES.**

9 (a) ASSESSMENT OF PENALTIES.—Any person orga-  
10 nizing an expedition that the Director determines, after  
11 notice and an opportunity for a hearing, to have failed  
12 to comply with the requirements of this subtitle, or its im-  
13 plementing regulations, shall be liable to the United States  
14 for a civil penalty. The amount of the civil penalty shall  
15 not exceed \$125,000 for each violation unless the prohib-  
16 ited act was knowingly committed, in which case the  
17 amount of the civil penalty shall not exceed \$250,000 for  
18 each violation. Each day an expedition remains in Antarc-  
19 tica without complying with the requirements of this sub-  
20 title shall constitute a separate offense for penalty pur-  
21 poses. The amount of any civil penalty shall be assessed  
22 by the Director by written notice. Any civil penalty as-  
23 sessed under this subsection may be remitted or mitigated  
24 by the Director.

1 (b) HEARINGS.—Hearings for the assessment of civil  
2 penalties under subsection (a) shall be conducted in ac-  
3 cordance with section 554 of Title 5, United States Code.  
4 For the purposes of conducting any such hearing, the Di-  
5 rector may issue subpoenas for the attendance and testi-  
6 mony of witnesses and the production of relevant papers,  
7 books, and documents, and may administer oaths. Wit-  
8 nesses summoned shall be paid the same fees and mileage  
9 that are paid to witnesses in the courts of the United  
10 States. In case of contumacy or refusal to obey a subpoena  
11 served upon any person pursuant to this subsection, the  
12 district court of the United States for any district in which  
13 such person is found, resides, or transacts business, upon  
14 application by the United States and after notice to such  
15 person, shall have jurisdiction to issue an order requiring  
16 such person to appear and give testimony before the Di-  
17 rector or to appear and produce documents before the Di-  
18 rector, or both, and any failure to obey such order of the  
19 court may be punished by such court as a contempt there-  
20 of.

21 (c) REVIEW.—Upon the failure of any person against  
22 whom a civil penalty is assessed under subsection (a) of  
23 this section to pay such penalty, the Director may request  
24 the Attorney General to institute a civil action in a district  
25 court of the United States for any district in which such

1 person is found, resides, or transacts business to collect  
2 the penalty and such court shall have jurisdiction to hear  
3 and decide any such action. The court shall hear such ac-  
4 tion on the record made before the Director and shall sus-  
5 tain the decision of the Director if it is supported by sub-  
6 stantial evidence on the record considered as a whole.

7 (d) PENALTIES UNDER OTHER LAWS.—The assess-  
8 ment of a civil penalty under subsection (a) of this section  
9 for any act shall not be deemed to preclude the assessment  
10 of a civil penalty for such act under any other law.

11 **SEC. 708. REGULATIONS.**

12 The Director may prescribe such regulations as may  
13 be appropriate to implement and enforce the provisions  
14 of this subtitle.

15 **SEC. 709. EFFECTIVE DATE.**

16 This subtitle shall take effect 180 days after enact-  
17 ment.

18 **Subtitle B—ANTARCTIC ENVI-**  
19 **RONMENTAL LIABILITY ACT**  
20 **OF 2020**

21 **SEC. 711. SHORT TITLE.**

22 This subtitle may be cited as the “Antarctic Environ-  
23 mental Liability Act of 2020”.

1 **SEC. 712. PURPOSE.**

2 The purpose of this subtitle is to implement Annex  
3 VI to the Protocol on Environmental Protection to the  
4 Antarctic Treaty, “Liability Arising From Environmental  
5 Emergencies”.

6 **SEC. 713. IMPLEMENTING AMENDMENTS.**

7 (a) IN GENERAL.—The Antarctic Conservation Act  
8 of 1978 (16 U.S.C. 2401 et seq.) is amended—

9 (1) in section 3, by striking “and” at the end  
10 of paragraph (22), striking the period at the end of  
11 paragraph (23) and inserting a semicolon, and by  
12 adding at the end the following:

13 “(24) the term ‘Annex VI’ means Annex VI to  
14 the Protocol on Environmental Protection to the  
15 Antarctic Treaty, Liability Arising From Environ-  
16 mental Emergencies;

17 “(25) the term ‘environmental emergency’  
18 means any event that occurs after the entry into  
19 force of Annex VI, and that results in, or immi-  
20 nently threatens to result in, any significant and  
21 harmful impact on the Antarctic environment;

22 “(26) the term ‘nongovernmental operator’  
23 means any operator other than a Governmental op-  
24 erator or a contractor or subcontractor acting on be-  
25 half of any Governmental operator;

1           “(27) the term ‘operator’ means any person  
2           who organizes activities (including tourist activities)  
3           in the United States to be carried out in Antarctica,  
4           and any person who organizes activities (including  
5           tourist activities) in a country other than the United  
6           States to be carried out in Antarctica if such person  
7           has its principal place of business or habitual place  
8           of residence in the United States, or is incorporated  
9           in the United States; except that the term operator  
10          does not include—

11                   “(A) an individual who is an employee,  
12                   contractor, subcontractor, or agent of, or who is  
13                   in the service of, a person who organizes activi-  
14                   ties to be carried out in Antarctica;

15                   “(B) a contractor or subcontractor acting  
16                   on behalf of any Governmental operator; or

17                   “(C) any person who organizes only fishing  
18                   activities to be carried out in Antarctica;

19          “(28) the term ‘reasonable,’ as applied to ‘pre-  
20          ventative measures’ and ‘response action,’ means  
21          measures or actions which are appropriate, prac-  
22          ticable, proportionate and based on the availability  
23          of objective criteria and information, including—

24                   “(A) risks to the Antarctic environment,  
25                   and the rate of its natural recovery;

1                   “(B) risks to human life and safety; and  
2                   “(C) technological and economic feasibility;  
3                   and  
4                   “(29) the term ‘response action’ means reason-  
5                   able measures taken after an environmental emer-  
6                   gency has occurred to avoid, minimize or contain the  
7                   impact of that environmental emergency, which to  
8                   that end may include clean-up in appropriate cir-  
9                   cumstances, and includes determining the extent of  
10                  that emergency and its impact, except that for pur-  
11                  poses of this Act, the definition of ‘response’ con-  
12                  tained in section 101(25) of the Comprehensive En-  
13                  vironmental Response, Compensation, and Liability  
14                  Act (42 U.S.C. sec. 9601(25)) shall not apply.”;

15                  (2) by inserting after section 4A the following:

16       **“SEC. 4B. PREVENTATIVE MEASURES.**

17                  “(a) Operators shall undertake reasonable preventa-  
18                  tive measures that are designed to reduce the risk of envi-  
19                  ronmental emergencies and their potential adverse impact.

20                  “(b) Such preventative measures may include—

21                         “(1) specialized structures or equipment incor-  
22                         porated into the design and construction of facilities  
23                         and means of transportation;

1           “(2) specialized procedures incorporated into  
2           the operation or maintenance of facilities and means  
3           of transportation; and

4           “(3) specialized training of personnel.

5   **“SEC. 4C. CONTINGENCY PLANS.**

6           “(a) Operators shall—

7           “(1) establish contingency plans for responses  
8           to incidents with potential adverse impacts on the  
9           Antarctic environment or dependent and associated  
10          ecosystems; and

11          “(2) cooperate in the formulation and imple-  
12          mentation of such contingency plans.

13          “(b) Such contingency plans shall include, when ap-  
14          propriate, the following components:

15          “(1) procedures for conducting an assessment  
16          of the nature of the incident;

17          “(2) notification procedures;

18          “(3) identification and mobilization of re-  
19          sources;

20          “(4) response plans;

21          “(5) training;

22          “(6) record keeping; and

23          “(7) demobilization.



