



(Original Signature of Member)

117TH CONGRESS  
1ST 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.

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IN THE HOUSE OF REPRESENTATIVES

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

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**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 2021”.

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

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

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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) improving the security and integrity of  
4 American research and development;

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

8 (6) expanding the STEM workforce at all levels  
9 to meet the demands of a 21st century economy;

10 (7) promoting regional innovation to support  
11 local economic growth across all regions of the  
12 United States;

13 (8) maximizing the effectiveness of the Federal  
14 Government's research and development activities;

15 (9) promoting collaboration among the Federal  
16 Government, Federal laboratories, universities, and  
17 industry; and

18 (10) improving technology transfer from the  
19 Federal Government and Federal laboratories to the  
20 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 the following:

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

23 “(a) REQUIREMENTS.—

24 “(1) QUADRENNIAL REVIEWS REQUIRED.—Not  
25 later than December 31, 2022, 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 nonprofit 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 make recommendations to im-  
9 prove translation of basic research and the enhance-  
10 ment of technology transfer of federally funded re-  
11 search;

12 “(7) assess and identify the infrastructure and  
13 tools needed to maintain the leadership of the  
14 United States in science and technology; and

15 “(8) review administrative or legislative policies  
16 that affect the science and technology enterprise and  
17 identify and make recommendations on policies that  
18 hinder research and development in the United  
19 States.

20 “(c) REPORTING.—

21 “(1) IN GENERAL.—Not later than December  
22 31 of the year in which a quadrennial science and  
23 technology review is conducted, the Director shall  
24 submit a report of the review to Congress.

1           “(2) PUBLICATION.—The Director shall, con-  
2           sistent with the protection of national security and  
3           other sensitive matters to the maximum extent pos-  
4           sible, make each report submitted under paragraph  
5           (1) publicly available on an internet website of the  
6           Office of Science and Technology Policy.”.

7           **Subtitle B—Office of Science and**  
8           **Technology Policy**

9           **SEC. 111. AUTHORIZATION OF APPROPRIATIONS.**

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

- 12           (1) \$5,544,000 for fiscal year 2022;  
13           (2) \$6,100,000 for fiscal year 2023;  
14           (3) \$6,500,000 for fiscal year 2024;  
15           (4) \$6,500,000 for fiscal year 2025;  
16           (5) \$6,500,000 for fiscal year 2026;  
17           (6) \$6,500,000 for fiscal year 2027;  
18           (7) \$6,500,000 for fiscal year 2028;  
19           (8) \$6,500,000 for fiscal year 2029;  
20           (9) \$6,500,000 for fiscal year 2030; and  
21           (10) \$6,500,000 for fiscal year 2031.

1    **TITLE II—RESEARCH SECURITY**  
2                                    **AND INTEGRITY**

3    **SEC. 201. FOREIGN TALENT PROGRAM PROHIBITION.**

4           (a) IN GENERAL.—Not later than 180 days after the  
5 date of enactment of this Act, each Federal research agen-  
6 cy head shall develop a policy to prohibit all agency per-  
7 sonnel, including Federal employees, contract employees,  
8 independent contractors, and special government employ-  
9 ees, from participating in a foreign government talent re-  
10 cruitment program.

11          (b) COORDINATION.—The Director of the Office of  
12 Science and Technology Policy, acting through the Na-  
13 tional Science and Technology Council and in accordance  
14 with the authority provided under section 1746 of the Na-  
15 tional Defense Authorization Act for Fiscal Year 2020  
16 (Public Law 116–92; 42 U.S.C. 6601 note) shall to the  
17 maximum extent practicable ensure that the policies devel-  
18 oped by Federal research agencies under subsection (a)  
19 are consistent.

20          (c) EXEMPTION.—Each policy developed under sub-  
21 section (a) shall include an exemption for participation in  
22 international conferences or other international exchanges,  
23 partnerships or programs, as sanctioned or approved by  
24 each Federal research agency head or their designee.

25          (d) DEFINITIONS.—In this section:

1           (1) FEDERAL RESEARCH AGENCY.—The term  
2           “Federal research agency” means any Federal agen-  
3           cy with an annual extramural research expenditure  
4           of over \$100,000,000.

5           (2) FOREIGN GOVERNMENT TALENT RECRUIT-  
6           MENT PROGRAM.—The term “foreign government  
7           talent recruitment program” means any program  
8           that includes compensation, including cash, research  
9           funding, honorific titles, promised future compensa-  
10          tion, or other types of remuneration, provided by the  
11          foreign state or an entity sponsored by the foreign  
12          state to the targeted individual in exchange for the  
13          individual transferring knowledge and expertise to  
14          the foreign country.

15 **SEC. 202. COMPUTING ENCLAVE PILOT PROGRAM.**

16          (a) IN GENERAL.—The Director of the National  
17          Science Foundation, in consultation with the Director of  
18          the National Institute of Standards and Technology and  
19          the Secretary of Energy, shall award grants to establish  
20          a pilot program to ensure the security of federally sup-  
21          ported research data and to assist regional institutions of  
22          higher education and their researchers in compliance with  
23          regulations regarding the safeguarding of sensitive infor-  
24          mation and other relevant regulations and Federal guide-  
25          lines.

1           (b) STRUCTURE.—In carrying out the pilot program  
2 established pursuant to subsection (a), the Director of the  
3 National Science Foundation shall select three institutions  
4 of higher education from among institutions classified  
5 under the Indiana University Center for Postsecondary  
6 Research Carnegie Classification as a doctorate-granting  
7 university with a very high level of research activity, and  
8 with a history of working with secure information for the  
9 development, installation, maintenance, or sustainment of  
10 secure computing enclaves.

11           (c) REGIONALIZATION.—

12           (1) In selecting universities pursuant to sub-  
13 section (b), the Director of the National Science  
14 Foundation shall give preference to institutions of  
15 higher education with the capability of serving other  
16 regional universities.

17           (2) The enclaves should be geographically dis-  
18 persed to better meet the needs of regional interests.

19           (d) PROGRAM ELEMENTS.—The Director of the Na-  
20 tional Science Foundation shall work with institutions of  
21 higher education selected pursuant to subsection (b) to—

22           (1) develop an approved design blueprint for  
23 compliance with Federal data protection protocols;

24           (2) develop a comprehensive and confidential  
25 list, or a bill of materials, of each binary component

1 of the software, firmware, or product that is re-  
2 quired to deploy additional secure computing en-  
3 claves;

4 (3) develop templates for all policies and proce-  
5 dures required to operate the secure computing en-  
6 clave in a research setting;

7 (4) develop a system security plan template;  
8 and

9 (5) develop a process for managing a plan of  
10 action and milestones for the secure computing en-  
11 clave.

12 (e) DURATION.—The pilot program established pur-  
13 suant to subsection (a) shall operate for not less than 3  
14 years.

15 (f) REPORT.—

16 (1) IN GENERAL.—The Director of the National  
17 Science Foundation shall report to Congress not  
18 later than 6 months after the completion of the pilot  
19 program under subsection (a).

20 (2) CONTENTS.—The report required under  
21 paragraph (1) shall include—

22 (A) an assessment of the pilot program  
23 under subsection (a), including an assessment  
24 of the security benefits provided by such secure  
25 computing enclaves;



1 (B) recommendations related to the value  
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. 203. PROTECTING RESEARCH FROM CYBER THEFT.**

9 (a) IMPROVING CYBERSECURITY OF INSTITUTIONS  
10 OF HIGHER EDUCATION.—Section 2(e)(1)(A) of the Na-  
11 tional Institute of Standards and Technology Act (15  
12 U.S.C. 272(e)(1)(A)) is amended—

13 (1) in clause (viii), by striking “and” after the  
14 semicolon;

15 (2) by redesignating clause (ix) as clause (x);  
16 and

17 (3) by inserting after clause (viii) the following:

18 “(ix) consider institutions of higher  
19 education (as defined in section 101 of the  
20 Higher Education Act of 1965 (20 U.S.C.  
21 1001)); and”.

22 (b) DISSEMINATION OF RESOURCES FOR RESEARCH  
23 INSTITUTIONS.—

24 (1) IN GENERAL.—Not later than 90 days after  
25 the date of the enactment of this Act, the Director

1 shall, using the authorities of the Director under  
2 subsections (c)(15) and (e)(1)(A)(ix) of section 2 of  
3 the National Institute of Standards and Technology  
4 Act (15 U.S.C. 272), as amended by subsection (a),  
5 disseminate and make publicly available resources to  
6 help research institutions and institutions of higher  
7 education identify, assess, manage, and reduce their  
8 cybersecurity risk related to conducting research.

9 (2) REQUIREMENTS.—The Director shall en-  
10 sure that the resources disseminated pursuant to  
11 paragraph (1)—

12 (A) are generally applicable and usable by  
13 a wide range of research institutions and insti-  
14 tutions of higher education;

15 (B) vary with the nature and size of the  
16 implementing research institutions or institu-  
17 tions of higher education, and the nature and  
18 sensitivity of the data collected or stored on the  
19 information systems or devices of the imple-  
20 menting research institutions or institutions of  
21 higher education;

22 (C) include elements that promote aware-  
23 ness of simple, basic controls, a workplace cy-  
24 bersecurity culture, and third-party stakeholder  
25 relationships, to assist research institutions or

1 institutions of higher education in mitigating  
2 common cybersecurity risks;

3 (D) include case studies of practical appli-  
4 cation;

5 (E) are technology-neutral and can be im-  
6 plemented using technologies that are commer-  
7 cial and off-the-shelf; and

8 (F) to the extent practicable, are based on  
9 international standards.

10 (3) NATIONAL CYBERSECURITY AWARENESS  
11 AND EDUCATION PROGRAM.—The Director shall en-  
12 sure that the resources disseminated under para-  
13 graph (1) are consistent with the efforts of the Di-  
14 rector under section 401 of the Cybersecurity En-  
15 hancement Act of 2014 (15 U.S.C. 7451).

16 (4) UPDATES.—The Director shall review peri-  
17 odically and update the resources under paragraph  
18 (1) as the Director determines appropriate.

19 (5) VOLUNTARY RESOURCES.—The use of the  
20 resources disseminated under paragraph (1) shall be  
21 considered voluntary.

22 (6) OTHER FEDERAL CYBERSECURITY RE-  
23 QUIREMENTS.—Nothing in this section may be con-  
24 strued to supersede, alter, or otherwise affect any

1       cybersecurity requirements applicable to Federal  
2       agencies.

3       (c) DEFINITIONS.—In this section:

4           (1) DIRECTOR.—The term “Director” means  
5       the Director of the National Institute of Standards  
6       and Technology.

7           (2) INSTITUTION OF HIGHER EDUCATION.—The  
8       term “institution of higher education” has the  
9       meaning given such term in section 101 of the High-  
10      er Education Act of 1965 (20 U.S.C. 1001).

11          (3) RESOURCES.—The term “resources” means  
12      guidelines, tools, best practices, standards, meth-  
13      odologies, and other ways of providing information.

14          (4) RESEARCH INSTITUTION.—The term “re-  
15      search institution”—

16           (A) means a nonprofit institution (as de-  
17      fined in section 4(3) of the Stevenson-Wydler  
18      Technology Innovation Act of 1980 (15 U.S.C.  
19      3703(3))); and

20           (B) includes federally funded research and  
21      development centers, as identified by the Na-  
22      tional Science Foundation in accordance with  
23      the Federal Acquisition Regulation issued in ac-  
24      cordance with section 1303(a)(1) of title 41 (or  
25      any successor regulation).

1 **SEC. 204. CHINESE RESEARCH FUNDS ACCOUNTING ACT.**

2 (a) STUDY.—The Comptroller General of the United  
3 States shall conduct a study on Federal funding made  
4 available to covered entities for research during the study  
5 period.

6 (b) MATTERS TO BE INCLUDED.—The study con-  
7 ducted under subsection (a) shall include, to the extent  
8 practicable with respect to the study period, an assessment  
9 of—

10 (1) the total amount of Federal funding made  
11 available to covered entities for research;

12 (2) the total number and types of covered enti-  
13 ties to whom such funding was made available;

14 (3) the requirements relating to the awarding,  
15 tracking, and monitoring of such funding;

16 (4) any other data available with respect to  
17 Federal funding made available to covered entities  
18 for research; and

19 (5) other matters the Comptroller General de-  
20 termines appropriate.

21 (c) BRIEFING ON AVAILABLE DATA.—Not later than  
22 120 days after the date of enactment of this Act, the  
23 Comptroller General shall brief the Committee on Science,  
24 Space, and Technology and the Committee on Foreign Af-  
25 fairs of the House of Representatives and the Committee  
26 on Commerce, Science, and Transportation and the Com-

1 mittee on Foreign Relations of the Senate on the data that  
2 is available with respect to Federal funding made available  
3 to covered entities for research.

4 (d) REPORT.—Not later than 240 days after the date  
5 of enactment of this Act, the Comptroller General shall  
6 submit to the congressional committees specified in sub-  
7 section (c) a report on the findings of the study conducted  
8 under subsection (a).

9 (e) DEFINITIONS.—In this section:

10 (1) COVERED ENTITY.—The term “covered en-  
11 tity” means an entity—

12 (A) located in the People’s Republic of  
13 China; or

14 (B) majority owned or controlled by the  
15 Chinese Communist Party.

16 (2) STUDY PERIOD.—The term “study period”  
17 means the 5-year period ending on the date of enact-  
18 ment of this Act.

## 19 **TITLE III—SUPPLY CHAIN AND** 20 **CRITICAL MATERIALS SECURITY**

### 21 **SEC. 301. NATIONAL SUPPLY CHAIN DATABASE.**

22 (a) ESTABLISHMENT OF NATIONAL SUPPLY CHAIN  
23 DATABASE.—The Director of the National Institute of  
24 Standards and Technology (referred to in this section as

1 “NIST”) shall establish a National Supply Chain Data-  
2 base.

3 (b) PURPOSE.—The purpose of the National Supply  
4 Chain Database shall be to assist the Federal government  
5 and industry sectors in minimizing disruptions to the  
6 United States supply chain by having an assessment of  
7 United States manufacturers’ capabilities.

8 (c) STUDY ON NATIONAL SUPPLY CHAIN DATA-  
9 BASE.—In establishing the National Supply Chain Data-  
10 base, the Director of NIST shall take into consideration  
11 the findings and recommendations from the study author-  
12 ized in section 9413 of the National Defense Authorization  
13 Act for Fiscal Year 2021 (Public Law 116–283), including  
14 measures to secure and protect the National Supply Chain  
15 Database from adversarial attacks and vulnerabilities.

16 (d) DATABASE AND MANUFACTURING EXTENSION  
17 PARTNERSHIP.—

18 (1) IN GENERAL.—The National Supply Chain  
19 Database shall be carried out and managed through  
20 the Hollings Manufacturing Extension Partnership  
21 program and the Director of NIST shall ensure that  
22 the Hollings Manufacturing Extension Partnership  
23 Centers are connected to the National Supply Chain  
24 Database.

1           (2) CAPABILITIES.—The National Supply Chain  
2 Database shall be capable of providing a national  
3 view of the supply chain and enable authorized data-  
4 base users to determine in near real-time the United  
5 States manufacturing capabilities for critical prod-  
6 ucts, including defense supplies, food, and medical  
7 devices, including personal protective equipment.

8           (3) INDIVIDUAL STATE DATABASES.—Each  
9 State’s supply chain database maintained by the  
10 NIST-recognized Manufacturing Extension Partner-  
11 ship Center within the State shall be complementary  
12 in design to the National Supply Chain Database.

13       (e) MAINTENANCE OF NATIONAL SUPPLY CHAIN  
14 DATABASE.—The Director of NIST through the Hollings  
15 Manufacturing Extension Partnership program shall  
16 maintain the National Supply Chain Database as an inte-  
17 gration of the State level databases from each State’s  
18 Manufacturing Extension Partnership Center and may be  
19 populated with information from past, current, or poten-  
20 tial Center clients.

21       (f) EXEMPT FROM PUBLIC DISCLOSURE.—The Na-  
22 tional Supply Chain Database and any information related  
23 to it not publicly released by NIST shall be exempt from  
24 public disclosure under section 552 of title 5, United  
25 States Code, and access to non-public content shall be lim-



1 ited to the contributing company and Manufacturing Ex-  
2 tension Partnership Center staff who sign an appropriate  
3 non-disclosure agreement.

4 **SEC. 302. CRITICAL MINERALS MINING RESEARCH AND DE-**  
5 **VELOPMENT AT THE NATIONAL SCIENCE**  
6 **FOUNDATION.**

7 (a) IN GENERAL.—The Director of the National  
8 Science Foundation shall award grants, on a competitive  
9 basis, to institutions of higher education or nonprofit orga-  
10 nizations (or consortium of such institutions or organiza-  
11 tions) to support basic research that will accelerate inno-  
12 vation to advance critical minerals mining strategies and  
13 technologies for the purpose of making better use of do-  
14 mestic resources and eliminating national reliance on min-  
15 erals and mineral materials that are subject to supply dis-  
16 ruptions.

17 (b) USE OF FUNDS.—Activities funded by a grant  
18 under this section may include—

19 (1) advancing mining research and development  
20 activities to develop new mapping and mining tech-  
21 nologies and techniques, including advanced critical  
22 mineral extraction, production, separation, alloying,  
23 or processing techniques and technologies that can  
24 decrease energy intensity, potential environmental  
25 impact and costs of those activities;

1           (2) conducting long-term earth observatory of  
2 reclaimed mine sites, including the study of the evo-  
3 lution of microbial diversity at such sites;

4           (3) examining the application of artificial intel-  
5 ligence for geological exploration of critical minerals,  
6 including what the size and diversity of data sets  
7 would be required;

8           (4) examining the application of machine learn-  
9 ing for detection and sorting of critical minerals, in-  
10 cluding what the size and diversity of data sets  
11 would be required;

12           (5) conducting detailed isotope studies of crit-  
13 ical minerals and the development of more refined  
14 geologic models; or

15           (6) providing training and researcher opportu-  
16 nities to undergraduate and graduate students to  
17 prepare the next generation of mining engineers and  
18 researchers.

19 **SEC. 303. ADVANCED RECYCLING RESEARCH AND DEVEL-**  
20 **OPMENT.**

21           (a) **SHORT TITLE.**—This section may be cited as the  
22 “Advanced Recycling Research and Development Act of  
23 2021”.

24           (b) **DEFINITIONS.**—In this section:

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

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

7           (3) SECRETARY.—The term “Secretary” means  
8 the Secretary of Energy.

9           (4) RECYCLABLE PLASTIC.—The term “recyclable  
10 ble plastic” means plastic that is designed to be  
11 readily, economically, and efficiently recyclable or  
12 otherwise recoverable for beneficial use.

13           (5) CRITICAL MATERIAL.—The term “critical  
14 material” means material that serves an essential  
15 function in the manufacturing of a product and has  
16 a high risk of a supply disruption, such that a short-  
17 age of such material would have significant con-  
18 sequences for the economic or national security of  
19 the United States.

20           (6) COMPOSITE.—The term “composite” means  
21 plastic reinforced with fiber or particulate secondary  
22 material like bio-derived fibers, carbon fibers, glass  
23 or any other solid material.

24           (c) OPTIMIZED PLASTICS RECYCLING RESEARCH  
25 AND DEVELOPMENT PROGRAM.—

1           (1) IN GENERAL.—The Secretary shall carry  
2           out a research, development, and demonstration pro-  
3           gram to accelerate innovation in energy-efficient re-  
4           cyclable plastics, next-generation plastics, and com-  
5           posites recycling and upcycling strategies and tech-  
6           nologies, in order to increase the economic value of  
7           plastics supply streams and to reduce the environ-  
8           mental impact of global plastics consumption.

9           (2) EXECUTION.—In carrying out the program  
10          under this subsection, the Secretary shall—

11                 (A) develop novel collection and sorting  
12                 technologies to prevent plastics and composites,  
13                 including waterborne plastics, from entering  
14                 landfills and the marine environment;

15                 (B) develop biological, chemical, and hy-  
16                 brid bio-chemical technologies and methods for  
17                 deconstructing plastic and composite waste, in-  
18                 cluding environmental waste, into useful chem-  
19                 ical and material streams;

20                 (C) develop technologies to upcycle waste,  
21                 including chemical, material, and gaseous  
22                 streams, into higher-value products;

23                 (D) develop new economically recyclable-  
24                 by-design plastics and composites that can be

1 scaled for domestic manufacturability and re-  
2 covery;

3 (E) develop new energy-efficient advanced  
4 manufacturing techniques for reclaimed plastics  
5 and composites; and

6 (F) develop new data collection methods  
7 and practices in collaboration with relevant  
8 Federal agencies.

9 (3) LEVERAGING.—In carrying out the program  
10 under this subsection, the Secretary shall leverage  
11 resources and expertise from—

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

15 (B) the Office of Energy Efficiency and  
16 Renewable Energy.

17 (4) STANDARD OF REVIEW.—The Secretary  
18 shall periodically review activities carried out under  
19 the program under this subsection to determine the  
20 achievement of technical milestones as determined  
21 by the Secretary.

22 (5) FUNDING.—

23 (A) IN GENERAL.—From within funds au-  
24 thorized to be appropriated—

1 (i) to the Department's Office of  
2 Science, there shall be made available to  
3 the Secretary to carry out the program  
4 under this subsection \$15,000,000 for each  
5 of fiscal years 2022 through 2026; and

6 (ii) to the Department's Office of En-  
7 ergy Efficiency and Renewable Energy,  
8 there shall be made available to the Sec-  
9 retary to carry out the program under this  
10 subsection \$25,000,000 for each of fiscal  
11 years 2022 through 2026.

12 (B) PROHIBITION.—In carrying out the  
13 program under this subsection, the Secretary  
14 shall not use funds made available under para-  
15 graph (1) for commercial application of energy  
16 technology.

17 (d) LITHIUM-ION BATTERY RECYCLING RESEARCH  
18 AND DEVELOPMENT PROGRAM.—

19 (1) IN GENERAL.—The Secretary shall carry  
20 out a research, development, and demonstration pro-  
21 gram to support the development of—

22 (A) advanced materials for batteries with  
23 considerations given to resource availability and  
24 environmentally benign disposal and recycling;  
25 and

1 (B) innovative technologies to reclaim and  
2 recycle critical materials from advanced and  
3 lithium-ion based battery technologies used in  
4 consumer electronics, defense, stationary stor-  
5 age, and transportation applications.

6 (2) EXECUTION.—In carrying out the program  
7 under this subsection, the Secretary shall—

8 (A) promote the discovery of new domesti-  
9 cally sourced raw materials for batteries that  
10 can degrade without causing damage to the en-  
11 vironment;

12 (B) develop innovative and cost-effective  
13 technologies and processes for the collection,  
14 storage, and transportation of discarded lith-  
15 ium-ion batteries that use domestic mining re-  
16 sources and increase availability of domestically  
17 sourced raw materials for batteries; and

18 (C) develop cost-effective recycling proc-  
19 esses to recover critical materials from dis-  
20 carded lithium-ion batteries and enable their re-  
21 introduction in new lithium-ion cell technologies  
22 and for use in other relevant industries.