1 **“SEC. 4D. RESPONSE ACTION.**

2 “An operator shall take prompt and effective re-  
3 sponse action to environmental emergencies arising from  
4 the activities of that operator.”;

5 (3) by inserting after section 6 the following:

6 **“SEC. 6A. LIABILITY OF NONGOVERNMENTAL OPERATORS.**

7 “(a) LIABILITY.—Whenever, on the basis of informa-  
8 tion available to it, a Government of a State Party to  
9 Annex VI, other than the United States—

10 “(1) finds that a nongovernmental operator has  
11 failed to take prompt and effective response action  
12 to an environmental emergency arising from that op-  
13 erator’s activities, as required by section 4D, and

14 “(2) said Government takes a response action  
15 to that environmental emergency, such Government  
16 may bring a civil action against that operator to re-  
17 cover the costs of such response action in an appro-  
18 priate district court in accordance with section 12.

19 Any such operator found to have violated the requirements  
20 of section 4D shall be liable to pay to that Government  
21 the costs of the response action taken by such Govern-  
22 ment.

23 “(b) FAILURE TO COMPLY.—Failure of a Govern-  
24 ment to comply with the provisions of Article 5, para-  
25 graphs 3, 4 or 5 of Annex VI shall not be a defense to  
26 liability under this section.

1           “(c) STRICT LIABILITY.—Liability pursuant to sub-  
2 sections (a), (e), (k), and (1) shall be strict.

3           “(d) JOINT LIABILITY.—When an environmental  
4 emergency arises from the activities of two or more non-  
5 governmental operators, they shall be jointly and severally  
6 liable under subsection (a), (k), or (1), except that an oper-  
7 ator which establishes that only part of the environmental  
8 emergency resulted from its activities shall be liable in re-  
9 spect of that part only.

10          “(e) CLAIMS.—Any nongovernmental operator may  
11 seek contribution from any other nongovernmental oper-  
12 ator that is liable or potentially liable under section 2406  
13 of this title. Such claims shall be brought in accordance  
14 with this section and the Federal Rules of Civil Procedure,  
15 and shall be governed by Federal law. In resolving con-  
16 tribution claims, the court may allocate response costs  
17 among liable parties using such equitable factors as the  
18 court determines are appropriate. Nothing in this sub-  
19 section shall diminish the right of any person to bring an  
20 action for contribution in the absence of a civil action  
21 under subsection (a), (k), or (1) of section 7.

22          “(f) PERIOD IN WHICH ACTIONS MAY BE  
23 BROUGHT.—

24                 “(1) RESPONSE PERIOD.—An action under sec-  
25 tion 7(a) or (k) of this title must be commenced

1 within three years of the commencement of the re-  
2 sponse action or within three years of the date on  
3 which the Government bringing the action knew or  
4 ought reasonably to have known the identity of the  
5 nongovernmental operator, whichever is later. In no  
6 event shall an action against a nongovernmental op-  
7 erator be commenced later than 15 years after the  
8 commencement of the response action.

9 “(2) COST RECOVERY PERIOD.—An action  
10 under section 7(e) of this title for contribution to-  
11 ward costs incurred pursuant to section 7(a) or (b)  
12 must be commenced within three years of the date  
13 of judgment in any action under section 7(a) or (k)  
14 for recovery of such response costs or in the absence  
15 of such an action, within three years of the date that  
16 the person seeking contribution knew or ought rea-  
17 sonably to have known the identity of the nongovern-  
18 mental operator.

19 “(3) COST CONTRIBUTION PERIOD.—An action  
20 under section 7(e) for contribution toward response  
21 costs assessed pursuant to section 7(1) must be  
22 commenced within three years of the date of the as-  
23 sessment or within three years of the date of any  
24 judgment under subsection 7(l)(vii), whichever is  
25 later.

1           “(g) LIABILITY COST LIMIT.—The maximum amount  
2 for which each nongovernmental operator may be liable  
3 for the costs of response actions under sections 7(a), 7(k),  
4 or 7(1), in respect of each environmental emergency, shall  
5 be as follows:

6           “(1) For an environmental emergency arising  
7 from an event involving a ship:

8           “(A) one million SDR for a ship with a  
9 tonnage not exceeding 2,000 tons;

10           “(B) for a ship with a tonnage in excess of  
11 2,000 tons, the following amount in addition to  
12 that referred to in subparagraph (A):

13           “(i) for each ton from 2,001 to  
14 30,000 tons, 400 SDR;

15           “(ii) for each ton from 30,001 to  
16 70,000 tons, 300 SDR; and

17           “(iii) for each ton in excess of 70,000  
18 tons, 200 SDR;

19           “(2) For an environmental emergency arising  
20 from an event which does not involve a ship, three  
21 million SDR.

22           “(3) For the purposes of this subsection:

23           “(A) ‘ship’ means a vessel of any type  
24 whatsoever operating in the marine environ-  
25 ment and includes hydrofoil boats, air-cushion

1 vehicles, submersibles, floating craft and fixed  
2 or floating platforms;

3 “(B) ‘SDR’ means the Special Drawing  
4 Rights as defined by the International Mone-  
5 tary Fund; and

6 “(C) a ship’s tonnage shall be the gross  
7 tonnage calculated in accordance with the ton-  
8 nage measurement rules contained in Annex I  
9 of the International Convention on Tonnage  
10 Measurement of Ships, 1969.

11 “(h) EXCEPTION.—Notwithstanding the provisions of  
12 subsection (g), liability shall not be limited if it is proved  
13 that the environmental emergency resulted from an act or  
14 omission of the operator, committed with the intent to  
15 cause such emergency, or recklessly and with knowledge  
16 that such emergency would probably result.

17 “(i) EXCEPTION.—A nongovernmental operator shall  
18 not be liable pursuant to subsection (a), subsection (e),  
19 subsection (k) or subsection (l) if it proves that the envi-  
20 ronmental emergency was caused by—

21 “(1) an act or omission necessary to protect  
22 human life or safety;

23 “(2) an event constituting in the circumstances  
24 of Antarctica a natural disaster of an exceptional  
25 character, which could not have been reasonably

1       foreseen, either generally or in the particular case,  
2       provided all reasonable preventative measures were  
3       taken that are designed to reduce the risk of envi-  
4       ronmental emergencies and their potential adverse  
5       impact;

6               “(3) an act of terrorism by some other person  
7       or entity; or

8               “(4) an act of belligerency by some other per-  
9       son or entity against the activities of the operator.

10       “(j) INSURANCE REQUIREMENT.—Nongovernmental  
11 operators shall maintain adequate insurance or other fi-  
12 nancial security, such as the guarantee of a bank or simi-  
13 lar financial institution, to cover liability under section 7  
14 of this title up to the limits set forth in subsection (g).

15       “(k) CIVIL ACTION.—Whenever, on the basis of infor-  
16 mation available to it, a department, agency or other in-  
17 strumentality of the United States (i) finds that a non-  
18 governmental operator has failed to take prompt and ef-  
19 fective response action to an environmental emergency  
20 arising from its activities, as required by section 4D, and  
21 (ii) takes a response action to that environmental emer-  
22 gency, such department, agency or other instrumentality  
23 may request the Attorney General to bring a civil action  
24 to recover the costs of such response action in an appro-  
25 priate district court in accordance with section 12 of this

1 title. Any such operator found to have violated the require-  
2 ments of section 4D shall be liable to the United States  
3 for the costs of the response action taken by said depart-  
4 ment, agency or instrumentality. The department, agency,  
5 or other instrumentality of the United States that takes  
6 a response action under this subsection, or section 9(a),  
7 is authorized to retain, in its budget, the monies collected  
8 pursuant to this subsection. Such monies shall remain  
9 available for expenditure, without further appropriation,  
10 until expended by that department, agency or other instru-  
11 mentality.

12 “(l) NOTIFICATION.—Upon notice that a nongovern-  
13 mental operator has failed to take prompt and effective  
14 response action to an environmental emergency arising  
15 from its activities, as required by section 4D, and no re-  
16 sponse action was taken by any Party to the Protocol, the  
17 following procedures shall be followed:

18 “(1) The Director, after notice and opportunity  
19 for a hearing in accordance with subsection (l)(ii),  
20 shall assess the cost of the response action that  
21 should have been taken and may assess the reason-  
22 able costs incurred by the United States under this  
23 subsection to determine that cost. The Director is  
24 authorized to promulgate regulations to implement  
25 this subsection.

1           “(2) Hearings for the assessment of the costs  
2           under subsection (l)(i) shall be conducted in accord-  
3           ance with section 554 of title 5, United States Code.  
4           For the purposes of conducting any such hearing,  
5           the Director may issue subpoenas for the attendance  
6           and testimony of witnesses and the production of  
7           relevant papers, books, and documents, and may ad-  
8           minister oaths. Witnesses summoned shall be paid  
9           the same fees and mileage that are paid to witnesses  
10          in the courts of the United States. In case of contu-  
11          macy or refusal to obey a subpoena served upon any  
12          person pursuant to this subsection, the district court  
13          of the United States for any district in which such  
14          person is found, resides, or transacts business, upon  
15          application by the United States and after notice to  
16          such person, shall have jurisdiction to issue an order  
17          requiring such person to appear and give testimony  
18          before the Director or to appear and produce docu-  
19          ments before the Director and any failure to obey  
20          such order of the court may be punished by such  
21          court as a contempt thereof.

22          “(3) Response action costs assessed pursuant to  
23          this section shall reflect, as much as possible, the  
24          costs of the response action that should have been  
25          taken and the maximum recovery amount of those



1 costs shall be as set forth in subsection (g). Further,  
2 the assessment of response action costs pursuant to  
3 this section shall not be deemed to preclude the as-  
4 sessment of additional civil or criminal penalties for  
5 violations of any other provision of this Chapter or  
6 any other law.

7 “(4) At the request of the Director, and with  
8 the concurrence of the Secretary of the Department  
9 in which the Coast Guard is operating, the Com-  
10 mandant of the Coast Guard shall

11 “(A) render, on a non-reimbursable basis,  
12 such assistance that the Director may require,  
13 necessary to assess the cost of response action  
14 that should have been taken in the case of an  
15 environmental emergency caused by the opera-  
16 tor’s ship-based activities, including any deter-  
17 mination concerning the underlying response  
18 activity; and

19 “(A) conduct, on a non-reimbursable basis,  
20 an investigation or an evidentiary hearing, nec-  
21 essary to assess the cost of the response action  
22 that should have been taken in the case of an  
23 environmental emergency caused by the opera-  
24 tor’s ship-based activities, including any deter-  
25 mination concerning the underlying response

1 activity and to submit to the Director proposed  
2 findings of fact and recommendations for adju-  
3 dication by the Director.

4 “(5) With regard to any investigation or evi-  
5 dentiary hearing conducted pursuant to clause (iv),  
6 the Director is authorized to delegate, to the Com-  
7 mandant, the authority, set forth in clause (ii), to  
8 issue subpoenas and administer oaths, and to pay  
9 fees and mileage. In case of contumacy or refusal to  
10 obey a subpoena served upon any person pursuant to  
11 this clause, the district court of the United States  
12 for any district in which such person is found, re-  
13 sides, or transacts business, upon application by the  
14 United States and after notice to such person, shall  
15 have jurisdiction to issue an order requiring such  
16 person to appear and give testimony before the  
17 agency head or to appear and produce documents  
18 before the agency head, and any failure to obey such  
19 order of the court may be punished by such court as  
20 a contempt thereof.

21 “(6) The Director shall not commence an ad-  
22 ministrative proceeding in accordance with sub-  
23 sections (i) and (ii) of this section later than 15  
24 years after the United States Government becomes  
25 aware of the environmental emergency.

1           “(7) Upon the failure of any operator against  
2           whom costs have been assessed under this section to  
3           pay such costs, the Director may request the Attor-  
4           ney General to institute a civil action in a district  
5           court of the United States for any district in which  
6           such person is found, resides, or transacts business  
7           to collect the costs and such court shall have juris-  
8           diction to hear and decide any such action. The  
9           court shall hear such action on the record made be-  
10          fore the Director pursuant to this section and shall  
11          sustain the Director’s decision if it is supported by  
12          substantial evidence on the record considered as a  
13          whole.

14          “(m) FEES.—Any monetary recovery under sections  
15 (a), (k) and (I) shall, in addition, include all reasonable  
16 attorney’s fees and costs.

17          “(n) ARTICLE 12 FUND.—An amount equal to the  
18 amount recovered pursuant to subsection (1) for the cost  
19 of the response action that should have been taken shall  
20 be forwarded to the fund established pursuant to Article  
21 12 of Annex VI.

22          “(o) EXPENDITURE.—To the extent the department,  
23 agency, or other instrumentality of the United States re-  
24 tains monies collected pursuant to this section, such entity  
25 is authorized to retain, in its budget, the monies collected

1 pursuant to this section. Such monies shall remain avail-  
2 able for expenditure, without further appropriation, until  
3 expended by that department, agency or other instrumen-  
4 tality of the United States.”;

5 (4) in section 6—

6 (A) in subsection (a)—

7 (i) by striking “Annex II and Annex  
8 V” and inserting “Annex II, Annex V and  
9 Annex VI”; and

10 (ii) by striking “including sections  
11 4(b)(2), (3), (4) and (5)” and inserting  
12 “including section 3, section 4(b)(2), (3),  
13 (4) and (5), section 4D and section 7”;  
14 and

15 (B) in subsection (b), by striking “to im-  
16 plement Annex IV to the Protocol and the pro-  
17 visions of this Act which implement that  
18 Annex” and inserting “to implement Annex IV  
19 and ship-based matters under Annex VI to the  
20 Protocol and the provisions of this Act which  
21 implement these Annexes”;

22 (5) in section 9—

23 (A) in subsection (a) by adding “other  
24 than a Federal department, agency or instru-  
25 mentality” after “person”; and

1 (B) by striking “\$5,000” and inserting  
2 “\$10,000”;

3 (6) in section 11—

4 (A) by striking the section heading and in-  
5 serting “Jurisdiction of Federal courts; venue,  
6 review of regulations; service of process”;

7 (B) by inserting “(a) U.S. DISTRICT  
8 COURTS.—” before “The district courts of the  
9 United States shall have exclusive jurisdiction  
10 over any case or controversy arising under the  
11 provisions of this chapter or of any regulation  
12 prescribed, or permit issued, under this chap-  
13 ter.”; and

14 (C) by adding the following subsections at  
15 the end of the section:

16 “(b) JURISDICTION.—An action by any Government  
17 of a State Party to Annex VI, including the United States,  
18 against any person subject to legal action under this chap-  
19 ter may be brought only in a district court in a jurisdiction  
20 where such person is located or resides or is doing busi-  
21 ness. A claim for contribution by a nongovernmental oper-  
22 ator under section 2406(e) of this title may be brought  
23 in any district in which the defendant resides, may be  
24 found, or has his principal office.

1       “(c) LIMITATION.—In any action brought under sec-  
2 tion 2406 of this title, process may be served in any dis-  
3 trict where the defendant is found, resides, transacts busi-  
4 ness, or has appointed an agent for the service of proc-  
5 ess.”.