23 (3) LEVERAGING.—In carrying out the program  
24 under this subsection, the Secretary shall leverage  
25 resources and expertise from—

1 (A) the Basic Energy Sciences Program of  
2 the Office of Science;

3 (B) the Office of Energy Efficiency and  
4 Renewable Energy, including current lithium-  
5 ion battery recycling activities supported by the  
6 Vehicle Technologies Office within the Office of  
7 Energy Efficiency and Renewable Energy; and

8 (C) the Office of Technology Transitions.

9 (4) STANDARD OF REVIEW.—The Secretary  
10 shall periodically review activities carried out under  
11 the program under this subsection to determine the  
12 achievement of technical milestones as determined  
13 by the Secretary.

14 (5) FUNDING.—

15 (A) IN GENERAL.—From within funds au-  
16 thorized to be appropriated—

17 (i) to the Department's Office of  
18 Science, there shall be made available to  
19 the Secretary to carry out the activities  
20 under this subsection \$10,000,000 for each  
21 of fiscal years 2022 through 2026; and

22 (ii) to the Department's Office of En-  
23 ergy Efficiency and Renewable Energy,  
24 there shall be made available to the Sec-  
25 retary to carry out the activities under this



1 subsection \$10,000,000 for each of fiscal  
2 years 2022 through 2026.

3 (B) PROHIBITION.—In carrying out the  
4 program under this subsection, the Secretary  
5 shall not use funds made available under sub-  
6 paragraph (A) for commercial application of en-  
7 ergy technology.

8 **SEC. 304. CRITICAL MINERALS INTERAGENCY SUB-**  
9 **COMMITTEE.**

10 (a) IN GENERAL.—The Critical Minerals Sub-  
11 committee of the National Science and Technology Council  
12 (referred to in this section as “Subcommittee”) shall co-  
13 ordinate Federal science and technology efforts to ensure  
14 secure and reliable supplies of critical minerals to the  
15 United States.

16 (b) PURPOSES.—The purposes of the Subcommittee  
17 shall be—

18 (1) to advise and assist the Committee on  
19 Homeland and National Security and the National  
20 Science and Technology Council on United States  
21 policies, procedures, and plans as it relates to crit-  
22 ical minerals, including—

23 (A) Federal research, development, and de-  
24 ployment efforts to optimize methods for ex-  
25 tractions, concentration, separation and purifi-

1 cation of conventional, secondary, and uncon-  
2 ventional sources of critical minerals;

3 (B) efficient use and reuse of critical min-  
4 erals;

5 (C) the critical minerals workforce of the  
6 United States; and

7 (D) United States private industry invest-  
8 ments in innovation and technology transfer  
9 from federally funded science and technology;

10 (2) to identify emerging opportunities, stimu-  
11 late international cooperation, and foster the devel-  
12 opment of secure and reliable supply chains of crit-  
13 ical minerals;

14 (3) to ensure the transparency of information  
15 and data related to critical minerals; and

16 (4) to provide recommendations on coordination  
17 and collaboration among the research, development,  
18 and deployment programs and activities of Federal  
19 agencies to promote a secure and reliable supply of  
20 critical minerals necessary to maintain national se-  
21 curity, economic well-being, and industrial produc-  
22 tion.

23 (c) RESPONSIBILITIES.—In carrying out paragraphs  
24 (1) and (2), the Subcommittee may, taking into account

1 the findings and recommendations of relevant advisory  
2 committees—

3           (1) provide recommendations on how Federal  
4 agencies may improve the topographic, geologic, and  
5 geophysical mapping of the United States and im-  
6 prove the discoverability, accessibility, and usability  
7 of the resulting and existing data, to the extent per-  
8 mitted by law and subject to appropriate limitation  
9 for purposes of privacy and security; assess the  
10 progress towards developing critical minerals recy-  
11 cling and reprocessing technologies, and techno-  
12 logical alternatives to critical minerals;

13           (2) examine options for accessing and devel-  
14 oping critical minerals through investment and trade  
15 with our allies and partners and provide rec-  
16 ommendations;

17           (3) evaluate and provide recommendations to  
18 incentivize the development and use of advances in  
19 science and technology in the private industry;

20           (4) assess the need for and make recommenda-  
21 tions to address the challenges the United States  
22 critical minerals supply chain workforce faces, in-  
23 cluding aging and retiring personnel and faculty;  
24 public perceptions about the nature of mining and

1 mineral processing; and foreign competition for  
2 United States talent;

3 (5) develop, and update as necessary, a stra-  
4 tegic plan to guide Federal programs and activities  
5 to enhance scientific and technical capabilities across  
6 critical mineral supply chains, including a roadmap  
7 that identifies key research and development needs  
8 and coordinates ongoing activities for source diver-  
9 sification, more efficient use, recycling, and substi-  
10 tution for critical minerals; as well as cross-cutting  
11 mining science, data science techniques, materials  
12 science, manufacturing science and engineering,  
13 computational modeling, and environmental health  
14 and safety research and development; and

15 (6) report to the appropriate committees of  
16 Congress on activities and findings under this sec-  
17 tion.

18 **SEC. 305. HEAVY FREIGHT AUTONOMOUS TRUCKING RE-**  
19 **SEARCH CORRIDOR.**

20 (a) IN GENERAL.—Not later than 1 year after the  
21 date of enactment of this Act, the Secretary of Transpor-  
22 tation shall establish a Heavy Freight Autonomous Truck-  
23 ing Research Initiative to lay the foundation for the broad  
24 scale adoption of autonomous freight trucking.

1 (b) RESPONSIBILITIES.—In carrying out the Initia-  
2 tive established under subsection (a), the Secretary shall—

3 (1) support and conduct research and develop-  
4 ment on automated and connected freight trucking  
5 with private industry, and industry associations,  
6 other Federal agencies, State and local Transpor-  
7 tation agencies, research universities, and a National  
8 Transportation center selected under section  
9 5505(c)(2) of title 49, United States Code; and

10 (2) support or establish a heavy freight autono-  
11 mous trucking research and development corridor  
12 and related pilot programs.

13 (c) RESEARCH AND DEVELOPMENT AGENDA.—The  
14 Secretary, in consultation with interested parties, shall es-  
15 tablish an agenda for research and development conducted  
16 under subsection (b)(1) and the programs described in  
17 subsection (b)(2) that at a minimum, include—

18 (1) analyzing, modeling, and piloting the feasi-  
19 bility and benefits of dedicated autonomous trucking  
20 corridors, including their impact on—

21 (A) long distance freight movement;

22 (B) supply chains that are critical to the  
23 United States economy;

24 (C) fuel economy and emissions;

25 (D) transportation infrastructure;

1 (E) vehicle miles traveled;

2 (F) the freight trucking workforce; and

3 (G) safety, accidents, and fatalities; and

4 (2) providing deployment guidance, including

5 for—

6 (A) utilization costs models;

7 (B) cyber-physical security; and

8 (C) human factors, including training the  
9 next generation of the transportation workforce.

10 (d) ELIGIBILITY.—An institution of higher education  
11 (as defined by section 102 of the Higher Education Act  
12 of 1965 (20 U.S.C. 1002)) or a consortium composed of  
13 nonprofits and institutions of higher education shall be eli-  
14 gible to receive grants under this program.

15 (e) SELECTION CRITERIA.—In awarding a grant, the  
16 Secretary shall—

17 (1) give preference to the recipient's past and  
18 current collaboration with local and state transpor-  
19 tation agencies in activities related to section;

20 (2) give preference to a recipient whose geo-  
21 graphic location offer access to long haul tucking  
22 corridors;

23 (3) consider the extent to which an applicant's  
24 proposal would involve participation by local, re-  
25 gional, and national stakeholders; and

1           (4) consider the local, regional, and national  
2           impacts of the applicant’s proposal.

3           (f) FEDERAL SHARE.—The Federal share of a grant  
4           under this subsection shall be 50 percent of the costs of  
5           establishing and operating the test corridor and related  
6           activities carried out by the grant recipient.

7           (g) AUTHORIZATION OF APPROPRIATIONS.—There  
8           are authorized to be appropriated to the Secretary  
9           \$6,000,000 for each of the fiscal years 2022 through 2026  
10          for grants under this section.

11 **SEC. 306. NIST UAV CHALLENGES AND CREDENTIALING**  
12 **PROGRAM.**

13          (a) UNMANNED AERIAL VEHICLE RESEARCH CHAL-  
14          LENGE.—

15               (1) PRIZE CHALLENGE.—Pursuant to section  
16               24 of the Stevenson-Wydler Technology Innovation  
17               Act of 1980 (15 U.S.C. 3719), the Secretary of  
18               Commerce, acting through the Under Secretary of  
19               Commerce for Standards and Technology (referred  
20               to in this subsection as the “Secretary”), shall, sub-  
21               ject to appropriations, carry out a program to part-  
22               ner with academic institutions to award prizes com-  
23               petitively to stimulate research and development of  
24               innovative unmanned aerial vehicle (UAV) tech-

1 nologies in order to expand upon and improve emer-  
2 gency response operations.

3 (2) PLAN FOR EMERGENCY RESPONSE OPER-  
4 ATIONS.—Each proposal submitted pursuant to  
5 paragraph (1) shall include a plan for UAV imple-  
6 mentation in emergency response operations.

7 (3) PRIZE AMOUNT.—In carrying out the pro-  
8 gram under paragraph (1), the Secretary may award  
9 not more than a total of \$2,250,000 to one or more  
10 winners of the prize challenge.

11 (4) REPORT.—Not later than 60 days after the  
12 date on which a prize is awarded under the prize  
13 challenge, the Secretary shall submit to the relevant  
14 committees of Congress a report that describes the  
15 winning proposal of the prize challenge.

16 (5) CONSULTATION.—In carrying out the pro-  
17 gram under subsection (a), the Secretary may con-  
18 sult with the heads of relevant departments and  
19 agencies of the Federal Government.

20 (b) UNMANNED AERIAL VEHICLE CREDENTIALING  
21 PROGRAM.—The Secretary shall partner with academic in-  
22 stitutions to establish the measurements and standards in-  
23 frastructure necessary for credentialing remote pilots, in-  
24 cluding implementation and demonstration of distributed



1 pilot training and evaluation using standard test methods,  
2 and support flight test simulations.

3 (c) AUTHORIZATION OF APPROPRIATIONS.—There  
4 are authorized to be appropriated to the Secretary to carry  
5 out this section \$3,250,000 for fiscal years 2022 through  
6 2032, of which not less than \$1,000,000 shall be used to  
7 carry out subsection (b).

## 8 **TITLE IV—DEPARTMENT OF** 9 **ENERGY**

### 10 **Subtitle A—Office of Science**

#### 11 **SEC. 401. DEFINITIONS.**

12 In this title:

13 (1) DEPARTMENT.—The term “Department”  
14 means the Department of Energy.

15 (2) DIRECTOR.—The term “Director” means  
16 the Director of the Office of Science of the Depart-  
17 ment.

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

22 (4) SECRETARY.—The term “Secretary” means  
23 the Secretary of Energy.

1 **SEC. 402. BASIC ENERGY SCIENCES.**

2 (a) IN GENERAL.—Section 303 of the Department of  
3 Energy Research and Innovation Act (42 U.S.C. 18641)  
4 is amended—

5 (1) by redesignating subsections (a) through (e)  
6 as subsections (b) through (f), respectively; and

7 (2) by inserting before subsection (b), as reded-  
8 igned by paragraph (1), the following:

9 “(a) PROGRAM.—The Director shall carry out a fun-  
10 damental research program in basic energy sciences, in-  
11 cluding materials sciences and engineering, chemical  
12 sciences, physical biosciences, and geosciences, in order to  
13 provide the foundations for new energy technologies and  
14 to support Department missions in energy, environment,  
15 and national security.”.

16 (b) BASIC ENERGY SCIENCES USER FACILITIES.—  
17 Paragraph (3) of subsection (c) of such section, as reded-  
18 igned by subsection (a)(1), is amended—

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

20 (2) by redesignating subparagraph (D) as sub-  
21 paragraph (E); and

22 (3) by inserting after subparagraph (C) the fol-  
23 lowing:

24 “(D) autonomous chemistry and materials  
25 synthesis facilities that leverage advances in ar-  
26 tificial intelligence; and”.

1 (c) BASIC ENERGY SCIENCES RESEARCH INFRA-  
2 STRUCTURE.—Such section, as amended by subsection  
3 (a), is further amended by adding at the end the following:

4 “(g) BASIC ENERGY SCIENCES RESEARCH INFRA-  
5 STRUCTURE.—

6 “(1) ADVANCED PHOTON SOURCE UPGRADE.—

7 “(A) IN GENERAL.—The Secretary shall  
8 provide for the upgrade to the Advanced Pho-  
9 ton Source described in the publication ap-  
10 proved by the Basic Energy Sciences Advisory  
11 Committee on June 9, 2016, titled ‘Report on  
12 Facility Upgrades’, including the development  
13 of a multi-bend achromat lattice to produce a  
14 high flux of coherent x-rays within the hard x-  
15 ray energy region and a suite of beamlines opti-  
16 mized for this source.

17 “(B) DEFINITIONS.—In this paragraph:

18 “(i) FLUX.—The term ‘flux’ means  
19 the rate of flow of photons.

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

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  
2 March 31, 2026.

3 “(D) FUNDING.—Out of funds authorized  
4 to be appropriated under section 409 for Basic  
5 Energy Sciences, there shall be made available  
6 to the Secretary to carry out the upgrade under  
7 this paragraph—

8 “(i) \$106,200,000 for fiscal year  
9 2022; and

10 “(ii) \$5,000,000 for fiscal year 2023.

11 “(2) SPALLATION NEUTRON SOURCE PROTON  
12 POWER UPGRADE.—

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

16 “(B) PROTON POWER UPGRADE DE-  
17 FINED.—For the purposes of this paragraph,  
18 the term ‘proton power upgrade’ means the  
19 Spallation Neutron Source power upgrade de-  
20 scribed in—

21 “(i) the publication of the Office of  
22 Science of the Department of Energy titled  
23 ‘Facilities for the Future of Science: A  
24 Twenty-Year Outlook’, published December  
25 2003;

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

7                   “(iii) the publication approved by the  
8                   Basic Energy Sciences Advisory Committee  
9                   on June 9, 2016, titled ‘Report on Facility  
10                  Upgrades’.

11                  “(C) START OF OPERATIONS.—The Sec-  
12                  retary shall, to the maximum extent practicable,  
13                  ensure that the start of full operations of the  
14                  upgrade under this paragraph occurs before De-  
15                  cember 31, 2025.

16                  “(D) FUNDING.—Out of funds authorized  
17                  to be appropriated under section 409 for Basic  
18                  Energy Sciences, there shall be made available  
19                  to the Secretary to carry out the upgrade under  
20                  this paragraph—

21                         “(i) \$25,000,000 for fiscal year 2022;

22                         “(ii) \$17,000,000 for fiscal year 2023;

23                                 and

24                         “(iii) \$7,800,000 for fiscal year 2024.

1           “(3) SPALLATION NEUTRON SOURCE SECOND  
2 TARGET STATION.—

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

6           “(B) DEFINITION OF SECOND TARGET  
7 STATION.—For the purposes of this paragraph,  
8 the term ‘second target station’ means the  
9 Spallation Neutron Source second target station  
10 described in—

11           “(i) the publication of the Office of  
12 Science of the Department of Energy titled  
13 ‘Facilities for the Future of Science: A  
14 Twenty-Year Outlook’, published December  
15 2003;

16           “(ii) the publication of the Office of  
17 Science of the Department of Energy titled  
18 ‘Four Years Later: An Interim Report on  
19 Facilities for the Future of Science: A  
20 Twenty-Year Outlook’, published August  
21 2007; and

22           “(iii) the publication approved by the  
23 Basic Energy Sciences Advisory Committee  
24 on June 9, 2016, titled ‘Report on Facility  
25 Upgrades’.

1           “(C) START OF OPERATIONS.—The Sec-  
2           retary shall, to the maximum extent practicable,  
3           ensure that the start of full operations of the  
4           second target station under this paragraph oc-  
5           curs before December 31, 2030, with the option  
6           for early operation in 2028.

7           “(D) FUNDING.—Out of funds authorized  
8           to be appropriated under section 409 for Basic  
9           Energy Sciences, there shall be made available  
10          to the Secretary to carry out activities, includ-  
11          ing construction, under this paragraph—

12                   “(i) \$50,000,000 for fiscal year 2022;

13                   “(ii) \$200,000,000 for fiscal year  
14                   2023;

15                   “(iii) \$275,000,000 for fiscal year  
16                   2024;

17                   “(iv) \$275,000,000 for fiscal year  
18                   2025;

19                   “(v) \$275,000,000 for fiscal year  
20                   2026;

21                   “(vi) \$250,000,000 for fiscal year  
22                   2027; and

23                   “(vii) \$120,000,000 for fiscal year  
24                   2028.

25          “(4) ADVANCED LIGHT SOURCE UPGRADE.—

1           “(A) IN GENERAL.—The Secretary shall  
2 provide for the upgrade to the Advanced Light  
3 Source described in the publication approved by  
4 the Basic Energy Sciences Advisory Committee  
5 on June 9, 2016, titled ‘Report on Facility Up-  
6 grades’, including the development of a multi-  
7 bend achromat lattice to produce a high flux of  
8 coherent x-rays within the soft x-ray energy re-  
9 gion.

10           “(B) DEFINITIONS.—In this paragraph:

11           “(i) FLUX.—The term ‘flux’ means  
12 the rate of flow of photons.

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

16           “(C) START OF OPERATIONS.—The Sec-  
17 retary shall, to the maximum extent practicable,  
18 ensure that the start of full operations of the  
19 upgrade under this paragraph occurs before De-  
20 cember 31, 2026.

21           “(D) FUNDING.—Out of funds authorized  
22 to be appropriated under section 409 for Basic  
23 Energy Sciences, there shall be made available  
24 to the Secretary to carry out the upgrade under  
25 this paragraph—



1 “(i) \$100,000,000 for fiscal year  
2 2022;

3 “(ii) \$130,000,000 for fiscal year  
4 2023;

5 “(iii) \$102,500,000 for fiscal year  
6 2024; and

7 “(iv) \$21,500,000 for fiscal year  
8 2025.

9 “(5) LINAC COHERENT LIGHT SOURCE II HIGH  
10 ENERGY UPGRADE.—

11 “(A) IN GENERAL.—The Secretary shall  
12 provide for the upgrade to the Linac Coherent  
13 Light Source II facility described in the publi-  
14 cation approved by the Basic Energy Sciences  
15 Advisory Committee on June 9, 2016, titled  
16 ‘Report on Facility Upgrades’, including the de-  
17 velopment of experimental capabilities for high  
18 energy x-rays to reveal fundamental scientific  
19 discoveries. The Secretary shall ensure the up-  
20 grade under this paragraph enables the produc-  
21 tion and use of high energy, ultra-short pulse x-  
22 rays delivered at a high repetition rate.

23 “(B) DEFINITIONS.—In this paragraph:

24 “(i) HIGH ENERGY X-RAY.—The term  
25 ‘high energy x-ray’ means a photon with

1 an energy in the 5 to 13 kiloelectron volt  
2 range.

3 “(ii) HIGH REPETITION RATE.—The  
4 term ‘high repetition rate’ means the deliv-  
5 ery of x-ray pulses up to 1 million pulses  
6 per second.

7 “(iii) ULTRA-SHORT PULSE X-RAYS.—  
8 The term ‘ultra-short pulse x-rays’ means  
9 x-ray bursts capable of durations of less  
10 than 100 femtoseconds.

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

16 “(D) FUNDING.—Out of funds authorized  
17 to be appropriated under section 409 for Basic  
18 Energy Sciences, there shall be made available  
19 to the Secretary to carry out the upgrade under  
20 this paragraph—

21 “(i) \$87,000,000 for fiscal year 2022;

22 “(ii) \$100,000,000 for fiscal year  
23 2023;

24 “(iii) \$100,000,000 for fiscal year  
25 2024;

1                   “(iv) \$100,000,000 for fiscal year  
2                   2025; and

3                   “(v) \$83,000,000 for fiscal year  
4                   2026.”.

5           (d) ARTIFICIAL PHOTOSYNTHESIS.—Subtitle G of  
6 title IX of the Energy Policy Act of 2005 (42 U.S.C.  
7 16311 et seq.) is amended—

8                   (1) in section 973(b), by striking paragraph (4)  
9                   and inserting:

10                   “(4)(A) FUNDING.—From within funds author-  
11                   ized to be appropriated under section 409 of the Se-  
12                   curing American Leadership in Science and Tech-  
13                   nology Act of 2021 for Basic Energy Sciences, the  
14                   Secretary shall make available for carrying out ac-  
15                   tivities under this subsection \$50,000,000 for each  
16                   of fiscal years 2022 through 2031.

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.”; and

21                   (2) in section 975(c), by striking paragraph (4)  
22                   and inserting:

23                   “(4)(A) FUNDING.—From within funds author-  
24                   ized to be appropriated under section 409 of the Se-  
25                   curing American Leadership in Science and Tech-

1 nology Act of 2021 for Basic Energy Sciences and  
2 Biological and Environmental Research, the Sec-  
3 retary shall make available for carrying out activities  
4 under this subsection \$50,000,000 for each of fiscal  
5 years 2022 through 2031.

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

10 (e) ELECTRICITY STORAGE RESEARCH INITIATIVE.—  
11 Section 975 of the Energy Policy Act of 2005 (42 U.S.C.  
12 16315) is amended—

13 (1) in subsection (b), by striking paragraph (4)  
14 and inserting:

15 “(4)(A) FUNDING.—From within funds author-  
16 ized to be appropriated under section 409 of the Se-  
17 curing American Leadership in Science and Tech-  
18 nology Act of 2021 for Basic Energy Sciences, the  
19 Secretary shall make available for carrying out ac-  
20 tivities under this subsection \$50,000,000 for each  
21 of fiscal years 2022 through 2031.

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.”;

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

3           “(4)(A) FUNDING.—From within funds author-  
4           ized to be appropriated under section 409 of the Se-  
5           curing American Leadership in Science and Tech-  
6           nology Act of 2021 for Basic Energy Sciences and  
7           Advanced Scientific Computing Research, the Sec-  
8           retary shall make available for carrying out activities  
9           under this subsection \$30,000,000 for each of fiscal  
10          years 2022 through 2031.

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.”; and

15          (3) in subsection (d), by striking paragraph (4)  
16          and inserting:

17          “(4)(A) FUNDING.—From within funds author-  
18          ized to be appropriated under section 409 of the Se-  
19          curing American Leadership in Science and Tech-  
20          nology Act of 2021 for Basic Energy Sciences and  
21          Biological and Environmental Research, the Sec-  
22          retary shall make available for carrying out activities  
23          under this subsection \$20,000,000 for each of fiscal  
24          years 2022 through 2031.

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

5           (f) COMPUTATIONAL MATERIALS AND CHEMISTRY.—  
6           Section 303 of the Department of Energy Research and  
7           Innovation Act (42 U.S.C. 18641) is amended by inserting  
8           after subsection (d) as so redesignated, the following:

9           “(1) IN GENERAL.—The Director shall support  
10          a program of fundamental research for the applica-  
11          tion of advanced computing practices to foundational  
12          and emerging research problems in chemistry and  
13          materials science.