6 **SEC. 714. EFFECTIVE DATE.**

7       This subtitle and the amendments made by this sub-  
8 title shall take effect upon the entry into force of Annex  
9 VI, except that the amendments made by subsections (f)  
10 and (g) of section 713 shall take effect immediately upon  
11 the enactment of this Act.

12                   **TITLE VIII—TECHNOLOGY**  
13                   **TRANSFER AND INNOVATION**

14 **SEC. 801. FEDERAL LABORATORY COMPUTER PROGRAMS**  
15                   **UPDATE.**

16       (a) UTILIZATION OF FEDERAL TECHNOLOGY UP-  
17 DATE.—Section 11 of the Stevenson–Wydler Technology  
18 Innovation Act of 1980 (15 U.S.C. 3710) is amended add-  
19 ing at the end the following:

20       “(j)(1) COPYRIGHT PROTECTION.—Pursuant to sec-  
21 tion 105(b)(1) of title 17, United States Code, and subject  
22 to the requirements therein, the director of any Govern-  
23 ment-operated Federal laboratory may seek copyright pro-  
24 tection on behalf of the United States in a work described  
25 in that section.

1       “(2) GUIDELINES.—The Secretary is authorized to  
2 provide guidelines to implement paragraph (1) of this sec-  
3 tion and to provide guidance for the management of works  
4 in which copyright protection is obtained.”.

5       (b) GOVERNMENT WORKS COPYRIGHT UPDATE.—  
6 Section 105 of title 17, United States Code is amended—

7           (1) by striking “Copyright protection” and in-  
8 sserting “(a) Copyright protection”; and

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

10       “(b) Notwithstanding subsection (a), copyright pro-  
11 tection under this title is available for—

12           “(1) a computer program that is a work of the  
13 United States Government and is created at a Fed-  
14 eral laboratory, as defined in section 4 of the Ste-  
15 venson–Wylder Technology Innovation Act of 1980  
16 (15 U.S.C. 3703), and which is a result of research,  
17 development, or engineering at the Federal labora-  
18 tory, provided that the United States Government  
19 makes application for copyright registration under  
20 section 409 pursuant to the authority granted under  
21 section 11(k) of such Act within 6 months from em-  
22 ployee disclosure of the work to the Federal labora-  
23 tory, and provided further that a certificate of reg-  
24 istration is issued pursuant to section 410 of this

1 title or following judicial review pursuant to chapter  
2 7 of title 5; and

3 “(2) standard reference data prepared or made  
4 available by the Department of Commerce, provided  
5 the copyright is secured by the Secretary of Com-  
6 merce in the manner set forth in section 6 of the  
7 Standard Reference Data Act (15 U.S.C. 290e).”.

8 **SEC. 802. EXTEND CRADA INFORMATION PROTECTION PE-**  
9 **RIOD.**

10 Section 12(c)(7)(B) of the Stevenson–Wylder Tech-  
11 nology Innovation Act of 1980 (15 U.S.C.  
12 3710a(c)(7)(B)) is amended by striking “5” and inserting  
13 “12”.

14 **SEC. 803. STEVENSON-WYDLER ACT AUTHORITY UPDATE.**

15 Section 11 of the Stevenson–Wylder Technology In-  
16 novation Act of 1980 (15 U.S.C. 3710(g)) is amended to  
17 read as follows:

18 “(g) FUNCTIONS OF SECRETARY.—The Secretary  
19 shall convene an Interagency Working Group for Tech-  
20 nology Transfer comprising those agencies with at least  
21 one Federal laboratory to—

22 “(1) share best practices for realizing the com-  
23 mercial potential of inventions and methods and op-  
24 tions for commercialization which are available to  
25 the Federal laboratories, including research and de-



1       velopment limited partnerships and cooperative re-  
2       search and development agreements; and

3               “(2) issue such guidelines as may be necessary  
4       to carry out this chapter, acting through the Direc-  
5       tor of the National Institute of Standards and Tech-  
6       nology and with the concurrence of the Interagency  
7       Working Group for Technology Transfer.”.

8       **SEC. 804. ROYALTY PAYMENTS TO FEDERAL EMPLOYEES**  
9               **UPDATE.**

10       Section 14 of the Stevenson-Wydler Technology Inno-  
11       vation Act of 1980 (15 U.S.C. 3710c) is amended—

12               (1) by striking “inventions” each place the term  
13       appears and inserting “inventions and other intellec-  
14       tual property”;

15               (2) by striking “invention” each place the term  
16       appears and inserting “invention or other intellec-  
17       tual property”;

18               (3) by striking “inventors” each place the term  
19       appears and inserting “inventors or contributors”

20               (4) in paragraph (a)(1) after “shall be” insert-  
21       ing “non-appropriated funds and shall be”;

22               (5) in clause (a)(1)(A)(i) inserting at the end  
23       “,or to the contributor or co-contributors if a certifi-  
24       cate of copyright registration is issued to the United  
25       States”;

1 (6) in clause (a)(1)(A)(ii) after “inventor of”  
2 inserting “or contributor to”;

3 (7) by in paragraph (a)(3) striking “inventor”  
4 each place the term appears and inserting “inventor  
5 or contributor”;

6 (8) in paragraph (a)(3) striking “\$150,000”  
7 each place the term appears and inserting  
8 “500,000”;

9 (9) at the end of subsection (a) by inserting the  
10 following new paragraph:

11 “(5) Any royalties or other payments received by a  
12 Federal agency from the licensing and assignment of  
13 works under agreements entered into by Federal labora-  
14 tories under section 12 of this Act, and from the licensing  
15 of works by Federal laboratories under any provision of  
16 law shall be retained by the agency licensing or assigning  
17 the work on behalf of the United States Government and  
18 shall be disposed of after payment of any copyright reg-  
19 istration cots. The head of the agency is authorized to dis-  
20 pose of such royalties or other payments through transfer  
21 by the agency to its bureaus or laboratories, with the ma-  
22 jority share of the royalties or other payments from any  
23 copyright going to the bureau or laboratory where or for  
24 which the copyrighted work was made.

1           “(A) The royalties or other payments so trans-  
2           ferred to any bureau or laboratory may be used or  
3           obligated by that bureau or laboratory during the  
4           fiscal year in which they are received or during the  
5           2 succeeding fiscal years—

6                   “(i) to reward contributors of copyrighted  
7                   computer programs;

8                   “(ii) to further information exchange  
9                   among bureaus and laboratories of the agency  
10                  or with another agency;

11                  “(iii) for education and training of employ-  
12                  ees consistent with the missions and objectives  
13                  of the agency, bureau, or laboratory;

14                  “(iv) for payment of expenses incidental to  
15                  the administration and licensing of intellectual  
16                  property by the agency or laboratory with re-  
17                  spect to copyrighted computer programs made  
18                  at that bureau or laboratory, including the fees  
19                  or other costs for the services of other agencies,  
20                  persons, or organizations for intellectual prop-  
21                  erty management and licensing services; or

22                  “(v) for scientific research and develop-  
23                  ment consistent with the research and develop-  
24                  ment missions and objectives of the bureau or  
25                  laboratory.

1           “(B) All royalties or other payments retained  
2           by the agency, bureau, or laboratory after payments  
3           have been made pursuant to subparagraph (A) that  
4           is unobligated and unexpended at the end of the sec-  
5           ond fiscal year succeeding the fiscal year in which  
6           the royalties and other payments were received shall  
7           be paid into the Treasury.