14          “(2) COMPUTATIONAL MATERIALS AND CHEM-  
15          ISTRY SCIENCE CENTERS.—

16                 “(A) IN GENERAL.—In carrying out the  
17                 activities authorized under paragraph (1), the  
18                 Director shall select and establish up to four  
19                 computational materials and chemistry science  
20                 centers to develop open-source, robust, and vali-  
21                 dated computational codes and user-friendly  
22                 software, coupled with innovative use of experi-  
23                 mental and theoretical data, to enable the de-  
24                 sign, discovery, and development of new mate-  
25                 rials and chemical systems including chemical

1 catalysis research and development. These cen-  
2 ters shall also focus on overcoming challenges  
3 and maximizing the benefits of exascale and  
4 other high performance computing systems.

5 “(B) SELECTION.—The Director shall se-  
6 lect centers under paragraph (1) on a competi-  
7 tive, merit-reviewed basis. The Director shall  
8 consider applications from the National Labora-  
9 tories, institutes of higher education, multi-in-  
10 stitutional collaborations, and other appropriate  
11 entities.

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

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

21 “(E) TERMINATION.—Consistent with the  
22 existing authorities of the Department, the Di-  
23 rector may terminate an underperforming cen-  
24 ter for cause during the performance period.

25 “(3) MATERIALS RESEARCH DATABASE.—

1           “(A) IN GENERAL.—The Director shall  
2 support the development of a web-based plat-  
3 form to provide access to a database of com-  
4 puted information on known and predicted ma-  
5 terials properties and computational tools to ac-  
6 celerate breakthroughs in materials discovery  
7 and design.

8           “(B) PROGRAM.—In carrying out this sec-  
9 tion, the Director shall—

10           “(i) conduct cooperative research with  
11 industry, academia, and other research in-  
12 stitutions to facilitate the design of novel  
13 materials;

14           “(ii) leverage existing high perform-  
15 ance computing systems to conduct high-  
16 throughput calculations, and develop com-  
17 putational and data mining algorithms for  
18 the prediction of material properties;

19           “(iii) advance understanding, pre-  
20 diction, and manipulation of materials;

21           “(iv) strengthen the foundation for  
22 new technologies and advanced manufac-  
23 turing; and

24           “(v) drive the development of ad-  
25 vanced materials for applications that span



1 the Department’s missions in energy, envi-  
2 ronment, and national security.

3 “(C) COORDINATION.—In carrying out this  
4 section, the Director shall leverage programs  
5 and activities across the Department.

6 “(D) FUNDING.—Out of funds authorized  
7 to be appropriated under section 409 for Basic  
8 Energy Sciences there shall be made available  
9 to the Secretary to carry out activities under  
10 this subsection \$10,000,000 for each of the fis-  
11 cal years 2022 through 2031.”.

12 **SEC. 403. ADVANCED SCIENTIFIC COMPUTING RESEARCH.**

13 (a) IN GENERAL.—Section 304 of the Department of  
14 Energy Research and Innovation Act (42 U.S.C. 18642)  
15 is amended—

16 (1) by redesignating subsections (a) through (c)  
17 as subsections (b) through (d), respectively; and

18 (2) by inserting before subsection (b), as reded-  
19 igned by paragraph (1), the following:

20 “(a) PROGRAM.—The Director shall carry out a re-  
21 search, development, and demonstration program to ad-  
22 vance computational and networking capabilities to ana-  
23 lyze, model, simulate, and predict complex phenomena rel-  
24 evant to the development of new energy technologies and  
25 the competitiveness of the United States.”.

1           (b) ADDITIONAL PROGRAMS.—Such section, as  
2 amended by subsection (a), is further amended by adding  
3 at the end the following:

4           “(e) BEYOND EXASCALE COMPUTING PROGRAM.—

5                   “(1) IN GENERAL.—The Secretary shall estab-  
6 lish a program to develop and implement a strategy  
7 for achieving computing systems with capabilities be-  
8 yond exascale computing systems. In establishing  
9 this program, the Secretary shall—

10                           “(A) maintain foundational research pro-  
11 grams in mathematical, computational, and  
12 computer sciences focused on new and emerging  
13 computing needs within the mission of the De-  
14 partment, including but not limited to post-  
15 Moore’s law computing architectures, novel ap-  
16 proaches to modeling and simulation, artificial  
17 intelligence and scientific machine learning,  
18 quantum computing, and extreme heterogeneity;  
19 and

20                           “(B) retain best practices and maintain  
21 support for essential hardware and software ele-  
22 ments of the Exascale Computing Project that  
23 are necessary for sustaining the vitality of a  
24 long-term exascale ecosystem.

1           “(2) REPORT.—Not later than one year after  
2           the date of the enactment of this Act, the Secretary  
3           shall submit to the Committee on Science, Space,  
4           and Technology of the House of Representatives,  
5           and the Committee on Energy and Natural Re-  
6           sources of the Senate, a report on the development  
7           and implementation of the strategy outlined in para-  
8           graph (1).

9           “(f) ENERGY EFFICIENT COMPUTING PROGRAM.—

10           “(1) IN GENERAL.—The Secretary shall sup-  
11           port a program of fundamental research, develop-  
12           ment, and demonstration of energy efficient com-  
13           puting technologies relevant to advanced computing  
14           applications in high performance computing, artifi-  
15           cial intelligence, and scientific machine learning.

16           “(2) EXECUTION.—

17           “(A) PROGRAM.—In carrying out the pro-  
18           gram, the Secretary shall—

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

1           “(ii) develop hardware and software  
2 technologies that decrease the energy needs  
3 of advanced computing practices;

4           “(iii) consider multiple heterogeneous  
5 computing architectures, including neuro-  
6 morphic computing, persistent computing,  
7 and ultrafast networking; and

8           “(iv) provide, as appropriate, on a  
9 competitive, merit-reviewed basis, access  
10 for researchers from institutions of higher  
11 education, National Laboratories, industry,  
12 and other Federal agencies to the energy  
13 efficient computing technologies developed  
14 pursuant to clause (i).

15           “(B) SELECTION OF PARTNERS.—In se-  
16 lecting participants for the partnership estab-  
17 lished under subparagraph (A)(i), the Secretary  
18 shall select participants through a competitive,  
19 merit-review process.

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

1           “(A) the activities conducted under sub-  
2           paragraph (A); and

3           “(B) the coordination and management of  
4           the Program to ensure an integrated research  
5           program across the Department.

6           “(g) ARTIFICIAL INTELLIGENCE, DATA ANALYTICS,  
7           AND COMPUTATIONAL RESEARCH.—

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

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

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

1           “(B) conduct basic research in modeling  
2           and simulation, artificial intelligence, machine  
3           learning, large-scale data analytics, natural lan-  
4           guage processing, and predictive analysis in  
5           order to develop novel or optimized predictive  
6           algorithms suitable for high-performance com-  
7           puting systems and large biomedical data sets;

8           “(C) develop multivariate optimization  
9           models to accommodate large data sets with  
10          variable quality and scale in order to visualize  
11          complex systems;

12          “(D) establish multiple scientific com-  
13          puting facilities to serve as data enclaves capa-  
14          ble of securely storing data sets created by Fed-  
15          eral agencies, institutions of higher education,  
16          nonprofit organizations, or industry at National  
17          Laboratories; and

18          “(E) promote collaboration and data shar-  
19          ing between National Laboratories, research en-  
20          tities, and facilities of the Department by pro-  
21          viding the necessary access and secure data  
22          transfer capabilities.

23          “(3) REPORT.—Not later than 2 years after the  
24          date of the enactment of this Act, the Secretary  
25          shall submit to the Committee on Science, Space,

1 and Technology of the House of Representatives and  
2 the Committee on Energy and Natural Resources of  
3 the Senate a report evaluating the effectiveness of  
4 the program under paragraph (1), including basic  
5 research discoveries achieved in the course of the  
6 program and potential opportunities to expand the  
7 technical capabilities of the Department through the  
8 development of artificial intelligence and data ana-  
9 lytics technologies.

10 “(h) ENERGY SCIENCES NETWORK.—

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

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

19 “(A) To provide high bandwidth scientific  
20 networking across the continental United States  
21 and the Atlantic Ocean.

22 “(B) To maximize network reliability.

23 “(C) To protect the network and data from  
24 cyber-attacks.

1           “(D) To support exponentially increasing  
2           levels of data from the Department’s scientific  
3           user facilities, experiments, and sensors.

4           “(E) To integrate heterogeneous com-  
5           puting frameworks and systems.

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

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

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

16           “(j) COMPUTATIONAL SCIENCE GRADUATE FELLOW-  
17           SHIP.—

18           “(1) IN GENERAL.—The Secretary shall sup-  
19           port the Computational Science Graduate Fellowship  
20           program in order to facilitate collaboration between  
21           graduate students and researchers at the National  
22           Laboratories, and contribute to the development of  
23           a computational workforce to help advance research  
24           in areas relevant to the mission of the Department.



1           “(2) FUNDING.—From within funds authorized  
2           to be appropriated under section 409 of the Securing  
3           American Leadership in Science and Technology Act  
4           of 2021 for Advanced Scientific Computing Research  
5           Program, the Secretary shall make available for car-  
6           rying out the activities under this section—

7                   “(A) \$21,000,000 for fiscal year 2022;

8                   “(B) \$22,050,000 for fiscal year 2023;

9                   “(C) \$23,152,500 for fiscal year 2024; and

10                  “(D) 24,310,125 for fiscal year 2025.”.

11           (c) APPLIED MATHEMATICS AND SOFTWARE DEVEL-  
12           OPMENT.—Subsection (d) of such section, as redesignated  
13           by subsection (a)(1), is amended to read as follows:

14           “(c) APPLIED MATHEMATICS AND SOFTWARE DE-  
15           VELOPMENT FOR HIGH-END COMPUTING SYSTEMS, COM-  
16           PUTATIONAL, AND COMPUTER SCIENCES RESEARCH.—

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

19                   “(A) mathematics, models, statistics, and  
20                   algorithms for modeling complex systems on ad-  
21                   vanced computing architectures; and

22                   “(B) tools, languages, programming envi-  
23                   ronments, and operations for high-end com-  
24                   puting systems (as defined in section 2 of the

1 American Super Computing Leadership Act (15  
2 U.S.C. 5541), as renamed by this section).

3 “(2) PORTFOLIO BALANCE.—The Director shall  
4 maintain a balanced portfolio within the advanced  
5 scientific computing research and development pro-  
6 gram established under section 976 of the Energy  
7 Policy Act of 2005 (42 U.S.C. 16316) that supports  
8 robust investment in—

9 “(A) applied mathematical, computational,  
10 and computer sciences research needs relevant  
11 to the mission of the Department, including ac-  
12 tivities related to data science, artificial intel-  
13 ligence, scientific machine learning, quantum  
14 information science, and other emerging areas;  
15 and

16 “(B) associated high-performance com-  
17 puting hardware and facilities.”.

18 (d) QUANTUM SCIENCE NETWORK.—

19 (1) DEFINITIONS.—Section 2 of the National  
20 Quantum Initiative Act (15 U.S.C. 8801) is amend-  
21 ed—

22 (A) by redesignating paragraph (7) as  
23 paragraph (8); and

24 (B) by inserting after paragraph (6) the  
25 following:

1           “(7) QUANTUM NETWORK INFRASTRUCTURE.—  
2           The term ‘quantum network infrastructure’ means  
3           any facility, expertise, or capability that is necessary  
4           to enable the development and deployment of scal-  
5           able and diverse quantum network technologies.”.

6           (2) DEPARTMENT OF ENERGY QUANTUM NET-  
7           WORK INFRASTRUCTURE RESEARCH AND DEVELOP-  
8           MENT PROGRAM.—Title IV of the National Quantum  
9           Initiative Act (15 U.S.C. 8851 et seq.) is amended  
10          by adding at the end the following:

11       **“SEC. 403. DEPARTMENT OF ENERGY QUANTUM NETWORK**  
12                               **INFRASTRUCTURE RESEARCH AND DEVELOP-**  
13                               **MENT PROGRAM.**

14          “(a) IN GENERAL.—The Secretary of Energy (re-  
15       ferred to in this section as the ‘Secretary’) shall carry out  
16       a research, development, and demonstration program to  
17       accelerate innovation in quantum network infrastructure  
18       in order to—

19               “(1) facilitate the advancement of distributed  
20       quantum computing systems through the internet  
21       and intranet;

22               “(2) improve the precision of measurements of  
23       scientific phenomena and physical imaging tech-  
24       nologies; and

1           “(3) develop secure national quantum commu-  
2           nications technologies and strategies.

3           “(b) PROGRAM.—In carrying out this section, the  
4           Secretary shall—

5           “(1) coordinate with—

6           “(A) the Director of the National Science  
7           Foundation;

8           “(B) the Director of the National Institute  
9           of Standards and Technology;

10          “(C) the Chair of the subcommittee on  
11          Quantum Information Science of the National  
12          Science and Technology Council established  
13          under section 103(a); and

14          “(D) the Chair of the subcommittee on the  
15          Economic and Security Implications of Quan-  
16          tum Science;

17          “(2) conduct cooperative research with indus-  
18          try, National Laboratories, institutions of higher  
19          education, and other research institutions to facili-  
20          tate new quantum infrastructure methods and tech-  
21          nologies, including—

22          “(A) quantum-limited detectors, ultra-low  
23          loss optical channels, space-to-ground connec-  
24          tions, and classical networking and cybersecu-  
25          rity protocols;

1           “(B) entanglement and hyper-entangled  
2 state sources and transmission, control, and  
3 measurement of quantum states;

4           “(C) quantum interconnects that allow  
5 short range local connections between quantum  
6 processors;

7           “(D) transducers for quantum sources and  
8 signals between optical and telecommunications  
9 regimes and quantum computer-relevant do-  
10 mains, including microwaves;

11           “(E) development of quantum memory  
12 buffers and small-scale quantum computers  
13 that are compatible with photon-based quantum  
14 bits in the optical or telecommunications wave-  
15 lengths;

16           “(F) long-range entanglement distribution  
17 at both the terrestrial and space-based level  
18 using quantum repeaters, allowing entangle-  
19 ment-based protocols between small- and large-  
20 scale quantum processors;

21           “(G) quantum routers, multiplexers, re-  
22 peaters, and related technologies necessary to  
23 create secure long-distance quantum commu-  
24 nication; and

1           “(H) integration of systems across the  
2           quantum technology stack into traditional com-  
3           puting networks, including the development of  
4           remote controlled, high performance, and reli-  
5           able implementations of key quantum network  
6           components;

7           “(3) engage with the Quantum Economic De-  
8           velopment Consortium (QED-C) to transition com-  
9           ponent technologies to help facilitate as appropriate  
10          the development of a quantum supply chain for  
11          quantum network technologies;

12          “(4) advance basic research in advanced sci-  
13          entific computing and material science to enhance  
14          the understanding, prediction, and manipulation of  
15          materials and processes relevant to quantum net-  
16          work infrastructure;

17          “(5) develop experimental tools and testbeds  
18          necessary to support cross-cutting fundamental re-  
19          search and development activities with diverse stake-  
20          holders from industry and institutions of higher edu-  
21          cation; and

22          “(6) consider quantum network infrastructure  
23          applications that span the Department of Energy’s  
24          missions in energy, environment, and national secu-  
25          rity.

1           “(c) LEVERAGING.—In carrying out this section, the  
2 Secretary shall leverage resources, infrastructure, and ex-  
3 pertise across the Department of Energy and from—

4           “(1) the National Institute of Standards and  
5 Technology;

6           “(2) the National Science Foundation;

7           “(3) the National Aeronautics and Space Ad-  
8 ministration;

9           “(4) other relevant Federal agencies;

10           “(5) the National Laboratories;

11           “(6) industry stakeholders;

12           “(7) institutions of higher education; and

13           “(8) the National Quantum Information  
14 Science Research Centers.

15           “(d) RESEARCH PLAN.—Not later than 180 days  
16 after the date of the enactment of the Securing American  
17 Leadership in Science and Technology Act of 2021, the  
18 Secretary shall submit to the Committee on Science,  
19 Space, and Technology of the House of Representatives  
20 and the Committee on Energy and Natural Resources of  
21 the Senate, a 4-year research plan that identifies and  
22 prioritizes basic research needs relating to quantum net-  
23 work infrastructure.

1           “(e) STANDARD OF REVIEW.—The Secretary shall  
2 review activities carried out under this section to deter-  
3 mine the achievement of technical milestones.

4           “(f) FUNDING.—Funds authorized to be appro-  
5 priated for the Department of Energy’s Office of Science,  
6 there shall be made available to the Secretary to carry out  
7 the activities under this section, \$100,000,000 for each  
8 of fiscal years 2022 through 2026.

9   **“SEC. 404. DEPARTMENT OF ENERGY QUANTUM USER EX-**  
10                           **PANSION FOR SCIENCE AND TECHNOLOGY**  
11                           **PROGRAM.**

12           “(a) IN GENERAL.—Not later than 90 days of the  
13 date of the enactment of the Securing American Leader-  
14 ship in Science and Technology Act, the Secretary of En-  
15 ergy (referred to in this section as the ‘Secretary’) shall,  
16 establish and carry out a program (to be known as the  
17 ‘Quantum User Expansion for Science and Technology  
18 program’ or ‘QUEST program’) to encourage and facili-  
19 tate access to United States quantum computing hardware  
20 and quantum computing clouds for research purposes in  
21 order to—

22                   “(1) enhance the United States quantum re-  
23 search enterprise;

24                   “(2) educate the future quantum computing  
25 workforce; and



1           “(3) accelerate the advancement of United  
2 States quantum computing capabilities.

3           “(b) PROGRAM.—In carrying out this section, the  
4 Secretary shall—

5           “(1) coordinate with—

6           “(A) the Director of the National Science  
7 Foundation;

8           “(B) the Director of the National Institute  
9 of Standards and Technology;

10           “(C) the Chair of the Quantum Informa-  
11 tion Science of the National Science and Tech-  
12 nology Council established under section  
13 103(a); and

14           “(D) the Chair of the subcommittee on the  
15 Economic and Security Implications of Quan-  
16 tum Science;

17           “(2) provide researchers based within the  
18 United States with access to, and use of, United  
19 States quantum computing resources through a com-  
20 petitive, merit-reviewed process;

21           “(3) consider applications from the National  
22 Laboratories, multi-institutional collaborations, insti-  
23 tutions of higher education, industry stakeholders,  
24 and any other entities that the Secretary determines

1 are appropriate to provide national leadership on  
2 quantum computing related issues; and

3 “(4) consult and coordinate with private sector  
4 stakeholders, the user community, and interagency  
5 partners on program development and best manage-  
6 ment practices.

7 “(c) LEVERAGING.—In carrying out this section, the  
8 Secretary shall leverage resources and expertise across the  
9 Department of Energy and from—

10 “(1) the National Institute of Standards and  
11 Technology;

12 “(2) the National Science Foundation;

13 “(3) the National Aeronautics and Space Ad-  
14 ministration;

15 “(4) other relevant Federal agencies;

16 “(5) the National Laboratories;

17 “(6) industry stakeholders;

18 “(7) institutions of higher education; and

19 “(8) the National Quantum Information  
20 Science Research Centers.

21 “(d) SECURITY.—In carrying out the activities au-  
22 thorized by this section, the Secretary, in consultation  
23 with the Director of the National Science Foundation and  
24 the Director of the National Institute of Standards and

1 Technology, shall ensure proper security controls are in  
2 place to protect sensitive information, as appropriate.

3 “(e) REPORT.—Not later than 180 days after the  
4 date of the enactment of the Securing American Leader-  
5 ship in Science and Technology Act of 2021, the Secretary  
6 shall submit to the Committee on Science, Space, and  
7 Technology of the House of Representatives and the Com-  
8 mittee on Energy and Natural Resources of the Senate,  
9 a report on the results of the QUEST program activities  
10 and any other information the Secretary determines ap-  
11 propriate.

12 “(f) FUNDING.—Funds authorized to be appro-  
13 priated for the Department of Energy’s Office of Science,  
14 there shall be made available to the Secretary to carry out  
15 the activities under this section,

16 “(1) \$30,000,000 for fiscal year 2022;

17 “(2) \$50,000,000 for fiscal year 2023;

18 “(3) \$70,000,000 for fiscal year 2024;

19 “(4) \$90,000,000 for fiscal year 2025; and

20 “(5) \$100,000,000 for fiscal year 2026.”.

21 **SEC. 404. HIGH ENERGY PHYSICS.**

22 (a) IN GENERAL.—Section 305 of the Department of  
23 Energy Research and Innovation Act (42 U.S.C. 18643)  
24 is amended—

1           (1) by redesignating subsections (a) through (d)  
2           as subsections (b) through (e);

3           (2) by inserting before subsection (b), as redesi-  
4           gnated by paragraph (1), the following:

5           “(a) PROGRAM.—The Director shall carry out a re-  
6           search program on the fundamental constituents of matter  
7           and energy and the nature of space and time in order to  
8           support theoretical and experimental research in both ele-  
9           mentary particle physics and fundamental accelerator  
10          science and technology and understand fundamental prop-  
11          erties of the universe.”;

12          (3) by amending subsection (c), as redesignated  
13          by paragraph (1), to read as follows:

14          “(c) INTERNATIONAL COLLABORATION.—The Direc-  
15          tor shall—

16                 “(1) as practicable and in coordination with  
17                 other appropriate Federal agencies as necessary, en-  
18                 sure the access of United States researchers to the  
19                 most advanced accelerator facilities and research ca-  
20                 pabilities in the world, including the Large Hadron  
21                 Collider;

22                 “(2) to the maximum extent practicable, con-  
23                 tinue to leverage United States participation in the  
24                 Large Hadron Collider, and prioritize expanding  
25                 international partnerships and investments in the

1 Long-Baseline Neutrino Facility/Deep Underground  
2 Neutrino Experiment; and

3 “(3) to the maximum extent practicable,  
4 prioritize engagement in collaborative efforts in sup-  
5 port of future international facilities that would pro-  
6 vide access to United States researchers of the most  
7 advanced accelerator facilities in the world.”; and

8 (4) by adding at the end the following:

9 “(f) LONG-BASELINE NEUTRINO FACILITY FOR  
10 DEEP UNDERGROUND NEUTRINO EXPERIMENT.—

11 “(1) IN GENERAL.—The Secretary shall provide  
12 for a Long-Baseline Neutrino Facility to facilitate  
13 the international Deep Underground Neutrino Ex-  
14 periment to enable a program in neutrino physics to  
15 measure the fundamental properties of neutrinos, ex-  
16 plore physics beyond the Standard Model, and better  
17 clarify the nature of matter and antimatter.

18 “(2) FACILITY CAPABILITIES.—The Secretary  
19 shall ensure that the facility described in paragraph  
20 (1) will provide, at a minimum, the following capa-  
21 bilities:

22 “(A) A neutrino beam with wideband capa-  
23 bility of 1.2 megawatts (MW) of beam power  
24 and upgradable to 2.4 MW of beam power.

1           “(B) Three caverns excavated for a 70 kil-  
2           ton fiducial detector mass and supporting sur-  
3           face buildings and utilities.

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

8           “(D) Cryogenic systems to support neu-  
9           trino detectors.

10          “(3) START OF OPERATIONS.—The Secretary  
11          shall, to the maximum extent practicable, ensure  
12          that the start of full operations of the facility under  
13          this subsection occurs before December 31, 2031.

14          “(4) FUNDING.—Out of funds authorized to be  
15          appropriated under section 409 for High Energy  
16          Physics, there shall be made available to the Sec-  
17          retary to carry out activities, including construction  
18          of the facility, under this subsection—

19                 “(A) \$200,000,000 for fiscal year 2022;

20                 “(B) \$325,000,000 for fiscal year 2023;

21                 “(C) \$400,000,000 for fiscal year 2024;

22                 “(D) \$375,000,000 for fiscal year 2025;

23                 “(E) \$250,000,000 for fiscal year 2026;

24                 “(F) \$250,000,000 for fiscal year 2027;

1                   “(G) \$250,000,000 for fiscal year 2028;

2                   and

3                   “(H) \$208,000,000 for fiscal year 2029.

4           “(g) PROTON IMPROVEMENT PLAN—II ACCELERATOR  
5 UPGRADE PROJECT.—

6                   “(1) IN GENERAL.—The Secretary of Energy  
7 shall provide for the Proton Improvement Plan II  
8 (PIP—II), an upgrade to the Fermilab accelerator  
9 complex identified in the 2014 Particle Physics  
10 Project Prioritization Panel (P5) report titled  
11 ‘Building for Discovery’, to provide the world’s most  
12 intense beam of neutrinos to the international  
13 LBNF/DUNE experiment as well as a broad range  
14 of future high energy physics experiments. The Sec-  
15 retary of Energy shall work with international part-  
16 ners to provide key contributions.

17                   “(2) FACILITY CAPABILITIES.—The Secretary  
18 shall ensure that the facility described in paragraph  
19 (1) will provide, at a minimum, the following capa-  
20 bilities:

21                   “(A) A state-of-the-art 800 megaelectron  
22 volt (MeV) superconducting linear accelerator.

23                   “(B) Proton beam power of 1.2 MW at the  
24 start of LBNF/DUNE, upgradeable to 2.4 MW  
25 of beam power.

1           “(C) A flexible design to enable high power  
2           beam delivery to multiple users simultaneously  
3           and customized beams tailored to specific sci-  
4           entific needs.

5           “(D) Sustained high reliability operation of  
6           the Fermilab accelerator complex.

7           “(3) START OF OPERATIONS.—The Secretary  
8           shall, to the maximum extent practicable, ensure  
9           that the start of full operations of the facility under  
10          this section occurs before December 31, 2028.

11          “(4) FUNDING.—Out of funds authorized to be  
12          appropriated under section 409 for High Energy  
13          Physics, there shall be made available to the Sec-  
14          retary to carry out activities, including construction  
15          of the facility, under this subsection—

16                 “(A) \$100,000,000 for fiscal year 2022;

17                 “(B) \$120,000,000 for fiscal year 2023;

18                 “(C) \$120,000,000 for fiscal year 2024;

19                 “(D) \$120,000,000 for fiscal year 2025;

20                 “(E) \$115,000,000 for fiscal year 2026;

21                 “(F) \$110,000,000 for fiscal year 2027;

22                 and

23                 “(G) \$56,500,000 for fiscal year 2028;

24          “(h) ACCELERATOR AND DETECTOR UPGRADES.—

25          The Director shall upgrade accelerator facilities and detec-



1 tors, as necessary and appropriate, to increase beam  
2 power, sustain high reliability, and improve precision  
3 measurement to advance the highest priority particle phys-  
4 ics research programs. In carrying out facility upgrades,  
5 the Director shall continue to work with international  
6 partners, when appropriate and in the United States inter-  
7 est, to leverage investments and expertise in critical tech-  
8 nologies to maintain leading facilities in the United States.

9       “(i) ACCELERATOR AND DETECTOR RESEARCH AND  
10 DEVELOPMENT.—The Director shall carry out a program  
11 in accelerator and detector research and development, in  
12 order to develop and deploy next generation technologies  
13 to support discovery science in particle physics.

14       “(j) RESEARCH COLLABORATIONS.—In developing  
15 accelerator technologies under the program authorized in  
16 subsection (e), the Director shall—

17               “(1) consider the requirements necessary to  
18 support translational research and development for  
19 medical, industrial, security, and defense applica-  
20 tions; and

21               “(2) leverage investments in accelerator tech-  
22 nologies and basic research in particle physics by  
23 partnering with institutes of higher education, indus-  
24 try, and other Federal agencies to help commer-  
25 cialize technologies with promising applications.

1 “(k) COSMIC MICROWAVE BACKGROUND STAGE 4.—

2 “(1) IN GENERAL.—The Secretary, in coordina-  
3 tion with the Director of the National Science Foun-  
4 dation shall provide for the construction of the Cos-  
5 mic Microwave Background Stage 4 experiment as  
6 described in the 2014 Particle Physics Prioritization  
7 Panel (P5) report titled ‘Building for Discovery:  
8 Strategic Plan for U.S. Particle Physics in the Glob-  
9 al Context.’ The Secretary shall consult with the pri-  
10 vate sector, universities, National Laboratories, and  
11 relevant Federal agencies to ensure that this experi-  
12 ment is capable of meeting Federal research needs  
13 in accessing the ultra-high energy physics of infla-  
14 tion and important neutrino properties.

15 “(2) EXPERIMENTAL CAPABILITIES.—The Sec-  
16 retary shall ensure that the facility described in sub-  
17 section (a) will provide at minimum, 500,000 super-  
18 conducting detectors deployed on an array of mm-  
19 wave telescopes with the required range in fre-  
20 quency, sensitivity, and survey speed to enable an  
21 order of magnitude advance in observations of the  
22 Cosmic Microwave Background, delivering trans-  
23 formative discoveries in fundamental physics, cos-  
24 mology, and astrophysics.

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 section occurs before December 31, 2030.

5           “(4) FUNDING.—Out of funds authorized to be  
6 appropriated under section 409 for High Energy  
7 Physics, there shall be made available to the Sec-  
8 retary to complete construction of the facility, under  
9 this subsection—

10                   “(A) \$37,000,000 for fiscal year 2022;

11                   “(B) \$45,000,000 for fiscal year 2023;

12                   “(C) \$71,000,000 for fiscal year 2024; and

13                   “(D) \$50,000,000 for fiscal year 2025.

14           “(1) CRYOMODULE REPAIR AND MAINTENANCE FA-  
15 CILITY.—The Secretary shall provide for the construction  
16 of a cryomodule repair and maintenance facility, including  
17 SRF cryomodules that make up the new superconducting  
18 accelerator being constructed by the LCLS–II and LCLS–  
19 II–HE projects, to service the Linac Coherent Light  
20 Source. The Secretary shall consult with the private sec-  
21 tor, universities, National Laboratories, and relevant Fed-  
22 eral agencies to ensure that this facility has the capability  
23 to maintain, repair, and test superconducting radio-  
24 frequency (SRF) accelerator components.”.

1 **SEC. 405. BIOLOGICAL AND ENVIRONMENTAL RESEARCH.**

2 (a) IN GENERAL.—Section 306 of the Department of  
3 Energy Research and Innovation Act (42 U.S.C. 18644)  
4 is amended to read as follows:

5 **“SEC. 306. BIOLOGICAL AND ENVIRONMENTAL RESEARCH.**

6 “(a) PROGRAM.—The Director shall carry out a pro-  
7 gram of basic research in the areas of biological systems  
8 science and environmental science relevant to the develop-  
9 ment of new energy technologies and to support Depart-  
10 ment missions in energy, environment, and national secu-  
11 rity.

12 “(b) BIOLOGICAL SYSTEMS.—The Director shall  
13 carry out research and development activities in funda-  
14 mental, structural, computational, and systems biology to  
15 increase systems-level understanding of the complex bio-  
16 logical systems, which may include activities—

17 “(1) to accelerate breakthroughs and new  
18 knowledge that would enable the cost-effective, sus-  
19 tainable production of—

20 “(A) biomass-based liquid transportation  
21 fuels;

22 “(B) bioenergy; and

23 “(C) biobased materials;

24 “(2) to improve understanding of the global  
25 carbon cycle, including processes for removing car-  
26 bon dioxide from the atmosphere, through photosyn-

1 thesis and other biological processes, for sequestra-  
2 tion and storage; and

3 “(3) to understand the biological mechanisms  
4 used to transform, immobilize, or remove contami-  
5 nants from subsurface environments.

6 “(c) LIMITATION FOR RESEARCH FUNDS.—The Di-  
7 rector shall not approve new climate science-related initia-  
8 tives without making a determination that such work is  
9 well-coordinated with any relevant work carried out by  
10 other Federal agencies.

11 “(d) BIOENERGY RESEARCH CENTERS.—

12 “(1) IN GENERAL.—In carrying out activities  
13 under subsection (a), the Director shall select and  
14 establish up to four bioenergy research centers to  
15 conduct basic and fundamental research in plant  
16 and microbial systems biology, bio imaging and anal-  
17 ysis, and genomics to inform the production of fuels,  
18 chemicals from sustainable biomass resources, and  
19 to facilitate the translation of basic research results  
20 to industry.

21 “(2) SELECTION.—The Director shall select  
22 centers under paragraph (1) on a competitive, merit-  
23 reviewed basis. The Director shall consider applica-  
24 tions from National Laboratories, multi-institutional  
25 collaborations, and other appropriate entities.

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

5           “(4) EXISTING CENTERS.—The Director may  
6 select a center for participation under this sub-  
7 section that is in existence, or undergoing a renewal  
8 process, on the date of enactment of this Act. Such  
9 center shall be eligible to receive support for the du-  
10 ration the 5-year period beginning on the date of es-  
11 tablishment of such center.

12           “(5) RENEWAL.—Upon the expiration of any  
13 period of support of a center under this subsection,  
14 the Director may renew support for the center, on  
15 a merit-reviewed basis, for a period of not more than  
16 5 years.

17           “(6) TERMINATION.—Consistent with the exist-  
18 ing authorities of the Department, the Director may  
19 terminate an underperforming center for cause dur-  
20 ing the performance period.

21           “(e) LOW-DOSE RADIATION RESEARCH PROGRAM.—

22           “(1) IN GENERAL.—The Secretary shall carry  
23 out a research program on low-dose and low dose-  
24 rate radiation to—

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

5           “(B) inform improved risk-assessment and  
6 risk-management methods with respect to such  
7 radiation.

8           “(2) PROGRAM COMPONENTS.—In carrying out  
9 the program required under paragraph (1), the Sec-  
10 retary shall—

11           “(A) support and carry out the directives  
12 under section 106(b) of the American Innova-  
13 tion and Competitiveness Act (42 U.S.C. 6601  
14 note), except that such section shall be treated  
15 for purposes of this subsection as applying to  
16 low dose and low-dose rate radiation research,  
17 in coordination with the Physical Science Sub-  
18 committee of the National Science and Tech-  
19 nology Council;

20           “(B) identify and, to the extent possible,  
21 quantify, potential monetary and health-related  
22 impacts to Federal agencies, the general public,  
23 industry, research communities, and other users  
24 of information produced by such research pro-  
25 gram;

1           “(C) leverage the collective body of knowl-  
2           edge from existing low-dose and low dose-rate  
3           radiation research;

4           “(D) engage with other Federal agencies,  
5           research communities, and potential users of in-  
6           formation produced under this section, includ-  
7           ing institutions performing or utilizing radiation  
8           research, medical physics, radiology, health  
9           physics, and emergency response measures; and

10          “(E) support education and outreach ac-  
11          tivities to disseminate information and promote  
12          public understanding of low-dose radiation, with  
13          a focus on non-emergency situations such as  
14          medical physics, space exploration, and natu-  
15          rally occurring radiation.

16          “(3) RESEARCH PLAN.—

17                 “(A) Not later than 90 days after the date  
18                 of enactment of the Energy Act of 2020, the  
19                 Secretary shall enter into an agreement with  
20                 the National Academy of Sciences to develop a  
21                 long-term strategic and prioritized research  
22                 agenda for the program described in paragraph  
23                 (2);

24                 “(B) Not later than one year after the  
25                 date of enactment of the Energy Act of 2020,



1 the Secretary shall transmit this research plan  
2 developed in subparagraph (A) to the Com-  
3 mittee on Science, Space, and Technology of  
4 the House of Representatives and the Com-  
5 mittee on Energy and Natural Resources of the  
6 Senate.

7 “(4) GAO STUDY.—Not later than 3 years after  
8 the date of enactment of the Energy Act of 2020,  
9 the Comptroller General shall transmit to the Com-  
10 mittee on Science, Space, and Technology of the  
11 House of Representatives and the Committee on En-  
12 ergy and Natural Resources of the Senate, a report  
13 on:

14 “(A) an evaluation of the program activi-  
15 ties carried out under this section;

16 “(B) the effectiveness of the coordination  
17 and management of the program; and

18 “(C) the implementation of the research  
19 plan outlined in paragraph (3).

20 “(5) DEFINITIONS.—In this subsection:

21 “(A) LOW-DOSE RADIATION.—The term  
22 ‘low-dose radiation’ means a radiation dose of  
23 less than 100 millisieverts.

24 “(B) LOW DOSE-RATE RADIATION.—  
25 The term ‘low dose-rate radiation’ means a ra-

1           diation dose rate of less than 5 millisieverts per  
2           hour.

3           “(6) RULE OF CONSTRUCTION.—Nothing in  
4           this subsection shall be construed to subject any re-  
5           search carried out by the Secretary for the program  
6           under this subsection to any limitations described in  
7           section 977(e) of the Energy Policy Act of 2005 (42  
8           U.S.C. 16317(e)).

9           “(7) FUNDING.—For purposes of carrying out  
10          this subsection, the Secretary is authorized to make  
11          available from funds provided to the Biological and  
12          Environmental Research Program—

13                 “(A) \$20,000,000 for fiscal year 2021;

14                 “(B) \$20,000,000 for fiscal year 2022;

15                 “(C) \$30,000,000 for fiscal year 2023;

16                 “(D) \$40,000,000 for fiscal year 2024.

17                 “(E) \$40,000,000 for fiscal year 2025;

18                 “(F) \$50,000,000 for fiscal year 2026;

19                 “(G) \$50,000,000 for fiscal year 2027;

20                 “(H) \$60,000,000 for fiscal year 2028;

21                 “(I) \$60,000,000 for fiscal year 2029;

22                 “(J) \$70,000,000 for fiscal year 2030; and

23                 “(K) \$70,000,000 for fiscal year 2031.

24          “(f) EARTH AND ENVIRONMENTAL SYSTEMS RE-  
25          SEARCH.—

1           “(1) IN GENERAL.—The Director shall carry  
2           out a program of fundamental research to develop  
3           high-resolution Earth system modeling, analysis, and  
4           intercomparison capabilities, in order to further the  
5           understanding of the biological, biogeochemical, and  
6           physical processes across the multiple scales that  
7           control the flux of environmentally relevant com-  
8           pounds between the terrestrial surface and the at-  
9           mosphere.

10           “(2) PRIORITIZATION.—In carrying out the  
11           program authorized under paragraph (1), the Direc-  
12           tor shall prioritize—

13                   “(A) the development of software and algo-  
14                   rithms to enable the productive application of  
15                   environmental systems and extreme weather  
16                   prediction models in high-performance com-  
17                   puting systems; and

18                   “(B) capabilities that support the Depart-  
19                   ment’s mission needs for energy and infrastruc-  
20                   ture security, resilience, and reliability.

21           “(3) USER FACILITIES.—

22                   “(A) IN GENERAL.—In carrying out the  
23                   activities authorized under paragraph (1), the  
24                   Director shall establish and operate user facili-  
25                   ties to advance the collection, validation, and

1 analysis of atmospheric data, including activi-  
2 ties to advance knowledge and improve model  
3 representations and measure the impact of at-  
4 mospheric gases, aerosols, and clouds on earth  
5 and environmental systems.

6 “(B) EXISTING FACILITIES.—To the max-  
7 imum extent practicable, the Director shall uti-  
8 lize existing facilities to carry out this sub-  
9 section.

10 “(C) SELECTION.—The Director shall se-  
11 lect user facilities under paragraph (1) on a  
12 competitive, merit-reviewed basis. The Director  
13 shall consider applications from the National  
14 Laboratories, institutes of higher education,  
15 multi-institutional collaborations, and other ap-  
16 propriate entities.

17 “(D) TERMINATION.—Consistent with the  
18 existing authorities of the Department, the Di-  
19 rector may terminate an underperforming user  
20 facility for cause during the performance pe-  
21 riod.

22 “(4) COORDINATION.—In carrying out the pro-  
23 gram authorized in paragraph (1), the Director shall  
24 ensure that the Office of Science—

1           “(A) consults and coordinates with the Na-  
2           tional Oceanic Atmospheric Administration, the  
3           Environmental Protection Agency, and any  
4           other relevant Federal agency on the collection,  
5           validation, and analysis of atmospheric data;  
6           and

7           “(B) coordinates with relevant stake-  
8           holders, including institutes of higher education,  
9           nonprofit research institutions, industry, State,  
10          local, and tribal governments, and other appro-  
11          priate entities to ensure access to the best avail-  
12          able relevant atmospheric and environmental  
13          data, including historical weather data.

14          “(g) COASTAL ZONE RESEARCH INITIATIVE.—

15           “(1) IN GENERAL.—The Director shall carry  
16           out a basic research program to enhance the under-  
17           standing of coastal ecosystems. In carrying out this  
18           program, the Director shall prioritize efforts to en-  
19           hance the collection of observational data, and shall  
20           develop models to analyze the ecological, biogeo-  
21           chemical, hydrological and physical processes that  
22           interact in coastal zones.

23           “(2) NATIONAL SYSTEM FOR COASTAL DATA  
24           COLLECTION.—The Director shall establish an inte-  
25           grated system of field research sites in order to im-

1 prove the quantity and quality of observational data,  
2 and that encompass at least three of the major land-  
3 water interfaces of the United States, including—

4 “(A) the Great Lakes region;

5 “(B) the Pacific coast;

6 “(C) the Atlantic coast;

7 “(D) the Arctic; and

8 “(E) the Gulf coast.

9 “(3) EXISTING INFRASTRUCTURE.—In carrying  
10 out the programs and establishing the field research  
11 sites under paragraph (1) and (2), the Secretary  
12 shall leverage existing Department of Energy infra-  
13 structure, including the Department’s existing ma-  
14 rine sciences lab.

15 “(4) COORDINATION.—For the purposes of car-  
16 rying out the programs and establishing the field re-  
17 search sites under the Initiative, the Secretary may  
18 enter into agreements with Federal Departments  
19 and agencies with complementary capabilities.

20 “(5) REPORT.—Not less than 2 years after the  
21 date of the enactment of this Act, the Director shall  
22 provide to the Committee on Science, Space, and  
23 Technology and the Committee on Appropriations of  
24 the House of Representatives and the Committee on  
25 Energy and Natural Resources and the Committee

1 on Appropriations of the Senate a report examining  
2 whether the system described in this section should  
3 be established as a National User Facility.

4 “(h) BIOLOGICAL AND ENVIRONMENTAL RESEARCH  
5 USER FACILITIES.—

6 “(1) IN GENERAL.—The Director shall carry  
7 out a program for the development, construction, op-  
8 eration, and maintenance of user facilities to en-  
9 hance the collection and analysis of observational  
10 data related to complex biological, earth, and envi-  
11 ronmental systems.

12 “(2) FACILITY REQUIREMENTS.—To the max-  
13 imum extent practicable, the user facilities devel-  
14 oped, constructed, operated, or maintained under  
15 paragraph (1) shall include—

16 “(A) distributed field research and obser-  
17 vation platforms for understanding earth sys-  
18 tem processes;

19 “(B) instruments and modeling resources  
20 for understanding the physical, chemical, and  
21 cellular processes of biological and environ-  
22 mental systems;

23 “(C) integrated high-throughput sequenc-  
24 ing, DNA design and synthesis, metabolomics  
25 and computational analysis; and

1           “(D) such other facilities as the Director  
2           considers appropriate, consistent with section  
3           209 of the Department of Energy Organization  
4           Act (42 U.S.C. 7139).

5           “(3) EXISTING FACILITIES.—In carrying out  
6           the program established in paragraph (1), the Direc-  
7           tor is encouraged to evaluate the capabilities of ex-  
8           isting user facilities and, to the maximum extent  
9           practicable, invest in modernization of those capa-  
10          bilities to address emerging research priorities.

11          “(i) LOW-DOSE RADIATION AND SPACE RADIATION  
12          RESEARCH PROGRAM.—

13           “(1) IN GENERAL.—The Secretary of Energy,  
14           in consultation with the Administrator of the Na-  
15           tional Aeronautics and Space Administration shall  
16           carry out a basic research program on the similar-  
17           ities and differences between the effects of exposure  
18           to low dose radiation on Earth, in low Earth orbit,  
19           and in the space environment.

20           “(2) PURPOSE.—The purpose of this program  
21           is to accelerate breakthroughs in low dose and low-  
22           dose rate radiation research and development as de-  
23           scribed in section (e) and to inform the advancement  
24           of new tools, technologies, and advanced materials  
25           needed to facilitate long-duration space exploration.



1 “(j) EMERGING TECHNOLOGIES.—

2 “(1) IN GENERAL.—The Secretary shall estab-  
3 lish within the Biological and Environmental Re-  
4 search program an initiative focused on the develop-  
5 ment of engineered ecosystems through the applica-  
6 tion of artificial intelligence, novel sensing capabili-  
7 ties, and other emerging technologies.

8 “(2) INTERAGENCY COORDINATION.—The Sec-  
9 retary shall coordinate with the Director of the Na-  
10 tional Science Foundation, the Administrator of the  
11 National Oceanic and Atmospheric Administration,  
12 the Director of the U.S. Geological Survey, and  
13 other relevant officials to avoid duplication of re-  
14 search and observational activities and to ensure  
15 that activities carried out under this initiative are  
16 complimentary to those currently being undertaken  
17 by other agencies.

18 “(3) REPORT.—Not later than 180 days after  
19 the enactment of this Act, the Secretary shall pro-  
20 vide a report to the Committee on Science, Space,  
21 and Technology of the House, and the Committee on  
22 Energy and Natural Resources of the Senate, on the  
23 activity mandated in subsection (j).

24 “(k) EMERGING INFECTIOUS DISEASE RESEARCH  
25 PROGRAM.—

1           “(1) IN GENERAL.—The Secretary, in coordina-  
2           tion with the Director of the National Science Foun-  
3           dation and the Administrator of the National Aero-  
4           nautics and Space Administration, shall carry out a  
5           research program to leverage the Federal Govern-  
6           ment’s innovative analytical resources and tools, user  
7           facilities, and advanced computational and net-  
8           working capabilities in order to prevent, prepare for,  
9           and respond to emerging infectious diseases, includ-  
10          ing COVID–19. The Secretary shall carry out this  
11          program through a competitive, merit reviewed proc-  
12          ess, and consider applications from National Labora-  
13          tories, institutions of higher education, multi-institu-  
14          tional collaborations, industry partners and other  
15          appropriate entities.