8           “(C) As used in the section, the term ‘contrib-  
9           utor’ means a laboratory employee who is a creator  
10          of an original expression in a copyrighted computer  
11          program.”; and

12          (10) in subsection (a)(1)(B)—

13                 (A) by striking “; or” at the end of clause  
14                 (iv) and inserting a semicolon;

15                 (B) by striking the period at the end of  
16                 clause (v) and inserting “; or”; and

17                 (C) by inserting at the end the following:

18                         “(vi) for the acquisition, administra-  
19                         tion and licensing of intellectual prop-  
20                         erty.”.

21   **SEC. 805. GOVERNMENT INTELLECTUAL PROPERTY CLARI-**  
22                         **FICATION.**

23          Section 15 of the Stevenson–Wydler Technology In-  
24          novation Act of 1980 (15 U.S.C. 3710d) is amended in  
25          subsection (a) to read as follows:

1 “(a) IN GENERAL.—

2 “(1) INVENTION RIGHTS.—The Government  
3 shall obtain the entire right, title and interest in and  
4 to all inventions made by any Federal employee—

5 “(A) during working hours;

6 “(B) with a contribution by the Govern-  
7 ment of facilities, equipment, materials, funds,  
8 or information, or of time or services of other  
9 Federal employees on official duty; or

10 “(C) within his or her field of research or  
11 within his or her official employment responsi-  
12 bility and activity.

13 “(2) DISCLOSURE.—Any invention made by a  
14 Federal employee as described in paragraph (1) shall  
15 be disclosed by the Federal employee to the agency  
16 that employs the Federal employee within 10 months  
17 of the earlier of the date of conception or actual re-  
18 duction to practice of the invention. The Govern-  
19 ment shall obtain the entire right, title, and interest  
20 in and to any invention conceived or actually re-  
21 duced to practice by a Federal employee that is not  
22 disclosed to the Government within 10 months from  
23 the earlier of the date of conception or actual reduc-  
24 tion to practice of the invention.

1           “(3) PRESUMPTION.—Any invention made by a  
2           Federal employee as described in paragraph (1) shall  
3           be presumed to be owned by the Government, and  
4           the Federal employee is presumptively obligated to  
5           assign the entire right, title, and interest in and to  
6           the invention to the Government. A Federal em-  
7           ployee that disagrees with the presumption of owner-  
8           ship and obligation of assignment may request, from  
9           the agency employing the Federal employee, a deter-  
10          mination of rights in and to the invention and shall  
11          do so within 30 days of the disclosure pursuant to  
12          paragraph (2). The request shall provide all grounds  
13          and justification for leaving rights with the Federal  
14          employee. If the request is not made by the em-  
15          ployee within the 30 day period, the Government  
16          shall retain all right, title, and interest to the inven-  
17          tion.

18          “(4) PATENT RIGHTS.—If a Federal agency  
19          which has ownership of or the right of ownership to  
20          an invention made by a Federal employee does not  
21          intend to file for a patent application or otherwise  
22          promote commercialization of such invention, the  
23          agency shall (upon request) allow the inventor, if the  
24          inventor is a Federal employee or former employee  
25          who made the invention during the course of employ-

1       ment with the Government, to obtain or retain title  
2       to the invention (subject to reservation by the Gov-  
3       ernment of a nonexclusive, nontransferable, irrev-  
4       ocable, paid-up license to practice the invention or  
5       have the invention practiced throughout the world by  
6       or on behalf of the Government). In addition, the  
7       agency may condition the inventor's right to title on  
8       the timely filing of a patent application in cases  
9       when the Government determines that it has or may  
10      have a need to practice the invention.

11           “(5) COMPUTER PROGRAM DISCLOSURE.—Any  
12      computer program that is a work of the United  
13      States Government and is created at a Federal lab-  
14      oratory within section 105(b)(1) of title 17, United  
15      States Code, shall be disclosed by the Federal em-  
16      ployee who created such program to the Federal lab-  
17      oratory that employs the Federal employee.

18           “(6) AUTHOR RIGHTS.—Any program described  
19      in paragraph (5) prepared by a Federal employee  
20      within the scope of his or her employment shall be  
21      considered a work made for hire and the Govern-  
22      ment shall be the author. A Federal employee who  
23      discloses as required under paragraph (5) but who  
24      contests that the Government is the author may re-  
25      quest, from the agency employing the Federal em-

1        ployee, a determination of rights in and to the pro-  
2        gram and shall do so within 30 days of the disclo-  
3        sure pursuant to paragraph (5). The request shall  
4        provide all grounds and justification for leaving  
5        rights with the Federal employee. If the request is  
6        not made by the Federal employee within the 30-day  
7        period, the Government shall remain and shall be  
8        the author of such program.

9            “(7) REPORTING EXEMPTION.—Such reporting  
10        requirements shall not apply to Federal employees  
11        who are otherwise prohibited from applying for or  
12        obtaining a patent. The Secretary may issue guide-  
13        lines to implement this section.”.

14    **SEC. 806. CLARIFYING CRADA AUTHORITY.**

15        Section 12 of the Stevenson–Wylder Technology In-  
16        novation Act of 1980 (15 U.S.C. 3710a) is amended—

17            (1) by inserting at the end of the section the  
18        following new subsection:

19            “(h) PATENT OBLIGATION.—Under an agreement  
20        entered into pursuant to this section, there is an obligation  
21        on the part of the collaborating party, in the event a  
22        United States patent application is filed by or on behalf  
23        of the collaborating party or by any assignee of the col-  
24        laborating party, to include within the specification of  
25        such application and any patent issuing thereon, a state-



1 ment specifying that the invention was made with Govern-  
2 ment support and that the Government has certain rights  
3 in the invention.”; and

4 (2) by striking subsection (d).

5 **SEC. 807. EXPANSION OF AGREEMENTS FOR COMMER-**  
6 **CIALIZING TECHNOLOGY AUTHORITY.**

7 The Stevenson–Wydler Technology Innovation Act of  
8 1980 (15 U.S. C. 3701 et seq.) is amended by inserting  
9 after section 14 the following:

10 **“SEC. 14a. AGREEMENTS FOR COMMERCIALIZING TECH-**  
11 **NOLOGY.**

12 “(a) AGREEMENTS WITH NON-FEDERAL ENTI-  
13 TIES.—The head of each Federal agency may permit the  
14 director of any of its Government-owned, contractor-oper-  
15 ated laboratories to perform work for non-Federal entities  
16 (sponsors) on a fully reimbursable basis and to execute  
17 agreements with a non-Federal entity, including a non-  
18 Federal entity already receiving Federal funding that will  
19 be used to support activities under the agreements, pro-  
20 vided that such funding is solely used to carry out the  
21 purposes of the Federal award.

22 “(b) RESTRICTION.—The requirements of chapter 18  
23 of title 35, United States Code (commonly known as the  
24 ‘Bayh-Dole Act’), shall apply if—

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

4           “(2) at least one of the parties to the funding  
5           agreement is eligible to receive rights under that  
6           chapter.

7           “(c) SUBMISSION TO AGENCY.—Each affected direc-  
8           tor of a Government-owned, contractor-operated labora-  
9           tory shall submit to the head of the Federal agency, with  
10          respect to each agreement entered into under this sec-  
11          tion—

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

14           “(2) the total estimated costs of the project;

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

17           “(4) other documentation determined to be ap-  
18          propriate by the head of the Federal agency.

19          “(d) CERTIFICATION.—The head of the Federal  
20          agency shall require the contractor of the affected Govern-  
21          ment-owned, contractor-operated laboratory to certify that  
22          each activity carried out under a project for which an  
23          agreement is entered into under this section—

24           “(1) is not in direct competition with the pri-  
25          vate sector; and

1           “(2) does not present, or minimizes, any appar-  
2           ent conflict of interest, and avoids or neutralizes any  
3           actual conflict of interest, as a result of the agree-  
4           ment under this section.