16          “(2) PROGRAM COMPONENTS.—In carrying out  
17          the program established under paragraph (1), the  
18          Secretary shall coordinate with relevant Federal  
19          agencies to determine a comprehensive set of tech-  
20          nical milestones for these research activities and  
21          prioritize the following objectives—

22                  “(A) supporting fundamental research and  
23                  development in advanced analytics, experi-  
24                  mental studies, materials synthesis, high-per-  
25                  formance computing technologies needed to

1 characterize, model, simulate, and predict com-  
2 plex phenomena and biological materials related  
3 to emerging infectious diseases, including  
4 COVID-19 mitigation challenges, including a  
5 focus on bioinformatics, epidemiology, and mo-  
6 lecular modeling;

7 “(B) using expertise from the private sec-  
8 tor and institutions of higher education, and  
9 the National Laboratories to develop computa-  
10 tional software and capabilities that prospective  
11 users may accelerate emerging infectious dis-  
12 eases research and development;

13 “(C) increasing the utility of the research  
14 infrastructure of the Department, including sci-  
15 entific computing user facilities, x-ray light  
16 sources, neutron scattering facilities, nanoscale  
17 science research centers, and sequencing and  
18 bio-characterization facilities by coordinating  
19 with the Advanced Scientific Computing Re-  
20 search, Basic Energy Sciences, and Biological  
21 and Environmental Research programs within  
22 the Office of Science;

23 “(D) leveraging experience from existing  
24 modeling and simulation research and work  
25 sponsored by the Department and promoting

1 collaboration and data sharing between Na-  
2 tional Laboratories, research entities, and user  
3 facilities of the Department by providing the  
4 necessary access and secure data transfer capa-  
5 bilities; and

6 “(E) ensuring that new experimental and  
7 computational tools are accessible to relevant  
8 research communities, including private sector  
9 entities engaged in technology development to  
10 address emerging infectious diseases, including  
11 COVID–19 challenges.

12 “(3) COORDINATION.—In carrying out these  
13 programs, the Secretary shall ensure, to the max-  
14 imum extent practicable, coordination of these activi-  
15 ties with the Department of Energy National Lab-  
16 oratories, institutions of higher education, and the  
17 private sector.

18 “(4) EMERGING INFECTIOUS DISEASES HIGH  
19 PERFORMANCE COMPUTING RESEARCH CONSOR-  
20 TIUM.—

21 “(A) IN GENERAL.—The Secretary in co-  
22 ordination with the Director of the National  
23 Science Foundation and the Director of the Of-  
24 fice of Science and Technology Policy shall es-  
25 tablish and operate an Emerging Infectious

1 Diseases High Performance Computing Re-  
2 search Consortium (referred to in this section  
3 as the ‘Consortium’), in order to support the  
4 program under paragraph (1) by providing, to  
5 the extent practicable, a centralized location for  
6 multidisciplinary, collaborative, emerging infec-  
7 tious disease research and development through  
8 high performance computing and advanced data  
9 analytics technologies and processes.

10 “(B) MEMBERSHIP.—The members of  
11 such consortium shall be representatives from  
12 relevant Federal agencies, the private sector, in-  
13 stitutions of higher education, which can each  
14 contribute relevant compute time, capabilities,  
15 or other resources.

16 “(C) ACTIVITIES.—The Consortium  
17 shall—

18 “(i) match applicants with available  
19 Federal and private sector computing re-  
20 sources;

21 “(ii) consider supplemental awards for  
22 computing partnerships with Consortium  
23 members to qualifying entities on a com-  
24 petitive merit-review basis;

1           “(iii) encourage collaboration and  
2           communication among member representa-  
3           tives of the consortium and awardees;

4           “(iv) make available the high-perform-  
5           ance computing capabilities, expertise, and  
6           user facilities of the Department and the  
7           National Laboratories; and

8           “(v) submit an annual report to the  
9           Secretary summarizing the activities of the  
10          Consortium, including—

11                 “(I) describing each project un-  
12                 dertaken by the Consortium;

13                 “(II) detailing organizational ex-  
14                 penditures; and

15                 “(III) evaluating contribution to  
16                 the achievement of technical mile-  
17                 stones as determined in paragraph  
18                 (1).

19           “(D) COORDINATION.—The Secretary shall  
20           ensure the coordination of, and avoid unneces-  
21           sary duplication of, the activities of the Consor-  
22           tium with the activities of other research enti-  
23           ties of the Department, institutions of higher  
24           education and the private sector.

1           “(5) REPORT.—Not later than 2 years after the  
2           date of enactment of this Act, the Secretary shall  
3           submit to the Committee on Science, Space, and  
4           Technology of the House, and the Committee on En-  
5           ergy and Natural Resources of the Senate, and the  
6           Committee on Commerce, Science, and Transpor-  
7           tation of the Senate a report detailing the effective-  
8           ness of—

9                   “(A) the interagency coordination between  
10                  each Federal agency involved in the research  
11                  program carried out under this section;

12                  “(B) the collaborative research achieve-  
13                  ments of the program, including the achieve-  
14                  ment of the technical milestones determined  
15                  under paragraph (1); and

16                  “(C) potential opportunities to expand the  
17                  technical capabilities of the Department.

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

22           “(7) FUNDING.—From within funds authorized  
23           to be appropriated for the Department’s Office of  
24           Science, there shall be made available to the Sec-  
25           retary to carry out the activities under this sub-

1 section, \$50,000,000 for fiscal years 2022 and  
2 2023.”.

3 **SEC. 406. FUSION ENERGY.**

4 (a) IN GENERAL.—Section 307 of the Department of  
5 Energy Research and Innovation Act (42 U.S.C. 18645)  
6 is amended by adding at the end the following:

7 “(p) HIGH-PERFORMANCE COMPUTATION COLLABO-  
8 RATIVE RESEARCH PROGRAM.—

9 “(1) IN GENERAL.—The Secretary shall carry  
10 out a program to conduct and support collaborative  
11 research, development, and demonstration of fusion  
12 energy technologies, through high-performance com-  
13 putation modeling and simulation techniques, in  
14 order to—

15 “(A) support basic science research in  
16 plasmas and matter at very high temperatures  
17 and densities;

18 “(B) inform the development of a broad  
19 range of fusion energy systems; and

20 “(C) facilitate the translation of basic re-  
21 search results in fusion energy science to indus-  
22 try.

23 “(2) COORDINATION.—In carrying out the pro-  
24 gram under paragraph (1), the Secretary shall co-



1       ordinate with relevant Federal agencies, and  
2       prioritize the following objectives:

3               “(A) Using expertise from the private sec-  
4               tor, institutions of higher education, and the  
5               National Laboratories to develop computational  
6               software and capabilities that prospective users  
7               may use to accelerate research and development  
8               of fusion energy systems.

9               “(B) Developing computational tools to  
10              simulate and predict fusion energy science phe-  
11              nomena that may be validated through physical  
12              experimentation.

13              “(C) Increasing the utility of the research  
14              infrastructure of the Department by coordi-  
15              nating with the Advanced Scientific Computing  
16              Research program within the Office of Science.

17              “(D) Leveraging experience from existing  
18              modeling and simulation entities sponsored by  
19              the Department.

20              “(E) Ensuring that new experimental and  
21              computational tools are accessible to relevant  
22              research communities, including private sector  
23              entities engaged in fusion energy technology de-  
24              velopment.

1           “(3) DUPLICATION.—The Secretary shall en-  
2           sure the coordination of, and avoid unnecessary du-  
3           plication of, the activities of this program with the  
4           activities of—

5                   “(A) other research entities of the Depart-  
6                   ment, including the National Laboratories, the  
7                   Advanced Research Projects Agency–Energy,  
8                   the Advanced Scientific Computing Research  
9                   program; and

10                   “(B) industry.

11           “(4) HIGH-PERFORMANCE COMPUTING FOR FU-  
12           SION INNOVATION HUB.—In carrying out the pro-  
13           gram under paragraph (1), the Secretary shall es-  
14           tablish and operate a national High-Performance  
15           Computing for Fusion Innovation Hub (referred to  
16           in this section as the ‘Hub’), which shall focus on  
17           the early stage research and development activities  
18           described under paragraph (1).

19           “(5) SELECTION.—The Secretary shall select  
20           the Hub under this subsection on a competitive,  
21           merit-reviewed basis. The Secretary shall consider  
22           applications from National Laboratories, institutions  
23           of higher education, multi-institutional collabora-  
24           tions, and other appropriate entities.

1           “(6) DURATION.—The Hub established under  
2 this subsection shall receive support for a period of  
3 not more than 5 years, subject to the availability of  
4 appropriations.

5           “(7) RENEWAL.—Upon the expiration of any  
6 period of support of the Hub, the Secretary may  
7 renew support for the Hub, on a merit-reviewed  
8 basis, for a period of not more than 5 years.

9           “(8) TERMINATION.—Consistent with the exist-  
10 ing authorities of the Department, the Secretary  
11 may terminate the Hub for cause during the per-  
12 formance period.

13           “(q) BRIGHTEST LIGHT RESEARCH INITIATIVE.—

14           “(1) IN GENERAL.—The Secretary shall estab-  
15 lish a high intensity laser research initiative con-  
16 sistent with the recommendations of the National  
17 Academies report, ‘Opportunities in Intense  
18 Ultrafast Lasers: Reaching for the Brightest Light’,  
19 and the Brightest Light Initiative workshop report,  
20 ‘The Future of Intense Ultrafast Lasers in the  
21 U.S.’. This initiative should include research and de-  
22 velopment of multi petawatt-scale laser technologies  
23 necessary for discovery science and to advance en-  
24 ergy technologies and investments in future facili-  
25 ties, including an open-access laser user facility in

1 the U.S. with multiple beamlines and short-pulse  
2 and high-peak-power lasers with very high-average  
3 power. This initiative should also provide support for  
4 a user network of academic and national laboratory  
5 high intensity laser facilities. The Director shall also  
6 leverage new laser technologies for more compact,  
7 less complex, and low-cost accelerator systems need-  
8 ed for science applications.

9 “(2) AUTHORIZATION OF APPROPRIATIONS.—

10 Out of funds authorized to be appropriated under  
11 subsection (o), there are authorized to be appro-  
12 priated to the Secretary to carry out the activities  
13 described in this subsection—

14 “(A) \$50,000,000 for fiscal year 2022;

15 “(B) \$100,000,000 for fiscal year 2023;

16 “(C) \$150,000,000 for fiscal year 2024;

17 “(D) \$200,000,000 for fiscal year 2025;

18 and

19 “(E) \$250,000,000 for fiscal year 2026.

20 “(r) MATERIAL PLASMA EXPOSURE EXPERIMENT.—

21 “(1) IN GENERAL.—The Secretary shall con-  
22 struct a Material Plasma Exposure Experiment fa-  
23 cility as described in the 2020 publication approved  
24 by the Fusion Energy Sciences Advisory Committee  
25 titled ‘Powering the Future: Fusion and Plasmas’.

1 The Secretary shall consult with the private sector,  
2 universities, National Laboratories, and relevant  
3 Federal agencies to ensure that this facility is capa-  
4 ble of meeting Federal research needs for steady-  
5 state, high-heat-flux and plasma-material interaction  
6 testing of fusion materials over a range of fusion en-  
7 ergy relevant parameters.

8 “(2) FACILITY CAPABILITIES.—The Secretary  
9 shall ensure that the facility described in subsection  
10 (a) will provide the following capabilities:

11 “(A) A magnetic field at the target of 1  
12 Tesla.

13 “(B) An energy flux at the target of 10  
14 MW/m<sup>2</sup>.

15 “(C) The ability to expose previously irra-  
16 diated plasma facing material samples to plas-  
17 ma.

18 “(3) START OF OPERATIONS.—The Secretary  
19 shall, to the maximum extent practicable, ensure  
20 that the start of full operations of the facility under  
21 this section occurs before December 31, 2027.

22 “(4) FUNDING.—Out of funds authorized to be  
23 appropriated under section 409 for Fusion Energy  
24 Sciences, there are funds authorized to be appro-  
25 priated to the Secretary for the Office of Fusion En-

1       ergy Science to carry out to completion the construc-  
2       tion of the facility under this section:

3               “(A) \$32,800,000 for fiscal year 2022;

4               “(B) \$13,400,000 for fiscal year 2023;

5               “(C) \$12,600,000 for fiscal year 2024; and

6               “(D) \$400,000 for fiscal year 2025.

7       “(s) MATTER IN EXTREME CONDITIONS INSTRU-  
8       MENT UPGRADE.—

9               “(1) IN GENERAL.—The Secretary shall provide  
10       for the upgrade to the Matter in Extreme Conditions  
11       endstation at the Linac Coherent Light Source as  
12       described in the 2020 publication approved by the  
13       Fusion Energy Sciences Advisory Committee titled  
14       ‘Powering the Future: Fusion and Plasmas’. The  
15       Secretary shall consult with the private sector, uni-  
16       versities, National Laboratories, and relevant Fed-  
17       eral agencies to ensure that this facility is capable  
18       of meeting Federal research needs for understanding  
19       physical and chemical changes to plasmas at funda-  
20       mental timescales, and explore new regimes of dense  
21       material physics, astrophysics, planetary physics,  
22       and short-pulse laser-plasma interactions.

23               “(2) 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, 2028.”.

3           (b) INTERNATIONAL THERMONUCLEAR EXPERI-  
4           MENTAL REACTOR CONSTRUCTION.—Section 972(c) of  
5           the Energy Policy Act of 2005 (42 U.S.C. 16312) is  
6           amended by adding at the end the following:

7                       “(C) \$281,000,000 for fiscal year 2026;

8                       “(D) \$281,000,000 for fiscal year 2027;

9                       “(E) \$281,000,000 for fiscal year 2028;

10                      “(F) \$281,000,000 for fiscal year 2029;

11                      “(G) \$281,000,000 for fiscal year 2030;

12                      and

13                      “(H) \$281,000,000 for fiscal year 2031.”.

14   **SEC. 407. NUCLEAR PHYSICS.**

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

18                      “(c) FACILITY FOR RARE ISOTOPE BEAMS INSTRU-  
19           MENTATION.—The Secretary shall provide for the con-  
20           struction of a high rigidity spectrometer and a gamma-  
21           ray energy tracking array for use at the Facility for Rare  
22           Isotope Beams to maximize the capabilities of this facility  
23           and advance the understanding of rare nuclear isotopes  
24           and the evolution of the cosmos.

25                      “(d) ELECTRON-ION COLLIDER.—

1           “(1) IN GENERAL.—The Secretary shall provide  
2           for an Electron Ion Collider as described in the  
3           2015 Nuclear Science Advisory Committee’s Long  
4           Range Plan and endorsed by the report from the  
5           National Academies of Science, Engineering, and  
6           Medicine report titled ‘An Assessment of U.S.-Based  
7           Electron-Ion Collider Science’, in order to measure  
8           the internal structure of the proton and the nucleus  
9           and answer fundamental questions about the nature  
10          of visible matter.

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

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

16               “(B) ion beams from deuterium to the  
17               heaviest nuclei;

18               “(C) variable center of mass energy from  
19               20 to 140 GeV; high luminosity of  $10^{33}$ – $10^{34}$   
20                $\text{cm}^{-2}\text{s}^{-1}$ ; and

21               “(D) the possibility of more than one  
22               interaction region.

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, 2030.”.

3 **SEC. 408. SCIENCE LABORATORIES INFRASTRUCTURE PRO-**  
4 **GRAM.**

5 Section 309 of the Department of Energy Research  
6 and Innovation Act (42 U.S.C. 18647) is amended by add-  
7 ing at the end the following:

8 “(c) USE OF AVAILABLE APPROACHES AND MECHA-  
9 NISMS.—In carrying out this section, the Director shall  
10 utilize all available approaches and mechanisms, including  
11 capital line items, minor construction projects, energy sav-  
12 ings performance contracts, utility energy service con-  
13 tracts, alternative financing, and expense funding, as ap-  
14 propriate.

15 “(d) MID-SCALE INSTRUMENTATION PROGRAM.—  
16 The Director shall establish a mid-scale instrumentation  
17 program to enable the development and acquisition of  
18 novel, state-of-the-art instruments that would significantly  
19 accelerate scientific breakthroughs at national laboratory  
20 user facilities.”.

21 **SEC. 409. AUTHORIZATION OF APPROPRIATIONS.**

22 (a) FISCAL YEAR 2022.—There are authorized to be  
23 appropriated to the Secretary for the Office of Science for  
24 fiscal year 2022 \$7,727,950,391, of which—

1           (1) \$2,514,400,000 shall be for Basic Energy  
2        Sciences;

3           (2) \$1,128,976,445 shall be for High Energy  
4        Physics;

5           (3) \$812,733,521 shall be for Biological and  
6        Environmental Research;

7           (4) \$769,560,425 shall be for Nuclear Physics;

8           (5) \$1,136,800,000 shall be for Advanced Sci-  
9        entific Computing Research;

10          (6) \$921,000,000 shall be for Fusion Energy  
11        Sciences;

12          (7) \$264,000,000 shall be for Science Labora-  
13        tories Infrastructure;

14          (8) \$195,840,000 shall be for Science Program  
15        Direction;

16          (9) \$123,420,000 shall be for Safeguards and  
17        Security; and

18          (10) \$29,580,000 shall be for Workforce Devel-  
19        opment for Teachers and Scientists.

20        (b) FISCAL YEAR 2023.—There are authorized to be  
21        appropriated to the Secretary for the Office of Science for  
22        fiscal year 2023 \$8,430,037,582, of which—

23           (1) \$2,783,800,000 shall be for Basic Energy  
24        Sciences;

1           (2) \$1,211,952,889 shall be for High Energy  
2           Physics;

3           (3) \$872,467,042 shall be for Biological and  
4           Environmental Research;

5           (4) \$826,120,851 shall be for Nuclear Physics;

6           (5) \$1,258,600,000 shall be for Advanced Sci-  
7           entific Computing Research;

8           (6) \$961,000,000 shall be for Fusion Energy  
9           Sciences;

10          (7) \$288,000,000 shall be for Science Labora-  
11          tories Infrastructure;

12          (8) \$199,756,800 shall be for Science Program  
13          Direction;

14          (9) \$125,888,400 shall be for Safeguards and  
15          Security; and

16          (10) \$30,171,600 shall be for Workforce Devel-  
17          opment for Teachers and Scientists.

18          (c) FISCAL YEAR 2024.—There are authorized to be  
19          appropriated to the Secretary for the Office of Science for  
20          fiscal year 2024 \$9,132,264,309, of which—

21                 (1) \$3,053,200,000 shall be for Basic Energy  
22                 Sciences;

23                 (2) \$1,294,929,334 shall be for High Energy  
24                 Physics;

1           (3) \$932,200,562 shall be for Biological and  
2       Environmental Research;

3           (4) \$882,681,276 shall be for Nuclear Physics;

4           (5) \$1,380,400,000 shall be for Advanced Sci-  
5       entific Computing Research;

6           (6) \$921,000,000 shall be for Fusion Energy  
7       Sciences;

8           (7) \$312,000,000 shall be for Science Labora-  
9       tories Infrastructure;

10          (8) \$203,751,936 shall be for Science Program  
11       Direction;

12          (9) \$128,406,168 shall be for Safeguards and  
13       Security; and

14          (10) \$30,775,032 shall be for Workforce Devel-  
15       opment for Teachers and Scientists.

16       (d) FISCAL YEAR 2025.—There are authorized to be  
17   appropriated to the Secretary for the Office of Science for  
18   fiscal year 2025 \$9,834,633,362, of which—

19          (1) \$3,322,600,000 shall be for Basic Energy  
20       Sciences;

21          (2) \$1,377,905,778 shall be for High Energy  
22       Physics;

23          (3) \$991,934,083 shall be for Biological and  
24       Environmental Research;

25          (4) \$939,241,702 shall be for Nuclear Physics;

1           (5) \$1,502,200,000 shall be for Advanced Sci-  
2           entific Computing Research;

3           (6) \$901,000,000 shall be for Fusion Energy  
4           Sciences;

5           (7) \$336,000,000 shall be for Science Labora-  
6           tories Infrastructure;

7           (8) \$207,826,975 shall be for Science Program  
8           Direction;

9           (9) \$130,974,291 shall be for Safeguards and  
10          Security; and

11          (10) \$31,390,533 shall be for Workforce Devel-  
12          opment for Teachers and Scientists.

13          (e) FISCAL YEAR 2026.—There are authorized to be  
14          appropriated to the Secretary for the Office of Science for  
15          fiscal year 2026 \$10,537,147,589, of which—

16          (1) \$3,592,000,000 shall be for Basic Energy  
17          Sciences;

18          (2) \$1,460,882,223 shall be for High Energy  
19          Physics;

20          (3) \$1,051,667,604 shall be for Biological and  
21          Environmental Research;

22          (4) \$995,802,127 shall be for Nuclear Physics;

23          (5) \$1,624,000,000 shall be for Advanced Sci-  
24          entific Computing Research;

1           (6) \$1,075,200,000 shall be for Fusion Energy  
2        Sciences;

3           (7) \$360,000,000 shall be for Science Labora-  
4        tories Infrastructure;

5           (8) \$211,983,514 shall be for Science Program  
6        Direction;

7           (9) \$133,593,777 shall be for Safeguards and  
8        Security; and

9           (10) \$32,018,343 shall be for Workforce Devel-  
10       opment for Teachers and Scientists.

11       (f) FISCAL YEAR 2027.—There are authorized to be  
12       appropriated to the Secretary for the Office of Science for  
13       fiscal year 2027 \$11,239,809,892, of which—

14           (1) \$3,861,400,000 shall be for Basic Energy  
15        Sciences;

16           (2) \$1,543,858,668 shall be for High Energy  
17        Physics;

18           (3) \$1,111,401,125 shall be for Biological and  
19        Environmental Research;

20           (4) \$1,052,362,553 shall be for Nuclear Phys-  
21        ics;

22           (5) \$1,745,800,000 shall be for Advanced Sci-  
23        entific Computing Research;

24           (6) \$1,155,840,000 shall be for Fusion Energy  
25        Sciences;

1           (7) \$384,000,000 shall be for Science Labora-  
2           tories Infrastructure;

3           (8) \$216,223,184 shall be for Science Program  
4           Direction;

5           (9) \$136,265,653 shall be for Safeguards and  
6           Security; and

7           (10) \$32,658,710 shall be for Workforce Devel-  
8           opment for Teachers and Scientists.

9           (g) FISCAL YEAR 2028.—There are authorized to be  
10          appropriated to the Secretary for the Office of Science for  
11          fiscal year 2028 \$11,942,623,234, of which—

12           (1) \$4,130,800,000 shall be for Basic Energy  
13           Sciences;

14           (2) \$1,626,835,112 shall be for High Energy  
15           Physics;

16           (3) \$1,171,134,646 shall be for Biological and  
17           Environmental Research;

18           (4) \$1,108,922,978 shall be for Nuclear Phys-  
19           ics;

20           (5) \$1,867,600,000 shall be for Advanced Sci-  
21           entific Computing Research;

22           (6) \$1,236,480,000 shall be for Fusion Energy  
23           Sciences;

24           (7) \$408,000,000 shall be for Science Labora-  
25           tories Infrastructure;

1 (8) \$220,547,648 shall be for Science Program

2 Direction;

3 (9) \$138,990,966 shall be for Safeguards and

4 Security; and

5 (10) \$33,311,884 shall be for Workforce Devel-

6 opment for Teachers and Scientists.