5           “(e) LIMITATION.—This authority only pertains to  
6           Federal agencies that do not have agency-specific authori-  
7           ties for Agreements for Commercializing Technology else-  
8           where in statute.”.

9           **SEC. 808. OTHER TRANSACTION AUTHORITY.**

10          The Stevenson–Wydler Technology Innovation Act of  
11          1980 (15 U.S.C. 3701 et seq.) is amended by inserting  
12          after section 15 the following:

13          **“SEC. 15A. OTHER TRANSACTIONS.**

14          “(a) GENERAL AUTHORITY.—

15                 “(1) PERMISSION.—Each Federal agency may  
16                 permit the director of any of its Government-oper-  
17                 ated Federal laboratories to enter into such other  
18                 transactions as may be necessary in the conduct of  
19                 the work of the Federal laboratory and on such  
20                 terms as the director of the Federal laboratory con-  
21                 siders appropriate, in furtherance of the purposes of  
22                 this Act.

23                 “(2) DISCLOSURE.—The Federal agency may  
24                 protect from disclosure, for up to 12 years after the  
25                 date on which the information is developed, any in-

1 formation developed pursuant to a transaction under  
2 this section that would be protected from disclosure  
3 under section 552(b)(4) of title 5, United States  
4 Code, if obtained from a person other than a Fed-  
5 eral agency.

6 “(3) **AUTHORITY LIMITATION.**—This authority  
7 only pertains to Federal agencies that do not have  
8 agency-specific authorities for other transactions  
9 elsewhere in statute.

10 “(b) **LIMITATIONS.**—A Federal laboratory using the  
11 authorities granted in subsection (a) may only enter into  
12 such other transactions when—

13 “(1) a warranted contracting officer determines  
14 that use of other authority of the Federal agency  
15 would be insufficient to achieve the purposes of this  
16 Act; and

17 “(2) use of such other transaction is approved  
18 by the Federal agency.”.

19 **SEC. 809. NONPROFIT FOUNDATIONS.**

20 The Stevenson–Wydler Technology Innovation Act of  
21 1980 (15 U.S.C. 3701 et seq.) is further amended by add-  
22 ing at the end the following:

23 **“SEC. 29. FOUNDATIONS.**

24 “(a) **IN GENERAL.**—A Government-owned Federal  
25 laboratory may establish or enter into an agreement with

1 a nonprofit organization to establish a Federal laboratory  
2 Foundation in support of its mission. Such a Foundation  
3 shall not be an agency or instrumentality of the United  
4 States Government, and the United States shall not be  
5 liable for any debts, defaults, acts, or omissions of the  
6 Foundation.

7 “(b) PURPOSE.—The purpose of a Foundation estab-  
8 lished under this section shall be to support the Govern-  
9 ment-owned Federal laboratory in its mission.

10 “(c) ACTIVITIES.—Activities of the Foundation may  
11 include the following:

12 “(1) The receipt, administration, solicitation,  
13 acceptance and use of funds, gifts, devises, or be-  
14 quests, either absolutely or in trust of real or per-  
15 sonal property or any income therefrom or other in-  
16 terest or equity therein for the benefit of, or in con-  
17 nection with, the mission of the Government-owned  
18 Federal laboratory. A gift, devise, or bequest may be  
19 accepted by the Foundation even though it is encum-  
20 bered, restricted, or subject to beneficial interests of  
21 private persons if any current or future interest  
22 therein is for the benefit of the Federal laboratory  
23 in its research and development activities. Contribu-  
24 tions, gifts, and other transfers made to or for the  
25 use of a Foundation established under this section

1 shall be regarded as contributions, gifts, or transfers  
2 to or for the use of the United States.

3 “(2) The conduct of support studies, competi-  
4 tions, projects, research and other activities that fur-  
5 ther the purposes of the Foundation.

6 “(3) Programs for fostering collaboration and  
7 partnerships with researches from the Federal and  
8 State governments, institutions of higher education,  
9 federally funded research and development centers,  
10 industry and nonprofit organizations for the re-  
11 search, development or commercialization of feder-  
12 ally supported technologies.

13 “(4) Programs for leveraging technologies to  
14 support new product development that supports re-  
15 gional economic development.

16 “(5) Administering prize competitions to accel-  
17 erate private sector competition and investment.

18 “(6) Provision of fellowships and grants to re-  
19 search and development personnel at, or affiliated  
20 with, federally funded centers. Such fellowships and  
21 grants may include stipends, travel, health insurance  
22 benefits and other appropriate expenses. The recipi-  
23 ents of fellowships shall be selected by the donors  
24 and the Foundation upon the recommendation of the  
25 employees in the Federal laboratory where the fellow

1 would serve, and shall be subject to agreement of the  
2 head of the agency whose mission is supported by  
3 the Foundation.

4 “(7) Supplementary programs to provide for—

5 “(A) scientists of other countries to serve  
6 in research capacities in the United States in  
7 association with the Federal laboratory whose  
8 mission the Foundation supports, or elsewhere,  
9 or opportunities for employees of the Federal  
10 laboratory whose mission the Foundation sup-  
11 ports to serve in such capacities in other coun-  
12 tries, or both;

13 “(B) the conduct and support of studies,  
14 projects, and research, that may include sti-  
15 pends, travel and other support for personnel in  
16 collaboration with national and international  
17 nonprofit and for-profit organizations;

18 “(C) the conduct and support of forums,  
19 meetings, conferences, courses, and training  
20 workshops that may include undergraduate,  
21 graduate, post-graduate, and post-doctoral ac-  
22 credited courses and the maintenance of accred-  
23 itation of such courses by the Foundation at  
24 the State and national level for college or con-  
25 tinuing education credits or for degrees;

1           “(D) programs to support and encourage  
2           teachers and students of science at all levels of  
3           education and programs for the general public  
4           which promote the understanding of science;

5           “(E) programs for writing, editing, print-  
6           ing, publishing, and vending of books and other  
7           materials; and

8           “(F) the conduct of other activities to  
9           carry out and support the purpose described in  
10          subsection (b).

11         “(d) TRANSFER OF FUNDS.—Notwithstanding any  
12         other provision of law, a Foundation established under  
13         this section may transfer funds to the Government-owned  
14         Federal laboratory and the Government-owned Federal  
15         laboratory may accept transfers of funds from the Foun-  
16         dation.”.

17         **SEC. 810. IMPROVING REPORTING AND METRICS.**

18         Section 11 of the Stevenson–Wylder Technology In-  
19         novation Act of 1980 (15 U.S.C. 3710) is amended by  
20         striking subsections (f) and (g) and inserting the fol-  
21         lowing:

22         “(f) AGENCY REPORTS ON UTILIZATION.—

23                 “(1) IN GENERAL.—Each Federal agency which  
24                 operates or directs one or more Federal laboratories  
25                 or which conducts activities under subsection (k) of



1 this section or sections 207 and 209 of title 35,  
2 United States Code, shall report annually to the Of-  
3 fice of Management and Budget, on the activities  
4 performed by that agency and its Federal labora-  
5 tories under the provisions of this section and of sec-  
6 tions 207 and 209 of such title 35.