7 (h) FISCAL YEAR 2029.—There are authorized to be

8 appropriated to the Secretary for the Office of Science for

9 fiscal year 2029 \$12,645,590,635, of which—

10 (1) \$4,400,200,000 shall be for Basic Energy

11 Sciences;

12 (2) \$1,709,811,557 shall be for High Energy

13 Physics;

14 (3) \$1,230,868,167 shall be for Biological and

15 Environmental Research;

16 (4) \$1,165,483,403 shall be for Nuclear Phys-

17 ics;

18 (5) \$1,989,400,000 shall be for Advanced Sci-

19 entific Computing Research;

20 (6) \$1,317,120,000 shall be for Fusion Energy

21 Sciences;

22 (7) \$432,000,000 shall be for Science Labora-

23 tories Infrastructure;

24 (8) \$224,958,601 shall be for Science Program

25 Direction;



1           (9) \$141,770,785 shall be for Safeguards and  
2 Security; and

3           (10) \$33,978,122 shall be for Workforce Devel-  
4 opment for Teachers and Scientists.

5           (i) FISCAL YEAR 2030.—There are authorized to be  
6 appropriated to the Secretary for the Office of Science for  
7 fiscal year 2030 \$13,348,715,176, of which—

8           (1) \$4,669,600,000 shall be for Basic Energy  
9 Sciences;

10          (2) \$1,792,788,001 shall be for High Energy  
11 Physics;

12          (3) \$1,290,601,687 shall be for Biological and  
13 Environmental Research;

14          (4) \$1,222,043,829 shall be for Nuclear Phys-  
15 ics;

16          (5) \$2,111,200,000 shall be for Advanced Sci-  
17 entific Computing Research;

18          (6) \$1,397,760,000 shall be for Fusion Energy  
19 Sciences;

20          (7) \$456,000,000 shall be for Science Labora-  
21 tories Infrastructure;

22          (8) \$229,457,773 shall be for Science Program  
23 Direction;

24          (9) \$144,606,201 shall be for Safeguards and  
25 Security; and

1           (10) \$34,657,684 shall be for Workforce Devel-  
2           opment for Teachers and Scientists.

3           (j) FISCAL YEAR 2031.—There are authorized to be  
4           appropriated to the Secretary for the Office of Science for  
5           fiscal year 2031 \$14,052,000,000, of which—

6           (1) \$4,939,000,000 shall be for Basic Energy  
7           Sciences;

8           (2) \$1,875,764,446 shall be for High Energy  
9           Physics;

10          (3) \$1,350,335,208 shall be for Biological and  
11          Environmental Research;

12          (4) \$1,278,604,254 shall be for Nuclear Phys-  
13          ics;

14          (5) \$2,233,000,000 shall be for Advanced Sci-  
15          entific Computing Research;

16          (6) \$1,478,400,000 shall be for Fusion Energy  
17          Sciences;

18          (7) \$480,000,000 shall be for Science Labora-  
19          tories Infrastructure;

20          (8) \$234,046,929 shall be for Science Program  
21          Direction;

22          (9) \$147,498,325 shall be for Safeguards and  
23          Security; and

24          (10) \$35,350,838 shall be for Workforce Devel-  
25          opment for Teachers and Scientists.

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

3       **SEC. 411. ADVANCED RESEARCH PROJECTS AGENCY-EN-**  
4                   **ERGY UPDATE.**

5           Paragraph (2) of section 5012(o) of the America  
6       COMPETES Act (42 U.S.C. 16538(o)) is amended by  
7       adding at the end the following:

8                   “(F) \$800,833,333 for fiscal year 2026;

9                   “(G) \$840,666,667 for fiscal year 2027;

10                  “(H) \$880,500,000 for fiscal year 2028;

11                  “(I) \$920,333,333 for fiscal year 2029;

12                  “(J) \$960,166,667 for fiscal year 2030;

13                  and

14                  “(K) \$1,000,000,000 for fiscal year  
15                  2031.”.

16       **Subtitle C—DOE Clean Energy**  
17                   **Infrastructure**

18       **SEC. 421. REGIONAL ENERGY INNOVATION CENTERS.**

19           (a) DEFINITIONS.—In this section:

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

22                          (A) an innovative technology—

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

- 1 (ii) that produces nuclear energy;
- 2 (iii) for carbon capture and sequestra-
- 3 tion;
- 4 (iv) that enables advanced vehicles,
- 5 vehicle components, and related tech-
- 6 nologies that result in significant energy
- 7 savings;
- 8 (v) that generates, transmits, distrib-
- 9 utes, uses, or stores energy more efficiently
- 10 than conventional technologies, including
- 11 through Smart Grid technologies; or
- 12 (vi) that enhances the energy inde-
- 13 pendence and security of the United States
- 14 by enabling improved or expanded supply
- 15 and production of domestic energy re-
- 16 sources, including coal, oil, and natural
- 17 gas;
- 18 (B) a research, development, demonstra-
- 19 tion, or commercial application activity nec-
- 20 essary to ensure the long-term, secure, and sus-
- 21 tainable supply of an energy critical element; or
- 22 (C) any other innovative energy technology
- 23 area identified by the Secretary.
- 24 (2) QUALIFYING ENTITY.—The term “quali-
- 25 fying entity” means—

- 1 (A) an institution of higher education;
- 2 (B) an appropriate State or Federal entity,
- 3 including a federally funded research and devel-
- 4 opment center of the Department;
- 5 (C) a nonprofit research institution;
- 6 (D) a multi-institutional collaboration; or
- 7 (E) any other relevant entity the Secretary
- 8 determines appropriate.

9 (b) AUTHORIZATION OF PROGRAM.—

10 (1) IN GENERAL.—

11 (A) The Secretary shall carry out a pro-

12 gram to enhance the economic, environmental,

13 and energy security of the United States by es-

14 tablishing and operating Regional Energy Inno-

15 vation Centers in diverse regions of the United

16 States, in order to provide, to the maximum ex-

17 tent practicable, one centralized location for

18 multidisciplinary, collaborative research, devel-

19 opment, and demonstration of advanced energy

20 technologies most suited to commercial applica-

21 tion in each region of the United States.

22 (B) In establishing the centers authorized

23 in subparagraph (A), the Secretary shall con-

24 sider the diverse natural resources available

25 throughout the United States, and maximize

1 the opportunities for cooperation between insti-  
2 tutes of higher education, industry, State and  
3 local governments, and nonprofit research insti-  
4 tutions with shared areas of energy expertise.

5 (2) TECHNOLOGY DEVELOPMENT FOCUS.—The  
6 Secretary shall designate for each center a unique  
7 advanced energy technology or basic research focus.  
8 In establishing focus areas for each center, the Sec-  
9 retary shall consider the energy needs, resources,  
10 and expertise available in each region of the United  
11 States.

12 (3) COORDINATION.—The Secretary shall en-  
13 sure the coordination of, and avoid unnecessary du-  
14 plication of, the activities of each center with the ac-  
15 tivities of—

16 (A) other research entities of the Depart-  
17 ment, including the National Laboratories, the  
18 Advanced Research Projects Agency–Energy,  
19 Energy Innovation Hubs, and Energy Frontier  
20 Research Centers;

21 (B) institutions of higher education; and

22 (C) industry.

23 (c) APPLICATION PROCESS.—

24 (1) ELIGIBILITY.—To be eligible to receive an  
25 award for the establishment and operation of a cen-

1       ter established under subsection (b)(1)(A), a consor-  
2       tium shall—

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

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

8                   (i) the proposed partnership agree-  
9                   ment, including the governance and man-  
10                  agement structure of the center;

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

15                  (iii) a proposed budget, including fi-  
16                  nancial contributions from non-Federal  
17                  sources; and

18               (C) operate as a nonprofit organization.

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

23       (3) DURATION.—A center established under  
24       this section shall receive support for a period of not

1 more than 5 years, subject to the availability of ap-  
2 propriations.

3 (4) RENEWAL.—Upon the expiration of any pe-  
4 riod of support of a center under this section, the  
5 Director may renew support for the center, on a  
6 merit-reviewed basis, for a period of not more than  
7 5 years.

8 (5) TERMINATION.—Consistent with the exist-  
9 ing authorities of the Department, the Director may  
10 terminate an underperforming center for cause dur-  
11 ing the performance period.

12 (d) CENTER OPERATIONS.—

13 (1) IN GENERAL.—Each center shall conduct or  
14 provide for multidisciplinary, collaborative research,  
15 development, demonstration of advanced energy  
16 technologies within the technology development focus  
17 designated under subsection (b)(2).

18 (2) ACTIVITIES.—Each center shall—

19 (A) encourage collaboration and commu-  
20 nication among the member qualifying entities  
21 of the consortium and awardees;

22 (B) develop and make publicly available  
23 proposed plans and programs; and



1 (C) submit an annual report to the De-  
2 partment summarizing the activities of the cen-  
3 ter, including—

4 (i) detailing organizational expendi-  
5 tures; and

6 (ii) describing each project under-  
7 taken by the center.

8 (3) CONFLICTS OF INTEREST.—Each center  
9 shall maintain conflict of interest procedures, con-  
10 sistent with the conflict of interest procedures of the  
11 Department.

12 (4) PROHIBITION ON CONSTRUCTION.—

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

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

18 (ii) construction of new buildings or  
19 facilities shall not be considered as part of  
20 the non-Federal share of a Hub cost-shar-  
21 ing agreement.

22 (B) TEST BED AND RENOVATION EXCEP-  
23 TION.—Nothing in this paragraph prohibits the  
24 use of funds provided under this section or non-  
25 Federal cost share funds for the construction of

1 a test bed or renovations to existing user facili-  
2 ties if the Secretary determines such facilities  
3 are necessary and applicable to conduct re-  
4 search within the focus areas identified for each  
5 center.

6 **SEC. 422. VERSATILE NEUTRON SOURCE.**

7 Section 955(c) of the Energy Policy Act of 2005  
8 (U.S.C. 16275) is amended—

9 (1) in paragraph (4), by striking “2026” and  
10 inserting “2030”; and

11 (2) in paragraph (7), by adding at the end the  
12 following:

13 “(F) \$639,000,000 for fiscal year 2026;

14 “(G) \$1,005,000,000 for fiscal year 2027;

15 “(H) \$1,081,000,000 for fiscal year 2028;

16 “(I) \$910,000,000 for fiscal year 2029;

17 and

18 “(J) \$654,000,000 for fiscal year 2030.”.

19 **SEC. 423. CARBON SEQUESTRATION RESEARCH AND DE-**  
20 **VELOPMENT PROGRAM.**

21 (a) SENSE OF CONGRESS.—It is the sense of Con-  
22 gress that power produced from fossil fuels is essential for  
23 maintaining the global competitiveness of United States  
24 manufacturing and industrial processes, and that these

1 domestic industries are critical to the prosperity and na-  
2 tional security of the United States.

3 (b) CARBON SEQUESTRATION RESEARCH INITIA-  
4 TIVE.—

5 (1) IN GENERAL.—The Secretary of Energy, in  
6 coordination with the Secretary of the Interior, shall  
7 establish an initiative focused on the evaluation the  
8 sequestration of carbon dioxide in geologic forma-  
9 tions in order to—

10 (A) enhance the scientific understanding  
11 of, and reduce uncertainties associated with, the  
12 effects of carbon dioxide stored in geologic for-  
13 mations for long and short term periods; and

14 (B) inform improved risk-assessment  
15 methods, risk-management practices, and  
16 standards with respect to the storage of carbon  
17 dioxide in geologic formations on large and  
18 small scale.

19 (2) PROGRAM COMPONENTS.—In carrying out  
20 the initiative under subsection (a), the Secretary of  
21 Energy shall—

22 (A) identify ongoing scientific challenges  
23 for understanding the long and short term ef-  
24 fects of sequestered carbon dioxide, especially in

1 shallow geologic formations and sites not used  
2 for enhanced oil recovery;

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

7 (C) leverage the collective body of knowl-  
8 edge from existing carbon utilization and se-  
9 questration research, including from the United  
10 States Geological Survey and the national Car-  
11 bon Utilization Research Center; and

12 (D) engage with other Federal agencies,  
13 research communities, and potential users of in-  
14 formation produced under this section.

15 (3) COORDINATION.—In carrying out the initia-  
16 tive under subsection (a), the Secretary of Energy  
17 shall ensure coordination with relevant Federal  
18 agencies, including the Department of the Interior,  
19 the Environmental Protection Agency, and the De-  
20 partment of Agriculture, and prioritize the following  
21 objectives:

22 (A) leveraging experience from existing en-  
23 tities, demonstrations, and research sponsored  
24 by the Department, including Regional Carbon  
25 Sequestration Partnerships;

1 (B) increasing the understanding and de-  
2 velopment of permanent soil carbon sequestra-  
3 tion;

4 (C) providing a coordinated update of car-  
5 bon storage potential across the United States  
6 by integrating data with DOE's Carbon Storage  
7 Atlas; and

8 (D) developing computational tools, in co-  
9 ordination with DOE's Office of Advanced Sci-  
10 entific Computing Research and the National  
11 Risk Assessment Partnership, to assess and  
12 manage potential environmental impacts at geo-  
13 logic carbon dioxide storage sites.

14 (4) DUPLICATION.—The Secretary shall ensure  
15 the coordination of, and avoid unnecessary duplica-  
16 tion of, the activities of this initiative with the activi-  
17 ties of—

18 (A) other research entities of the Depart-  
19 ment, including the National Laboratories, the  
20 Advanced Research Projects Agency—Energy;  
21 and

22 (B) industry.

23 (5) RESEARCH PLAN.—Not later than 1 year  
24 after the date of enactment of this Act, the Sec-  
25 retary shall transmit to the Committee on Science,

1 Space, and Technology of the House of Representa-  
2 tives and the Committee on Energy and Natural Re-  
3 sources of the Senate a 4-year research plan that  
4 identifies and prioritizes basic research needs relat-  
5 ing to carbon sequestration in geologic formations.

6 **SEC. 424. FRONTIER OBSERVATORY FOR RESEARCH IN**  
7 **GEOHERMAL ENERGY.**

8 Section 615 (c)(7)(A) of the Energy Independence  
9 and Security Act of 2007 (42 U.S.C. 17194) is amended  
10 by adding at the end the following:

11 “(vi) \$70,000,000 for fiscal year  
12 2026;

13 “(vii) \$70,000,000 for fiscal year  
14 2027;

15 “(viii) \$70,000,000 for fiscal year  
16 2028;

17 “(ix) \$70,000,000 for fiscal year  
18 2029;

19 “(x) \$70,000,000 for fiscal year 2030;  
20 and

21 “(xi) \$70,000,000 for fiscal year  
22 2031.”.

23 **SEC. 425. ENERGY STORAGE GRAND CHALLENGE.**

24 (a) IN GENERAL.—The Secretary shall carry out a  
25 research challenge to be known as the “Energy Storage

1 Grand Challenge” (referred to in this section as the “Chal-  
2 lenge”) to support and accelerate the research, develop-  
3 ment, and demonstration of advanced energy storage tech-  
4 nologies, in order to—

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

8 (2) inform the development of a broad range of  
9 energy storage systems, including batteries, chemical  
10 storage, and thermal storage, with emphasis on in-  
11 novative materials, manufacturing, and recycling;  
12 and

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

15 (b) LEVERAGING.—In carrying out programs and ac-  
16 tivities under the Challenge, the Secretary shall leverage  
17 expertise and resources and facilitate collaboration be-  
18 tween—

19 (1) the Office of Electricity;

20 (2) the Office of Energy Efficiency and Renew-  
21 able Energy;

22 (3) the Office of Fossil Energy;

23 (4) the Office of Nuclear Energy; and

1           (5) the Basic Energy Sciences Program and  
2           Advanced Scientific Computing Program of the Of-  
3           fice of Science.

4 The Secretary may organize additional activities under  
5 this subsection through Energy Frontier Research Cen-  
6 ters, Energy Innovation Hubs, or cross-cutting research  
7 programs.

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

19 **SEC. 426. CRITICAL INFRASTRUCTURE RESEARCH AND**  
20 **CONSTRUCTION.**

21           (a) IN GENERAL.—The Secretary shall carry out a  
22 program of fundamental research, development, and early-  
23 stage demonstration of innovative engineered systems and  
24 tools to help ensure the resilience and security of critical  
25 integrated grid infrastructures.



1 (b) COORDINATION.—In carrying out the program  
2 under subsection (a), the Secretary shall leverage expertise  
3 and resources and facilitate collaboration and coordination  
4 between—

- 5 (1) the Office of Electricity;
- 6 (2) the Office of Cybersecurity, Energy Secu-  
7 rity, and Emergency Response;
- 8 (3) the Office of Science;
- 9 (4) the Department of Defense; and
- 10 (5) the Department of Homeland Security.

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

- 18 (1) cyber security test beds; and
- 19 (2) electric grid test beds.

20 (d) SELECTION.—The Secretary shall select the Test  
21 Range under this section on a competitive, merit-reviewed  
22 basis. The Secretary shall consider applications from Na-  
23 tional Laboratories, institutions of higher education,  
24 multi-institutional collaborations, and other appropriate  
25 entities.

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

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

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

11 **TITLE V—NATIONAL INSTITUTE**  
12 **OF STANDARDS AND TECH-**  
13 **NOLOGY**

14 **SEC. 501. FINDINGS.**

15 Congress finds the following:

16 (1) The National Institute of Standards and  
17 Technology (NIST) promotes United States innova-  
18 tion and industrial competitiveness by advancing  
19 measurement science, standards and technology in  
20 ways that enhance economic security and improve  
21 Americans' quality of life.

22 (2) NIST's leadership in a broad range of cut-  
23 ting-edge scientific endeavors including but not lim-  
24 ited to quantum science and engineering, cybersecu-  
25 rity, biologics, artificial intelligence (AI), machine

1 learning, additive manufacturing, disaster resilience,  
2 and international standards development is critical  
3 to America's leadership in the industries of the fu-  
4 ture.

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

8 **SEC. 502. AUTHORIZATION OF APPROPRIATIONS.**

9 (a) FISCAL YEAR 2022.—

10 (1) IN GENERAL.—There are authorized to be  
11 appropriated to the Secretary of Commerce  
12 \$1,244,800,000 for the National Institute of Stand-  
13 ards and Technology for fiscal year 2022.

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

16 (A) \$866,800,000 shall be for scientific  
17 and technical research and services laboratory  
18 activities, of which \$9,900,000 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 \$20,000,000 for IT infrastructure; and

1 (C) \$178,000,000 shall be for industrial  
2 technology services activities, of which  
3 \$153,000,000 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 278l) and \$25,000,000 shall be for the Network  
8 for Manufacturing Innovation Program under  
9 section 34 of the National Institute of Stand-  
10 ards and Technology Act (15 U.S.C. 278s).

11 (b) FISCAL YEAR 2023.—

12 (1) IN GENERAL.—There are authorized to be  
13 appropriated to the Secretary of Commerce  
14 \$1,326,600,000 for the National Institute of Stand-  
15 ards and Technology for fiscal year 2023.

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

18 (A) \$945,600,000 shall be for scientific  
19 and technical research and services laboratory  
20 activities, of which \$10,800,000 may be trans-  
21 ferred to the Working Capital Fund;

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

1 Maintenance, and Major Repairs, including  
2 \$20,000,000 for IT infrastructure; and

3 (C) \$181,000,000 shall be for industrial  
4 technology services activities, of which  
5 \$156,000,000 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 (c) FISCAL YEAR 2024.—

15 (1) IN GENERAL.—There are authorized to be  
16 appropriated to the Secretary of Commerce  
17 \$1,408,400,000 for the National Institute of Stand-  
18 ards and Technology for fiscal year 2024.

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

21 (A) \$1,024,000,000 shall be for scientific  
22 and technical research and services laboratory  
23 activities, of which \$11,700,000 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) \$184,000,000 shall be for industrial  
7 technology services activities, of which  
8 \$159,000,000 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 (d) FISCAL YEAR 2025.—

18 (1) IN GENERAL.—There are authorized to be  
19 appropriated to the Secretary of Commerce  
20 \$1,490,200,000 for the National Institute of Stand-  
21 ards and Technology for fiscal year 2025.

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

24 (A) \$1,103,200,000 shall be for scientific  
25 and technical research and services laboratory

1 activities, of which \$12,600,000 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) \$187,000,000 shall be for industrial  
9 technology services activities, of which  
10 \$162,000,000 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 (e) FISCAL YEAR 2026.—

20 (1) IN GENERAL.—There are authorized to be  
21 appropriated to the Secretary of Commerce  
22 \$1,572,000,000 for the National Institute of Stand-  
23 ards and Technology for fiscal year 2026.

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

1 (A) \$1,182,000,000 shall be for scientific  
2 and technical research and services laboratory  
3 activities, of which \$13,500,000 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) \$190,000,000 shall be for industrial  
11 technology services activities, of which  
12 \$165,000,000 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 (f) FISCAL YEAR 2027.—

22 (1) IN GENERAL.—There are authorized to be  
23 appropriated to the Secretary of Commerce  
24 \$1,653,800,000 for the National Institute of Stand-  
25 ards and Technology for fiscal year 2027.



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

3           (A) \$1,260,800,000 shall be for scientific  
4 and technical research and services laboratory  
5 activities, of which \$14,400,000 may be trans-  
6 ferred to the Working Capital Fund;

7           (B) \$200,000,000 shall be for the con-  
8 struction and maintenance of facilities, of which  
9 \$120,000,000 shall be for Safety, Capacity,  
10 Maintenance, and Major Repairs, including  
11 \$10,000,000 for IT infrastructure; and

12           (C) \$193,000,000 shall be for industrial  
13 technology services activities, of which  
14 \$168,000,000 shall be for the Manufacturing  
15 Extension Partnership program under sections  
16 25 and 26 of the National Institute of Stand-  
17 ards and Technology Act (15 U.S.C. 278k and  
18 278I) and \$25,000,000 shall be for the Net-  
19 work for Manufacturing Innovation Program  
20 under section 34 of the National Institute of  
21 Standards and Technology Act (15 U.S.C.  
22 278s).

23       (g) FISCAL YEAR 2028.—

24           (1) IN GENERAL.—There are authorized to be  
25 appropriated to the Secretary of Commerce

1       \$1,735,600,000 for the National Institute of Stand-  
2       ards and Technology for fiscal year 2028.

3           (2) SPECIFIC ALLOCATIONS.—Of the amount  
4       authorized by paragraph (1)—

5           (A) \$1,339,600,000 shall be for scientific  
6       and technical research and services laboratory  
7       activities, of which \$15,300,000 may be trans-  
8       ferred to the Working Capital Fund;

9           (B) \$200,000,000 shall be for the con-  
10      struction and maintenance of facilities, of which  
11      \$120,000,000 shall be for Safety, Capacity,  
12      Maintenance, and Major Repairs, including  
13      \$10,000,000 for IT infrastructure; and

14          (C) \$196,000,000 shall be for industrial  
15      technology services activities, of which  
16      \$174,000,000 shall be for the Manufacturing  
17      Extension Partnership program under sections  
18      25 and 26 of the National Institute of Stand-  
19      ards and Technology Act (15 U.S.C. 278k and  
20      278I) and \$25,000,000 shall be for the Net-  
21      work for Manufacturing Innovation Program  
22      under section 34 of the National Institute of  
23      Standards and Technology Act (15 U.S.C.  
24      278s).

25      (h) FISCAL YEAR 2029.—

1           (1) IN GENERAL.—There are authorized to be  
2           appropriated to the Secretary of Commerce  
3           \$1,817,400,000 for the National Institute of Stand-  
4           ards and Technology for fiscal year 2029.

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

7                   (A) \$1,418,000,000 shall be for scientific  
8                   and technical research and services laboratory  
9                   activities, of which \$16,200,000 may be trans-  
10                  ferred to the Working Capital Fund;

11                  (B) \$200,000,000 shall be for the con-  
12                  struction and maintenance of facilities, of which  
13                  \$120,000,000 shall be for Safety, Capacity,  
14                  Maintenance, and Major Repairs, including  
15                  \$10,000,000 for IT infrastructure; and

16                  (C) \$199,000,000 shall be for industrial  
17                  technology services activities, of which  
18                  \$174,000,000 shall be for the Manufacturing  
19                  Extension Partnership program under sections  
20                  25 and 26 of the National Institute of Stand-  
21                  ards and Technology Act (15 U.S.C. 278k and  
22                  278I) and \$25,000,000 shall be for the Net-  
23                  work for Manufacturing Innovation Program  
24                  under section 34 of the National Institute of

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

3 (i) FISCAL YEAR 2030.—

4 (1) IN GENERAL.—There are authorized to be  
5 appropriated to the Secretary of Commerce  
6 \$1,899,200,000 for the National Institute of Stand-  
7 ards and Technology for fiscal year 2030.

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

10 (A) \$1,497,200,000 shall be for scientific  
11 and technical research and services laboratory  
12 activities, of which \$17,100,000 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 \$10,000,000 for IT infrastructure; and

19 (C) \$202,000,000 shall be for industrial  
20 technology services activities, of which  
21 \$177,000,000 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 (j) FISCAL YEAR 2031.—

6 (1) IN GENERAL.—There are authorized to be  
7 appropriated to the Secretary of Commerce  
8 \$1,981,000,000 for the National Institute of Stand-  
9 ards and Technology for fiscal year 2031.

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

12 (A) \$1,576,000,000 shall be for scientific  
13 and technical research and services laboratory  
14 activities, of which \$18,000,000 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) \$205,000,000 shall be for industrial  
22 technology services activities, of which  
23 \$180,000,000 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   **SEC. 503. NIST FACILITIES MODERNIZATION FUND.**

8           (a) ESTABLISHMENT.—There is established in the  
9   Treasury of the United States a fund to be known as the  
10 “NIST Facilities Modernization Fund” (hereafter in this  
11 section referred to as the “Fund”).

12          (b) USE OF FUNDS.—Amounts in the Fund shall be  
13 available to Secretary, acting through the Director, for  
14 Capital Projects on the National Institute of Standards  
15 and Technology’s campuses for the modernization and  
16 construction of research facilities needed to conduct lead-  
17 ing edge scientific and technical research.

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

20               (1) Such amounts as may be appropriated by  
21   law.

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

23          (d) AUTHORIZATION OF FUNDS.—Of the funds au-  
24 thorized to be appropriated in section 302 of this Act for  
25 the construction and maintenance of facilities,

1 \$80,000,000 for each of the fiscal years 2022 through  
2 2031 shall be provided for the Fund established in sub-  
3 section (a).

4 (e) CONTINUING AVAILABILITY OF FUNDS.—  
5 Amounts in the Fund are available without regard to fiscal  
6 year limitation.

7 (f) NOTIFICATION TO COMMITTEES.—Upon making  
8 any obligation or expenditure of any amount in the Fund,  
9 the Secretary, through the Director, shall notify the House  
10 of Representatives Science, Space, and Technology Com-  
11 mittee, the Senate Committee on Commerce, Science, and  
12 Transportation, the Committee on Appropriations of the  
13 House of Representatives and the Committee on Appro-  
14 priations of the Senate of the amount and purpose of the  
15 obligation or expenditure.

16 (g) NIST FACILITIES MODERNIZATION AND MAIN-  
17 TENANCE PLAN.—

18 (1) IN GENERAL.—To carry out the program  
19 authorized in subsection (a), the Secretary, acting  
20 through the Director, shall develop and submit to  
21 Congress a 5-year modernization and maintenance  
22 plan for the National Institute of Standards and  
23 Technology's campuses.

24 (2) TIMING.—The modernization and mainte-  
25 nance plan required in paragraph (1) shall be sub-

1       mitted to Congress within 30 days of enactment of  
2       this Act, and updated on an annual basis.

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

5                       (A) A list of Capitol Construction Projects  
6                       expected to be undertaken in the next 5 years,  
7                       the core capabilities these facilities will provide,  
8                       anticipated schedule of construction, and antici-  
9                       pated funding requirements.

10                      (B) A list of planned utility infrastructure  
11                      projects expected to be undertaken in the next  
12                      5 years, anticipated schedule of construction,  
13                      and anticipated funding requirements.

14                      (C) A list of planned IT infrastructure  
15                      projects expected to be undertaken in the next  
16                      5 years, anticipated schedule of construction,  
17                      and anticipated funding requirements.

18                      (D) A list of the deferred maintenance, a  
19                      list of deferred maintenance projects expected  
20                      to be undertaken in the next 5 years, antici-  
21                      pated schedule of construction, anticipated  
22                      funding requirements, and an evaluation of  
23                      progress made in reducing the deferred mainte-  
24                      nance backlog.



1 **SEC. 504. CYBERSECURITY RESEARCH.**

2 (a) RESEARCH.—The Secretary, acting through the  
3 Director, shall expand the fundamental and applied re-  
4 search carried out by the Institute to address key ques-  
5 tions relating the measurement of privacy, security, and  
6 vulnerability of software tools and communications net-  
7 works, including through—

8 (1) the development of research and engineering  
9 capabilities to provide practical solutions, including  
10 measurement techniques and engineering toolkits, to  
11 solve cybersecurity challenges such as human fac-  
12 tors, identity management, network security, pri-  
13 vacy, and software;

14 (2) investment in tools to help private and pub-  
15 lic sector organizations, including institutions of  
16 higher education and research organizations, meas-  
17 ure and manage cybersecurity risks and ensure  
18 workforce preparedness for new cybersecurity chal-  
19 lenges; and

20 (3) investment in programs to prepare the  
21 United States with strong cybersecurity and  
22 encryption technologies to apply to emerging tech-  
23 nologies such as artificial intelligence, the internet of  
24 things, and quantum computing.

25 (b) ASSISTANCE TO FEDERAL AGENCIES.—The Di-  
26 rector shall enhance and expand the Institute’s guidance

1 and assistance to Federal agencies to help agencies effec-  
2 tively implement the Framework for Improving Critical  
3 Infrastructure Cybersecurity, including—

4 (1) technical guidance on the requirements in  
5 the Executive order;

6 (2) technical guidance and education and train-  
7 ing of agency staff responsible for cyber security,  
8 consultative services, and other assistance at indi-  
9 vidual Federal agencies; and

10 (3) technical guidance and education and train-  
11 ing of individual Federal agency Inspectors General  
12 and staff who are responsible for the annual inde-  
13 pendent evaluation they are required to perform of  
14 the information security program and practices of  
15 Federal agencies under section 3555 of title 44,  
16 United States Code.

17 (c) REPORT.—The Director shall provide the House  
18 Science, Space, and Technology Committee and the Sen-  
19 ate Committee on Commerce, Science, and Transportation  
20 a report, not later than 12 months after the date of the  
21 enactment of this Act, describing how the National Insti-  
22 tute of Standards and Technology carried out the activi-  
23 ties described in subsection (b) in as much detail as pos-  
24 sible, including identification of agencies assisted and the  
25 types of consultative services, education, guidance, assist-

1 ance, and training provided to individual agencies and In-  
2 spectors General.

3 **SEC. 505. INTERNET OF THINGS.**

4 The Secretary, acting through the Director, shall con-  
5 tinue to conduct research with respect to and support the  
6 expanded connectivity, interoperability, and security of  
7 interconnected systems and other aspects of the internet  
8 of things, including through—

9 (1) the development of new tools and meth-  
10 odologies for cybersecurity of the internet of things;

11 (2) the development of technologies to address  
12 network congestion and device interference, such as  
13 the development of testing tools for next generation  
14 wireless communications, internet of things proto-  
15 cols, coexistence of wireless communications systems,  
16 and spectrum sharing;

17 (3) convening experts in the public and private  
18 sectors to develop recommendations for accelerating  
19 the adoption of sound interoperability standards,  
20 guidelines, and best practices for the internet of  
21 things; and

22 (4) the development and publication of new cy-  
23 bersecurity tools, encryption methods, and best prac-  
24 tices for internet of things security.

1 **SEC. 506. 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. 507. 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. 508. 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           (3) 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          (4) China’s “Standardization Reform Plan”  
14          and “Five-Year Plan for Standardization” highlight  
15          its high-level goals to establish China as a “stand-  
16          ards power” by 2020, participate in at least half of  
17          all standards drafting and revision efforts in recog-  
18          nized international standards setting organizations,  
19          and to strengthen China’s participation in the gov-  
20          ernance of international standards setting organiza-  
21          tions.

22          (5) As emerging technologies develop for global  
23          deployment, it is critical that the United States and  
24          its allies continue to shape standards that underpin

1 the technologies themselves, and the future inter-  
2 national governance of these technologies.

3 (6) United States position on standardization in  
4 emerging technologies will be critical to United  
5 States economic competitiveness.

6 (7) NIST is in a unique position to strengthen  
7 United States leadership in standards development,  
8 particularly for emerging technologies, to ensure  
9 continuing United States economic competitiveness  
10 and national security.

11 (b) SENSE OF CONGRESS.—It is the sense of Con-  
12 gress that—

13 (1) while United States experts have historically  
14 been leaders in international standards development  
15 activities, there is concern that the United States is  
16 losing its edge;

17 (2) strengthening the unique United States  
18 public-private partnerships approach to standards  
19 development is critical to United States economic  
20 competitiveness; and

21 (3) the United States Government should en-  
22 sure cooperation and coordination across Federal  
23 agencies to partner with and support private sector  
24 stakeholders to continue to shape international dia-

1 logues in regard to standards development for  
2 emerging technologies.

3 (c) RESEARCH ACTIVITIES AND ENGAGEMENT.—The  
4 Secretary, acting through the Director, shall—

5 (1) build capacity and training opportunities to  
6 help create a pipeline of talent and leadership in key  
7 standards development positions, including stand-  
8 ards education and training related activities tar-  
9 geted at integrating standards content into under-  
10 graduate and graduate curricula in science, engi-  
11 neering, business, public policy, and law;

12 (2) partner with private sector entities to sup-  
13 port strategically increased engagement and leader-  
14 ship in the development of international standards  
15 for digital economy technologies, including  
16 partnering with industry to incentivize private sector  
17 partners to develop standards strategies and support  
18 engagement and participation in the relevant stand-  
19 ards activities; and

20 (3) develop approaches to prioritize standard-  
21 ization for emerging technologies, identify organiza-  
22 tion in which to develop these standards, identify  
23 leadership positions of interest to the United States,  
24 and identify key contributors for technical and lead-  
25 ership expertise in these areas.



1 **SEC. 509. REVIEW OF THE CENTER FOR NEUTRON RE-**  
2 **SEARCH.**

3 Not later than 1 year after the date of enactment  
4 of this Act, the Comptroller of the United States shall con-  
5 duct an evaluation of NIST's Center for Neutron Re-  
6 search, including the following:

7 (1) An assessment of what progress NIST has  
8 made in planning for the future of the Center for  
9 Neutron Research's nuclear reactor since the release  
10 of the 2018 National Academies report, and what  
11 steps NIST has taken to implement the Academies  
12 report.

13 (2) An analysis of the extent to which NIST's  
14 planning efforts align with leading practices.

15 (3) An assessment of the extent to which NIST  
16 has worked with the Department of Energy to iden-  
17 tify the scientific community's long-term needs for  
18 neutron research facilities and discuss the coordina-  
19 tion of future facilities, and how these agencies are  
20 factoring these needs into their decision-making  
21 process.

22 (4) Recommendations for NIST and the De-  
23 partment of Energy on how best to continue to sup-  
24 port civilian nuclear research reactors.

1 **SEC. 510. HIRING AND MANAGEMENT.**

2 (a) **DIRECT HIRE AUTHORITY.**—The Secretary, act-  
3 ing through the Director, may—

4 (1) appoint, without regard to the provisions of  
5 subchapter I of chapter 33 of title 5, United States  
6 Code (other than sections 3303, 3328, and 3330e of  
7 such chapter), qualified candidates to scientific, en-  
8 gineering, and professional positions for carrying out  
9 research and development functions which require  
10 the services of specially qualified personnel relating  
11 to cybersecurity and quantum information science  
12 and technology and such other areas of national re-  
13 search priorities as the Secretary, acting through the  
14 Director, may determine; and

15 (2) fix the rate of basic pay of any individual  
16 appointed under paragraph (1), at a rate not in ex-  
17 cess of the basic rate of pay of the Vice President  
18 under section 104 of title 3, United States Code,  
19 without regard to title 5, United States Code.

20 (b) **LIMITATION.**—The Director may appoint not  
21 more than 10 individuals under subsection (a).

22 (c) **SUNSET.**—The authority under subsection (a)  
23 shall expire on the date that is 10 years after the date  
24 of enactment of this Act.

25 (d) **OTHER TRANSACTION AUTHORITY.**—Section  
26 2(b)(4) of the National Institute of Standards and Tech-

1 nology Act (15 U.S.C. 272(b)(4)) is amended to read as  
2 follows:

3           “(4) to enter into and perform such contracts,  
4 including cooperative research and development ar-  
5 rangements and grants and cooperative agreements  
6 or other transactions, as may be necessary in the  
7 conduct of its work and on such terms as it may  
8 deem appropriate, in furtherance of the purposes of  
9 this Act;”.

10 **SEC. 511. NATIONAL INSTITUTE OF STANDARDS AND TECH-**  
11 **NOLOGY FOUNDATION.**

12           (a) IN GENERAL.—The Secretary of Commerce, act-  
13 ing through the Director, may establish or enter into an  
14 agreement with a nonprofit organization to establish a Na-  
15 tional Institute of Standards and Technology Foundation.  
16 The Foundation shall not be an agency or instrumentality  
17 of the United States Government.

18           (b) PURPOSE.—The purpose of the Foundation shall  
19 be to support the National Institute of Standards and  
20 Technology in its mission.

21           (c) ACTIVITIES.—Activities of the Foundation may  
22 include the solicitation and acceptance of funds—

23                   (1) to support international metrology and  
24 standards engagement activities;

1           (2) to conduct education and outreach activi-  
2           ties; and

3           (3) to offer direct support to NIST associates,  
4           including through activities such as the provision of  
5           fellowships, grants, and occupational safety and  
6           awareness training.

7           (d) **TRANSFER OF FUNDS.**—The Director may au-  
8           thorize, under the agreement under subsection (a), the  
9           transfer of funds from the National Institute of Standards  
10          and Technology to the nonprofit organization to offset any  
11          administrative costs of the Foundation.

12          (e) **LIABILITY.**—The United States shall not be liable  
13          for any debts, defaults, acts, or omissions of the Founda-  
14          tion. The full faith and credit of the United States shall  
15          not extend to any obligations of the Foundation.

16          **SEC. 512. MEP OUTREACH.**

17          Section 25 of the National Institute of Standards and  
18          Technology Act (15 U.S.C. 278k) is amended—

19                 (1) in subsection (c)—

20                         (A) in paragraph (6), by striking “commu-  
21                         nity colleges and area career and technical edu-  
22                         cation schools” and inserting the following:  
23                         “secondary schools (as defined in section 8101  
24                         of the Elementary and Secondary Education  
25                         Act of 1965 (20 U.S.C. 7801)), community col-

1           leges, and area career and technical education  
2           schools, including those in underserved and  
3           rural communities,”; and

4                   (B) in paragraph (7)—

5                           (i) by striking “and local colleges”  
6                           and inserting the following: “local high  
7                           schools and local colleges, including those  
8                           in underserved and rural communities,”;  
9                           and

10                           (ii) by inserting “or other applied  
11                           learning opportunities” after “apprentice-  
12                           ships”; and

13                   (2) in subsection (d)(3), by striking “, commu-  
14                   nity colleges, and area career and technical edu-  
15                   cation schools,” and inserting the following: “and  
16                   local high schools, community colleges, and area ca-  
17                   reer and technical education schools, including those  
18                   in underserved and rural communities,”.

19 **SEC. 513. DEFINITIONS.**

20           In this title:

21                   (1) **DIRECTOR.**—The term “Director” means  
22                   the Director of the National Institute of Standards  
23                   and Technology.

24                   (2) **FRAMEWORK.**—The term “Framework”  
25                   means the Framework for Improving Critical Infra-

1 structure Cybersecurity developed by the National  
2 Institute of Standards and Technology and referred  
3 to in Executive Order 13800 issued on May 11,  
4 2017 (82 Fed. Reg. 22391 et seq.).

5 (3) INSTITUTE.—The term “Institute” means  
6 the National Institute of Standards and Technology.

7 (4) INSTITUTION OF HIGHER EDUCATION.—The  
8 term “institution of higher education” has the  
9 meaning given such term in section 101 of the High-  
10 er Education Act of 1965 (20 U.S.C. 1001).

11 (5) NIST ASSOCIATE.—The term “NIST asso-  
12 ciate” means any guest researcher, research asso-  
13 ciate, facility user, or volunteer who conducts re-  
14 search at a National Institute of Standards and  
15 Technology facility, but is not an employee of the  
16 National Institute of Standards and Technology or  
17 of another Federal department or agency.

18 (6) SECRETARY.—The term “Secretary” means  
19 the Secretary of Commerce.

1 **TITLE VI—NATIONAL OCEANIC**  
2 **AND ATMOSPHERIC ADMINIS-**  
3 **TRATION**

4 **SEC. 601. ESTABLISHMENT OF A TECHNOLOGY TRANSFER**  
5 **OFFICE.**

6 (a) **TECHNOLOGY TRANSFER OFFICE.**—The Under  
7 Secretary shall establish a technology transfer office at the  
8 corporate agency level.

9 (b) **TECHNOLOGY TRANSFER COORDINATOR.**—The  
10 Under Secretary shall appoint a Technology Transfer Co-  
11 ordinator to be the principal advisor to the Under Sec-  
12 retary on all matters relating to technology transfer and  
13 commercialization and will serve as director of the tech-  
14 nology transfer office.

15 (c) **QUALIFICATIONS.**—The Coordinator shall be an  
16 individual who, by reason of professional background and  
17 experience, is specially qualified to advise the Under Sec-  
18 retary on matters pertaining to technology transfer at the  
19 Agency.

20 (d) **DUTIES OF THE COORDINATOR.**—The Coordi-  
21 nator shall oversee—

22 (1) the expenditure of funds allocated for tech-  
23 nology transfer within the Agency;

1           (2) efforts to improve research to operations  
2           within the Office of Oceanic and Atmospheric Re-  
3           search and other Agency line offices;

4           (3) efforts to engage private sector entities, in-  
5           cluding venture capital companies;

6           (4) efforts to engage State and local govern-  
7           ments;

8           (5) coordinate efforts across the Agency; and

9           (6) facilitate knowledge transfer from the Agen-  
10          cy on Federal standards to commercial, State, and  
11          local governments.

12          (e) **TECHNOLOGY TRANSFER RESPONSIBILITY.**—

13          Nothing in this section affects the technology transfer re-  
14          sponsibilities of Federal employees under the Stevenson-  
15          Wylder Technology Innovation Act of 1980 (15 U.S.C.  
16          3701 et seq.).

17          (f) **PLANNING AND REPORTING.**—

18                 (1) **IN GENERAL.**—Not later than 180 days  
19                 after the date of enactment of this Act, the Under  
20                 Secretary shall submit to Congress a technology  
21                 transfer execution plan.

22                 (2) **UPDATES.**—Each year after the submission  
23                 of the plan under paragraph (1), the Under Sec-  
24                 retary shall submit to Congress an updated execu-  
25                 tion plan and reports that describe progress toward



1 meeting goals set forth in the execution plan and the  
2 funds expended under subsection (e).

3 **SEC. 602. TECHNOLOGY TRANSFER AND TRANSITIONS AS-**  
4 **SESSMENT.**

5 Not later than 1 year after the date of enactment  
6 of this Act, and annually thereafter, the Under Secretary  
7 shall transmit to the Committee on Science, Space, and  
8 Technology of the House of Representatives and the Com-  
9 mittee on Commerce, Science, and Transportation of the  
10 Senate a report which shall include—

11 (1) report on the Agency's research to oper-  
12 ations activities during the previous fiscal year; and

13 (2) recommended agency policy changes to in-  
14 crease research to operations activities in the coming  
15 fiscal year.

16 **SEC. 603. NATIONAL MESONET PROGRAM.**

17 (a) FINDINGS.—Congress finds that—

18 (1) since the initial establishment of a private-  
19 public partnership demonstration program, the Na-  
20 tional Mesonet Program has leveraged data collected  
21 by existing weather station networks to—

22 (A) provide accurate, real-time observation  
23 for weather forecasters and emergency response  
24 personnel in metropolitan areas across the  
25 United States;

1 (B) address persistent impediments, identi-  
2 fied in a National Academy of Sciences Report  
3 released in 2009, to fulfill the need for broader  
4 and denser weather observation networks to im-  
5 prove severe weather lead-times;

6 (C) achieve major improvements for the  
7 National Oceanic and Atmospheric Administra-  
8 tion and the broader American Weather Enter-  
9 prise, despite some significant development  
10 issues and cost overruns, according to a Na-  
11 tional Academy of Sciences Report released in  
12 2011;

13 (D) increase the amount of non-Federal  
14 weather data available to government by orders  
15 of magnitude; and

16 (E) improve understanding of the impact,  
17 the size and duration of mesoscale weather  
18 events; and

19 (2) the National Mesonet Program is a critical  
20 component of agency operations and provides reli-  
21 able, real-time prediction and observation capabili-  
22 ties for the physical environment that enhances re-  
23 sponse and prevention strategies to severe weather  
24 events.

1 (b) PROGRAM.—The National Weather Service shall  
2 carry out the National Mesonet Program under law to im-  
3 prove understanding of and forecast capabilities for at-  
4 mospheric events, placing priority on leveraging available  
5 commercial and other non-Federal weather data to en-  
6 hance coordination across the private, public, and aca-  
7 demic sectors of the American weather enterprise.

8 (c) PROGRAM ELEMENTS.—The program described  
9 in subsection (b) shall focus on the following activities:

10 (1) Improving the National Oceanic and Atmos-  
11 pheric Administration and the National Weather  
12 Service’s ability to provide the baseline forecasts and  
13 warnings that protect the Nation’s citizens, busi-  
14 nesses, military, and government agencies and en-  
15 able them to operate and perform in safe, efficient,  
16 and orderly manners.

17 (2) Yielding significant amounts of boundary-  
18 layer data to result in dramatic improvements in nu-  
19 merical weather prediction performance.

20 (3) Providing the critical technical and adminis-  
21 trative infrastructure needed to facilitate rapid inte-  
22 gration of new and emerging surface, boundary  
23 layer, and space-based networks anticipated in com-  
24 ing years.

1           (4) Utilizing and integrating existing National  
2           Oceanic and Atmospheric Administration data, in-  
3           cluding, but not limited to, National Ocean Service  
4           water level stations into existing forecasts.

5           (5) Leveraging existing networks of environ-  
6           mental monitoring stations to dramatically increase  
7           the quantity and density of weather observations  
8           available to the National Weather Service at a highly  
9           cost-effective price.