7 “(2) CONTENTS.—The report shall include—

8 “(A) an explanation of the agency’s tech-  
9 nology transfer activities for the preceding fis-  
10 cal year and the agency’s plans to manage inno-  
11 vations with commercial promise consistent with  
12 the agency’s mission and benefitting the com-  
13 petitiveness of United States industry; and

14 “(B) information on technology transfer  
15 activities for the preceding fiscal year, includ-  
16 ing—

17 “(i) the number of patent applications  
18 filed;

19 “(ii) the number of patents received;

20 “(iii) the number of works registered  
21 for copyright protection in the United  
22 States on behalf of the United States, pur-  
23 suant to section 105(b) of title 17, United  
24 States Code;

1                   “(iv) the number of fully-executed li-  
2                   censes which received income from licens-  
3                   ing in the preceding fiscal year;

4                   “(v) the total income from licensing;

5                   “(vi) the number of licenses termi-  
6                   nated for cause;

7                   “(vii) the number of collaborative re-  
8                   search and development relationships; and

9                   “(viii) any other parameters or discus-  
10                  sion that the agency deems relevant or  
11                  unique to its practice of technology trans-  
12                  fer.

13                  “(3) COPY TO SECRETARY.—The agency shall  
14                  transmit a copy of the report to the Secretary of  
15                  Commerce for inclusion in the annual summary re-  
16                  quired by subsection (g)(2).

17                  “(4) PUBLIC AVAILABILITY.—Each Federal  
18                  agency reporting under this subsection shall make  
19                  available to the public through Internet sites, up-  
20                  dated at least annually—

21                  “(A) the information contained in such re-  
22                  port;

23                  “(B) information on intellectual property  
24                  which is available for licensing from the Federal  
25                  agency; and

1 “(C) information on Federal research and  
2 development programs, facilities, equipment and  
3 tools, expertise, services, and other relevant as-  
4 sets which are made available to the public by  
5 the Federal agency.

6 “(5) PUBLICATION BY NIST.—The Director of  
7 the National Institute of Standards and Technology  
8 is authorized to provide the summary required by  
9 subsection (g)(2) to the public through Internet  
10 sites.”.

11 **SEC. 811. INNOVATIVE APPROACHES TO TECHNOLOGY**  
12 **TRANSFER.**

13 Section 9(jj) of the Small Business Act (15 U.S.C.  
14 638(jj)) is amended to read as follows:

15 “(jj) INNOVATIVE APPROACHES TO TECHNOLOGY  
16 TRANSFER.—

17 “(1) GRANT PROGRAM.—

18 “(A) IN GENERAL.—Each Federal agency  
19 required by subsection (n) to establish an  
20 STTR program shall carry out a grant program  
21 to support innovative approaches to technology  
22 transfer at institutions of higher education (as  
23 defined in section 101(a) of the Higher Edu-  
24 cation Act of 1965 (20 U.S.C. 1001(a)), non-  
25 profit research institutions and Federal labora-

1           tories in order to accelerate the commercializa-  
2           tion of federally funded research and technology  
3           by small business concerns, including new busi-  
4           nesses.

5           “(B)   AWARDING   OF   GRANTS   AND  
6           AWARDS.—

7           “(i)   IN   GENERAL.—Each   Federal  
8           agency required by subparagraph (A) to  
9           participate in this program, shall award,  
10          through a competitive, merit-based process,  
11          grants, in the amounts listed in subpara-  
12          graph (C) to institutions of higher edu-  
13          cation, technology transfer organizations  
14          that facilitate the commercialization of  
15          technologies developed by one or more such  
16          institutions of higher education, Federal  
17          laboratories, other public and private non-  
18          profit entities, and consortia thereof, for  
19          initiatives that help identify high-quality,  
20          commercially viable federally funded re-  
21          search and technologies and to facilitate  
22          and accelerate their transfer into the mar-  
23          ketplace.

1                   “(ii) USE OF FUNDS.—Activities sup-  
2                   ported by grants under this subsection  
3                   may include—

4                   “(I) providing early-stage proof  
5                   of concept funding for translational  
6                   research;

7                   “(II) identifying research and  
8                   technologies at recipient institutions  
9                   that have the potential for accelerated  
10                  commercialization;

11                  “(III) technology maturation  
12                  funding to support activities such as  
13                  prototype construction, experiment  
14                  analysis, product comparison, and col-  
15                  lecting performance data;

16                  “(IV) technical validations, mar-  
17                  ket research, clarifying intellectual  
18                  property rights position and strategy,  
19                  and investigating commercial and  
20                  business opportunities; and

21                  “(V) programs to provide advice,  
22                  mentoring, entrepreneurial education,  
23                  project management, and technology  
24                  and business development expertise to  
25                  innovators and recipients of tech-

1 nology transfer licenses to maximize  
2 commercialization potential.

3 “(iii) SELECTION PROCESS AND AP-  
4 PPLICATIONS.—Qualifying institutions seek-  
5 ing a grant under this subsection shall  
6 submit an application to a Federal agency  
7 required by subparagraph (A) to partici-  
8 pate in this program at such time, in such  
9 manner, and containing such information  
10 as the agency may require. The application  
11 shall include, at a minimum—

12 “(I) a description of innovative  
13 approaches to technology transfer,  
14 technology development, and commer-  
15 cial readiness that have the potential  
16 to increase or accelerate technology  
17 transfer outcomes and can be adopted  
18 by other qualifying institutions, or a  
19 demonstration of proven technology  
20 transfer and commercialization strate-  
21 gies, or a plan to implement proven  
22 technology transfer and commer-  
23 cialization strategies, that can achieve  
24 greater commercialization of federally

1 funded research and technologies with  
2 program funding;

3 “(II) a description of how the  
4 qualifying institution will contribute  
5 to local and regional economic devel-  
6 opment efforts; and

7 “(III) a plan for sustainability  
8 beyond the duration of the funding  
9 award.

10 “(iv) PROGRAM OVERSIGHT  
11 BOARDS.—

12 “(I) IN GENERAL.—Successful  
13 proposals shall include a plan to as-  
14 semble a Program Oversight Board,  
15 the members of which shall have tech-  
16 nical, scientific, or business expertise  
17 and shall be drawn from industry,  
18 start-up companies, venture capital,  
19 technical enterprises, financial institu-  
20 tions, and business development orga-  
21 nizations.

22 “(II) PROGRAM OVERSIGHT  
23 BOARDS RESPONSIBILITIES.—Pro-  
24 gram Oversight Boards shall—

1           “(aa) establish award pro-  
2           grams for individual projects;

3           “(bb) provide rigorous eval-  
4           uation of project applications;

5           “(cc) determine which  
6           projects should receive awards, in  
7           accordance with guidelines estab-  
8           lished under subparagraph  
9           (C)(ii);

10          “(dd) establish milestones  
11          and associated award amounts  
12          for projects that reach mile-  
13          stones;

14          “(ee) determine whether  
15          awarded projects are reaching  
16          milestones; and

17          “(ff) develop a process to re-  
18          allocate outstanding award  
19          amounts from projects that are  
20          not reaching milestones to other  
21          projects with more potential.

22          “(C) GRANT AND AWARD AMOUNTS.—

23                 “(i) GRANT AMOUNTS.—Each Federal  
24                 agency required by subparagraph (A) to  
25                 carry out a grant program may make



1 grants to a qualifying institution for up to  
2 \$1,000,000 per year for up to 3 years.

3 “(ii) AWARD AMOUNTS.—Each quali-  
4 fying institution that receives a grant  
5 under subparagraph (B) shall provide  
6 awards for individual projects of not more  
7 than \$150,000, to be provided in phased  
8 amounts, based on reaching the milestones  
9 established by the qualifying institution’s  
10 Program Oversight Board.

11 “(D) AUTHORIZED EXPENDITURES FOR  
12 INNOVATIVE APPROACHES TO TECHNOLOGY  
13 TRANSFER GRANT PROGRAM.—

14 “(i) PERCENTAGE.—The percentage  
15 of the extramural budget each Federal  
16 agency required by subsection (n) to estab-  
17 lish an STTR program shall expend on the  
18 Innovative Approaches to Technology  
19 Transfer Grant Program shall be—

20 “(I) 0.05 percent for each of fis-  
21 cal years 2014 and 2015; and

22 “(II) 0.1 percent for each of fis-  
23 cal years 2016 and 2017.

24 “(ii) TREATMENT OF EXPENDI-  
25 TURES.—Any portion of the extramural

1 budget expended by a Federal agency on  
2 the Innovative Approaches to Technology  
3 Transfer Grant Program shall apply to-  
4 wards the agency's expenditure require-  
5 ments under subsection (n).

6 “(2) PROGRAM EVALUATION AND DATA COL-  
7 LECTION AND DISSEMINATION.—

8 “(A) EVALUATION PLAN AND DATA COL-  
9 LECTION.—Each Federal agency required by  
10 paragraph (1)(A) to establish an Innovative Ap-  
11 proaches to Technology Transfer Grant Pro-  
12 gram shall develop a program evaluation plan  
13 and collect annually such information from  
14 grantees as is necessary to assess the Program.  
15 Program evaluation plans shall require the col-  
16 lection of data aimed at identifying outcomes  
17 resulting from the transfer of technology with  
18 assistance from the Innovative Approaches to  
19 Technology Transfer Grant Program, such as—

20 “(i) specific follow-on funding identi-  
21 fied or obtained, including follow-on fund-  
22 ing sources, such as Federal sources or  
23 private sources;

24 “(ii) number of projects which result  
25 in a license to a start-up company or an

1 established company with sufficient re-  
2 sources for effective commercialization  
3 within 5 years of receiving an award under  
4 paragraph (1);

5 “(iii) invention disclosures and pat-  
6 ents;

7 “(iv) number of projects supported by  
8 qualifying institutions receiving a grant  
9 under paragraph (1) that secure Phase I  
10 or Phase II SBIR or STTR awards;

11 “(v) available information on revenue,  
12 sales or other measures of products that  
13 have been commercialized as a result of  
14 projects awarded under paragraph (1);

15 “(vi) number and location of jobs cre-  
16 ated resulting from projects awarded under  
17 paragraph (1); and

18 “(vii) other data as deemed appro-  
19 priate by a Federal agency required by this  
20 subparagraph to develop a program evalua-  
21 tion plan.

22 “(B) EVALUATIVE REPORT TO CON-  
23 GRESS.—The head of each Federal agency that  
24 participates in the Innovative Approaches to  
25 Technology Transfer Grant Program shall sub-

1           mit to the Committee on Science, Space, and  
2           Technology and the Committee on Small Busi-  
3           ness of the House of Representatives and the  
4           Committee on Small Business and Entrepre-  
5           neurship of the Senate an evaluative report re-  
6           garding the activities of the program. The re-  
7           port shall include—

8                   “(i) a detailed description of the im-  
9                   plementation of the program;

10                   “(ii) a detailed description of the  
11                   grantee selection process;

12                   “(iii) an accounting of the funds used  
13                   in the program; and

14                   “(iv) a summary of the data collected  
15                   under subparagraph (A).

16                   “(C) DATA DISSEMINATION.—For the pur-  
17                   poses of program transparency and dissemina-  
18                   tion of best practices, the Administrator shall  
19                   include on the public database under subsection  
20                   (k)(1) information on the Innovative Ap-  
21                   proaches to Technology Transfer Grant Pro-  
22                   gram, including—

23                           “(i) the program evaluation plan re-  
24                           quired under subparagraph (A);

1                   “(ii) a list of recipients of awards  
2                   under paragraph (1); and

3                   “(iii) information on the use of grants  
4                   under paragraph (1) by recipient institu-  
5                   tions.”.

6 **SEC. 812. DOE PUBLIC-PRIVATE PARTNERSHIPS FOR COM-**  
7 **MERCIALIZATION.**

8           (a) IN GENERAL.—Subject to subsections (b) and (c),  
9 the Secretary of Energy shall delegate to directors of the  
10 National Laboratories signature authority with respect to  
11 any agreement described in subsection (b) the total cost  
12 of which (including the National Laboratory contributions  
13 and project recipient cost share) is less than \$1,000,000,  
14 if such an agreement falls within the scope of—

15               (1) a strategic plan for the National Laboratory  
16               that has been approved by the Department of En-  
17               ergy; or

18               (2) the most recent congressionally approved  
19               budget for Department of Energy activities to be  
20               carried out by the National Laboratory.

21           (b) AGREEMENTS.—Subsection (a) applies to—

22               (1) a cooperative research and development  
23               agreement;

24               (2) a non-Federal work-for-others agreement;  
25               and

1           (3) any other agreement determined to be ap-  
2           propriate by the Secretary of Energy, in collabora-  
3           tion with the directors of the National Laboratories.

4           (c) ADMINISTRATION.—

5           (1) ACCOUNTABILITY.—The director of the af-  
6           fected National Laboratory and the affected con-  
7           tractor shall carry out an agreement under this sec-  
8           tion in accordance with applicable policies of the De-  
9           partment of Energy, including by ensuring that the  
10          agreement does not compromise any national secu-  
11          rity, economic, or environmental interest of the  
12          United States.

13          (2) CERTIFICATION.—The director of the af-  
14          fected National Laboratory and the affected con-  
15          tractor shall certify that each activity carried out  
16          under a project for which an agreement is entered  
17          into under this section does not present, or mini-  
18          mizes, any apparent conflict of interest, and avoids  
19          or neutralizes any actual conflict of interest, as a re-  
20          sult of the agreement under this section.

21          (3) AVAILABILITY OF RECORDS.—Within 30  
22          days of entering an agreement under this section,  
23          the director of a National Laboratory shall submit  
24          to the Secretary of Energy for monitoring and re-

1 view all records of the National Laboratory relating  
2 to the agreement.

3 (4) RATES.—The director of a National Lab-  
4 oratory may charge higher rates for services per-  
5 formed under a partnership agreement entered into  
6 pursuant to this section, regardless of the full cost  
7 of recovery, if such funds are used exclusively to  
8 support further research and development activities  
9 at the respective National Laboratory.

10 (d) EXCEPTION.—This section does not apply to any  
11 agreement with a majority foreign-owned company.

12 (e) CONFORMING AMENDMENT.—Section 12 of the  
13 Stevenson-Wydler Technology Innovation Act of 1980 (15  
14 U.S.C. 3710a) is amended—

15 (1) in subsection (a)—

16 (A) by redesignating paragraphs (1) and

17 (2) as subparagraphs (A) and (B), respectively;

18 (B) by striking “Each Federal agency” and

19 inserting the following:

20 “(1) IN GENERAL.—Except as provided in para-  
21 graph (2), each Federal agency”; and

22 (C) by adding at the end the following:

23 “(2) EXCEPTION.—Notwithstanding paragraph  
24 (1), in accordance with section 813(a) of the Secur-  
25 ing American Leadership in Science and Technology

1 Act of 2020, approval by the Secretary of Energy  
2 shall not be required for any technology transfer  
3 agreement proposed to be entered into by a National  
4 Laboratory of the Department of Energy, the total  
5 cost of which (including the National Laboratory  
6 contributions and project recipient cost share) is less  
7 than \$1,000,000.”; and

8 (2) in subsection (b), by striking “subsection  
9 (a)(1)” each place it appears and inserting “sub-  
10 section (a)(1)(A)”.

11 (f) SAVINGS CLAUSE.—Nothing in this section or an  
12 amendment made by this section abrogates or otherwise  
13 affects the primary responsibilities of any National Lab-  
14 oratory to the Department of Energy.