10          (6) Supporting the National Weather Service in  
11          reaching its target of a 30-minute warning time for  
12          severe weather through better predictive algorithms  
13          driven by increasingly effective observations.

14          (d) AUTHORIZATION OF APPROPRIATIONS.—Of  
15          amounts otherwise made available to the National Weath-  
16          er Service, there are authorized to carry out this section  
17          \$25,000,000 for fiscal year 2022, \$26,000,000 for fiscal  
18          year 2023, \$27,000,000 for fiscal year 2024, \$28,000,000  
19          for fiscal year 2025, \$29,000,000 for fiscal year 2026, and  
20          \$30,000,000 for fiscal year 2027.

21          **SEC. 604. SEVERE WEATHER EXTRAMURAL TESTBEDS.**

22          (a) FINDINGS.—Congress finds the following:

23                  (1) The Weather Research and Forecasting In-  
24                  novation Act of 2017 instructs NOAA to prioritize  
25                  improving weather data, modeling, computing, fore-

1 casting and warnings for the protection of life and  
2 property and for the enhancement of the national  
3 economy.

4 (2) The Weather Research and Forecasting In-  
5 novation Act of 2017 has also mandated that the  
6 NOAA Office of Oceanic and Atmospheric Research  
7 prioritize involving extramural partners to leverage  
8 existing public and private resources to expand and  
9 improve weather forecasting and modeling as quickly  
10 and efficiently as possible.

11 (3) There is a need for additional weather re-  
12 search and forecasting innovation given the increas-  
13 ing number of severe weather events and their in-  
14 creasing effect on public health, safety, and national  
15 and regional economic well-being.

16 (b) PROGRAM.—Not later than 180 days after the en-  
17 actment of this Act, the Assistant Administrator for the  
18 Office of Oceanic and Atmospheric Research shall estab-  
19 lish a program to create one or more weather research  
20 testbeds, hosted by extramural university based partners,  
21 to develop improved understanding of and forecast capa-  
22 bilities for atmospheric events and their impacts. Re-  
23 sources for such testbeds shall not be taken from the exist-  
24 ing NOAA cooperative institutes.

1 (c) PROGRAM ELEMENTS.—The program described  
2 in subsection (b) shall focus on the following activities:

3 (1) Improving the fundamental understanding  
4 of weather, including the boundary layer and other  
5 processes affecting high impact weather events.

6 (2) Improving the understanding of how the  
7 public receives, interprets, and responds to warnings  
8 and forecasts of high impact weather events that en-  
9 danger life and property.

10 (3) Research and development, and transfer of  
11 knowledge, technologies, and applications to the Na-  
12 tional Weather Service and other appropriate agen-  
13 cies and entities, including the United States weath-  
14 er industry and academic partners.

15 (d) EXTRAMURAL RESEARCH.—

16 (1) IN GENERAL.—In carrying out the program  
17 under this section, the Assistant Administrator for  
18 Oceanic and Atmospheric Research shall collaborate  
19 with and support the non-Federal weather research  
20 community, which includes institutions of higher  
21 education, private entities, and nongovernmental or-  
22 ganizations, by making funds available through com-  
23 petitive grants, contracts, and cooperative agree-  
24 ments. Preference shall be given to applicants with  
25 significant expertise in severe weather research that

1 are co-located with existing NOAA intramural  
2 weather related laboratories.

3 (2) EXTRAMURAL ACADEMIC PARTNERS.—Of  
4 the funds authorized in subsection (e), not less than  
5 80 percent shall be dedicated to research of extra-  
6 mural academic partners.

7 (e) AUTHORIZATION OF APPROPRIATIONS.—For each  
8 of fiscal years 2022 and 2023, there are authorized out  
9 of funds appropriated to the National Oceanic and Atmos-  
10 pheric Administration, \$10,000,000 to carry out the ac-  
11 tivities of this section.

12 **SEC. 605. NEXT GENERATION DIGITAL RADAR.**

13 (a) FINDINGS.—Congress finds that—

14 (1) the national weather radar network is  
15 aging, and procurement and replacement must begin  
16 by early in the decade commencing with the year  
17 2030;

18 (2) research by the National Oceanic and At-  
19 mospheric Administration on next generation radar  
20 systems has largely focused on the development of a  
21 phased array radar for severe weather forecasting;

22 (3) a phased array radar system can achieve  
23 precise measurements of precipitation rates and con-  
24 ditions through a rapid scan of the atmosphere to

1 reveal critical weather thumbprints that point to the  
2 potential of severe weather;

3 (4) though initially established through the  
4 joint collaboration between the Federal Aviation Ad-  
5 ministration and the National Oceanic and Atmos-  
6 pheric Administration, the potential for use of the  
7 phased array radar for severe weather observations  
8 has emerged as the focus;

9 (5) lifetime operations and maintenance costs  
10 will be significantly reduced due to the simple, dig-  
11 ital process for updating the digital array radar sys-  
12 tem; and

13 (6) the National Oceanic and Atmospheric Ad-  
14 ministration must continue to conduct crucial tech-  
15 nical risk reduction research to be ready for the next  
16 generation of radar networks.

17 (b) PROGRAM.—The Under Secretary shall develop,  
18 in collaboration with the Assistant Administrators for  
19 Weather Services and Oceanic and Atmospheric Research,  
20 and utilizing NOAA's existing academic partners for im-  
21 plementation, a technical risk reduction program, that will  
22 lead to the baseline requirements to procure an all-digital  
23 ground based phased array radar system for initial deploy-  
24 ment by no later than 2032. At a minimum, such a pro-  
25 gram must demonstrate the ability to significantly im-



1 prove the accuracy of severe weather forecasts while low-  
2 ering long term Federal operating costs.

3 (c) PROGRAM ELEMENTS.—The program described  
4 in subsection (b) shall focus on the following activities:

5 (1) Definition of key system requirements need-  
6 ed to cost effectively lead to significantly improve  
7 weather forecasting accuracy and precision through  
8 a nationwide all-digital ground based phased array  
9 weather radar system.

10 (2) Identification of critical technologies and  
11 subsystems on the critical path to the development  
12 of an all-digital phased array system, and an invest-  
13 ment schedule to reduce risk in each designated  
14 area.

15 (3) Development of a full-scale digital phased  
16 array radar demonstrator that will meet require-  
17 ments set in paragraph (1).

18 (4) Development of a multi-year effort to  
19 strengthen ties between NOAA and its public univer-  
20 sity based academic partners so as to maintain an  
21 ongoing reservoir of science and technology talent to  
22 help to guide and advise Federal program managers  
23 on the implementation and use of an all-digital  
24 phased array radar system.

1 (d) AUTHORIZATION OF APPROPRIATIONS.—Of the  
2 amounts otherwise made available to the National Oceanic  
3 and Atmospheric Administration’s Operations, Research,  
4 and Facilities Action, there are authorized to carry out  
5 this section \$20,000,000 for each of fiscal years 2022 and  
6 2023.

7 **SEC. 606. FELLOWSHIPS.**

8 (a) IN GENERAL.—To carry out the educational and  
9 training objectives of this Act, the Under Secretary shall  
10 support a program of weather fellowships for qualified in-  
11 dividuals at the graduate and postgraduate level. The fel-  
12 lowships shall be related to meteorology, atmospheric  
13 science, space weather, and climatology and awarded pur-  
14 suant to guidelines established by the Under Secretary.

15 (b) WEATHER FELLOWSHIP.—The Under Secretary  
16 may award weather fellowships to support the placement  
17 of individuals at the graduate level of education in fields  
18 related to meteorology, atmospheric science, space weath-  
19 er, and climatology within NOAA. A fellowship awarded  
20 under this subsection shall be for a period of not more  
21 than 1 year.

22 **SEC. 607. COMMERCIAL DATA REPORT UPDATE.**

23 Section 302(d)(4) of the Weather Research and Fore-  
24 casting Innovation Act of 2017 (15 U.S.C. 8532(d)(4))

1 is amended by striking the period and inserting: “, includ-  
2 ing—

3           “(A) if the Under Secretary determines  
4 that existing commercial data does not meet  
5 National Oceanic and Atmospheric Administra-  
6 tion needs, an explanation of why the commer-  
7 cial data was not sufficient; and

8           “(B) if the Under Secretary determines  
9 that no commercial data will be purchased in a  
10 fiscal year, guidance to Congress about poten-  
11 tial uses of commercial data.”.

12 **SEC. 608. REPORT ON NATIONAL WEATHER SERVICE**  
13 **INTERNET BANDWIDTH SHORTAGE.**

14       (a) **IN GENERAL.**—Not later than six months after  
15 the date of enactment of this Act, the Under Secretary  
16 shall issue a report to the Committee on Commerce,  
17 Science, and Transportation of the Senate, and the Com-  
18 mittee on Science, Space, and Technology of the House,  
19 a report on internet bandwidth issues at the National Cen-  
20 ter for Environmental Prediction.

21       (b) **CONTENTS.**—The report required under sub-  
22 section (a) shall include—

23           (1) an assessment of the cause of any internet  
24 bandwidth issues experienced by the National  
25 Weather Service;

- 1           (2) recommended solutions to mitigate ongoing  
2           bandwidth issues;
- 3           (3) potential impacts on commercial data users;  
4           and
- 5           (4) estimated costs of recommended solutions.

6 **SEC. 609. NAPA STUDY.**

7           (a) IN GENERAL.—The Under Secretary shall con-  
8           tract with the National Academy of Public Administration  
9           to conduct a study examining the feasibility of transfer-  
10          ring Marine Protection services to the Department of the  
11          Interior.

12          (b) REPORT.—Not later than 180 days after the date  
13          of enactment of this Act, the Under Secretary shall submit  
14          to Congress a report on the results of the study conducted  
15          under subsection (a).

16 **SEC. 610. AUTHORIZATION OF APPROPRIATIONS.**

17          (a) FINDINGS.—Congress finds the following:

18               (1) The National Oceanic and Atmospheric Ad-  
19               ministration promotes United States science and in-  
20               novation by providing weather forecasts, severe  
21               storm warnings, and climate monitoring that sup-  
22               port and affect more than one-third of the national  
23               gross domestic product.

24               (2) The Office of Oceanic and Atmospheric Re-  
25               search provides science that enables better forecasts,

1 earlier warnings for natural disasters, and a greater  
2 understanding of the Earth.

3 (3) The cutting-edge research conducted at  
4 OAR provides citizens, planners, and emergency  
5 managers reliable information that is critical to daily  
6 life.

7 (b) AUTHORIZATION OF APPROPRIATIONS.—Of  
8 amounts otherwise available to the National Oceanic and  
9 Atmospheric Administration, there are authorized to be  
10 appropriated for the Office of Oceanic and Atmospheric  
11 Research—

12 (1) \$614,000,000 for fiscal year 2022;

13 (2) \$665,000,000 for fiscal year 2023;

14 (3) \$720,000,000 for fiscal year 2024;

15 (4) \$780,000,000 for fiscal year 2025;

16 (5) \$845,000,000 for fiscal year 2026;

17 (6) \$915,000,000 for fiscal year 2027;

18 (7) \$990,000,000 for fiscal year 2028;

19 (8) \$1,072,000,000 for fiscal year 2029;

20 (9) \$1,146,000,000 for fiscal year 2030; and

21 (10) \$1,228,000,000 for fiscal year 2031.

22 **SEC. 611. DEFINITIONS.**

23 In this title:

24 (1) AGENCY.—The term “Agency” means the  
25 National Oceanic and Atmospheric Administration.

1           (2) NOAA.—The term “NOAA” means the Na-  
2           tional Oceanic and Atmospheric Administration.

3           (3) UNDER SECRETARY.—The term “Under  
4           Secretary” means the Under Secretary of Commerce  
5           for Oceans and Atmosphere.

6           **TITLE VII—NATIONAL SCIENCE**  
7           **FOUNDATION**

8           **SEC. 701. AUTHORIZATION OF APPROPRIATIONS.**

9           (a) FISCAL YEAR 2022.—

10           (1) IN GENERAL.—There are authorized to be  
11           appropriated to the Foundation \$9,288,351,900 for  
12           fiscal year 2022.

13           (2) SPECIFIC ALLOCATION.—Of the amount au-  
14           thorized by paragraph (1)—

15                   (A) \$7,600,745,900 shall be made avail-  
16                   able for research and related activities;

17                   (B) \$1,057,950,000 shall be made avail-  
18                   able for education and human resources includ-  
19                   ing—

20                           (i) \$85,800,000 for the Advanced  
21                           Technical Education Program;

22                           (ii) \$315,000,000 for the Graduate  
23                           Research Fellowship Program;

24                           (iii) \$83,250,000 for the Robert  
25                           Noyce Teacher Scholarship Program;

1 (iv) \$82,500,000 for the CyberCorps  
2 Scholarship for Service Program; and

3 (v) \$64,000,000 for the NSF Re-  
4 search Traineeship Program;

5 (C) \$255,000,000 shall be made available  
6 for major research equipment and facilities con-  
7 struction, of which \$90,000,000 shall be for  
8 mid-scale projects;

9 (D) \$352,000,000 shall be made available  
10 for agency operations and award management;

11 (E) \$4,500,000 shall be made available for  
12 the Office of the National Science Board; and

13 (F) \$18,156,000 shall be made available  
14 for the Office of the Inspector General.

15 (b) FISCAL YEAR 2023.—

16 (1) IN GENERAL.—There are authorized to be  
17 appropriated to the Foundation \$10,058,692,800 for  
18 fiscal year 2023.

19 (2) SPECIFIC ALLOCATION.—Of the amount au-  
20 thorized by paragraph (1)—

21 (A) \$8,291,722,800 shall be made avail-  
22 able for research and related activities;

23 (B) \$1,129,950,000 shall be made avail-  
24 able for education and human resources includ-  
25 ing—

1 (i) \$92,400,000 for the Advanced  
2 Technical Education Program;

3 (ii) \$342,000,000 for the Graduate  
4 Research Fellowship Program;

5 (iii) \$97,500,000 for the Robert  
6 Noyce Teacher Scholarship Program;

7 (iv) \$96,250,000 for the CyberCorps  
8 Scholarship for Service Program; and

9 (v) \$66,000,000 for the NSF Re-  
10 search Traineeship Program;

11 (C) \$255,000,000 shall be made available  
12 for major research equipment and facilities con-  
13 struction, of which \$90,000,000 shall be for  
14 mid-scale projects;

15 (D) \$359,000,000 shall be made available  
16 for agency operations and award management;

17 (E) \$4,500,000 shall be made available for  
18 the Office of the National Science Board; and

19 (F) \$18,520,000 shall be made available  
20 for the Office of the Inspector General.

21 (c) FISCAL YEAR 2024.—

22 (1) IN GENERAL.—There are authorized to be  
23 appropriated to the Foundation \$10,862,529,700 for  
24 fiscal year 2024.



1           (2) SPECIFIC ALLOCATION.—Of the amount au-  
2           thorized by paragraph (1)—

3           (A) \$8,982,699,700 shall be made avail-  
4           able for research and related activities;

5           (B) \$1,205,450,000 shall be made avail-  
6           able for education and human resources includ-  
7           ing—

8           (i) \$99,000,000 for the Advanced  
9           Technical Education Program;

10          (ii) \$370,500,000 for the Graduate  
11          Research Fellowship Program;

12          (iii) \$113,750,000 for the Robert  
13          Noyce Teacher Scholarship Program;

14          (iv) \$110,000,000 for the CyberCorps  
15          Scholarship for Service Program; and

16          (v) \$68,000,000 for the NSF Re-  
17          search Traineeship Program;

18          (C) \$285,000,000 shall be made available  
19          for major research equipment and facilities con-  
20          struction, of which \$105,000,000 shall be for  
21          mid-scale projects;

22          (D) \$366,000,000 shall be made available  
23          for agency operations and award management;

24          (E) \$4,500,000 shall be made available for  
25          the Office of the National Science Board; and

1 (F) \$18,880,000 shall be made available  
2 for the Office of the Inspector General.

3 (d) FISCAL YEAR 2025.—

4 (1) IN GENERAL.—There are authorized to be  
5 appropriated to the Foundation \$11,624,846,600 for  
6 fiscal year 2025.

7 (2) SPECIFIC ALLOCATION.—Of the amount au-  
8 thorized by paragraph (1)—

9 (A) \$9,673,676,600 shall be made avail-  
10 able for research and related activities;

11 (B) \$1,269,400,000 shall be made avail-  
12 able for education and human resources includ-  
13 ing—

14 (i) \$105,600,000 for the Advanced  
15 Technical Education Program;

16 (ii) \$399,000,000 for the Graduate  
17 Research Fellowship Program;

18 (iii) \$130,000,000 for the Robert  
19 Noyce Teacher Scholarship Program;

20 (iv) \$112,200,000 for the CyberCorps  
21 Scholarship for Service Program; and

22 (v) \$70,000,000 for the NSF Re-  
23 search Traineeship Program;

24 (C) \$285,000,000 shall be made available  
25 for major research equipment and facilities con-

1           struction, of which \$120,000,000 shall be for  
2           mid-scale projects;

3           (D) \$373,000,000 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) \$19,270,000 shall be made available  
8           for the Office of the Inspector General.

9           (e) FISCAL YEAR 2026.—

10           (1) IN GENERAL.—There are authorized to be  
11           appropriated to the Foundation \$12,403,503,500 for  
12           fiscal year 2026.

13           (2) SPECIFIC ALLOCATION.—Of the amount au-  
14           thorized by paragraph (1)—

15           (A) \$10,364,653,500 shall be made avail-  
16           able for research and related activities;

17           (B) \$1,319,700,000 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) \$427,500,000 for the Graduate  
23           Research Fellowship Program;

24           (iii) \$132,600,000 for the Robert  
25           Noyce Teacher Scholarship Program;

1 (iv) \$114,400,000 for the CyberCorps  
2 Scholarship for Service Program; and

3 (v) \$72,000,000 for the NSF Re-  
4 search Traineeship Program;

5 (C) \$315,000,000 shall be made available  
6 for major research equipment and facilities con-  
7 struction, of which \$180,000,000 shall be for  
8 mid-scale projects;

9 (D) \$380,000,000 shall be made available  
10 for agency operations and award management;

11 (E) \$4,500,000 shall be made available for  
12 the Office of the National Science Board; and

13 (F) \$19,650,000 shall be made available  
14 for the Office of the Inspector General.

15 (f) FISCAL YEAR 2027.—

16 (1) IN GENERAL.—There are authorized to be  
17 appropriated to the Foundation \$13,152,330,400 for  
18 fiscal year 2027.

19 (2) SPECIFIC ALLOCATION.—Of the amount au-  
20 thorized by paragraph (1)—

21 (A) \$11,055,630,400 shall be made avail-  
22 able for research and related activities;

23 (B) \$1,370,200,000 shall be made avail-  
24 able for education and human resources includ-  
25 ing—

1 (i) \$118,800,000 for the Advanced  
2 Technical Education Program;

3 (ii) \$456,000,000 for the Graduate  
4 Research Fellowship Program;

5 (iii) \$135,300,000 for the Robert  
6 Noyce Teacher Scholarship Program;

7 (iv) \$116,700,000 for the CyberCorps  
8 Scholarship for Service Program; and

9 (v) \$74,000,000 for the NSF Re-  
10 search Traineeship Program;

11 (C) \$315,000,000 shall be made available  
12 for major research equipment and facilities con-  
13 struction, of which \$205,000,000 shall be for  
14 mid-scale projects;

15 (D) \$382,000,000 shall be made available  
16 for agency operations and award management;

17 (E) \$4,500,000 shall be made available for  
18 the Office of the National Science Board; and

19 (F) \$20,000,000 shall be made available  
20 for the Office of the Inspector General.

21 (g) FISCAL YEAR 2028.—

22 (1) IN GENERAL.—There are authorized to be  
23 appropriated to the Foundation \$13,931,257,300 for  
24 fiscal year 2028.

1           (2) SPECIFIC ALLOCATION.—Of the amount au-  
2           thorized by paragraph (1)—

3                   (A) \$11,746,607,300 shall be made avail-  
4                   able for research and related activities;

5                   (B) \$1,420,700,000 shall be made avail-  
6                   able for education and human resources includ-  
7                   ing—

8                           (i) \$125,400,000 for the Advanced  
9                           Technical Education Program;

10                           (ii) \$484,500,000 for the Graduate  
11                           Research Fellowship Program;

12                           (iii) \$138,000,000 for the Robert  
13                           Noyce Teacher Scholarship Program;

14                           (iv) \$119,000,000 for the CyberCorps  
15                           Scholarship for Service Program; and

16                           (v) \$76,000,000 for the NSF Re-  
17                           search Traineeship Program;

18                   (C) \$345,000,000 shall be made available  
19                   for major research equipment and facilities con-  
20                   struction, of which \$215,000,000 shall be for  
21                   mid-scale projects;

22                   (D) \$394,000,000 shall be made available  
23                   for agency operations and award management;

24                   (E) \$4,500,000 shall be made available for  
25                   the Office of the National Science Board; and

1 (F) \$20,450,000 shall be made available  
2 for the Office of the Inspector General.

3 (h) FISCAL YEAR 2029.—

4 (1) IN GENERAL.—There are authorized to be  
5 appropriated to the Foundation \$14,680,234,200 for  
6 fiscal year 2029.

7 (2) SPECIFIC ALLOCATION.—Of the amount au-  
8 thorized by paragraph (1)—

9 (A) \$12,437,584,200 shall be made avail-  
10 able for research and related activities;

11 (B) \$1,471,300,000 shall be made avail-  
12 able for education and human resources includ-  
13 ing—

14 (i) \$132,000,000 for the Advanced  
15 Technical Education Program;

16 (ii) \$513,000,000 for the Graduate  
17 Research Fellowship Program;

18 (iii) \$140,700,000 for the Robert  
19 Noyce Teacher Scholarship Program;

20 (iv) \$121,400,000 for the CyberCorps  
21 Scholarship for Service Program; and

22 (v) \$78,000,000 for the NSF Re-  
23 search Traineeship Program;

24 (C) \$345,000,000 shall be made available  
25 for major research equipment and facilities con-

1           struction, of which \$225,000,000 shall be for  
2           mid-scale projects;

3           (D) \$401,000,000 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) \$20,850,000 shall be made available  
8           for the Office of the Inspector General.

9           (i) FISCAL YEAR 2030.—

10           (1) IN GENERAL.—There are authorized to be  
11           appropriated to the Foundation \$15,460,331,100 for  
12           fiscal year 2030.

13           (2) SPECIFIC ALLOCATION.—Of the amount au-  
14           thorized by paragraph (1)—

15           (A) \$13,128,561,100 shall be made avail-  
16           able for research and related activities;

17           (B) \$1,523,000,000 shall be made avail-  
18           able for education and human resources includ-  
19           ing—

20           (i) \$139,600,000 for the Advanced  
21           Technical Education Program;

22           (ii) \$541,500,000 for the Graduate  
23           Research Fellowship Program;

24           (iii) \$143,500,000 for the Robert  
25           Noyce Teacher Scholarship Program;



1 (iv) \$123,800,000 for the CyberCorps  
2 Scholarship for Service Program; and

3 (v) \$80,000,000 for the NSF Re-  
4 search Traineeship Program;

5 (C) \$375,000,000 shall be made available  
6 for major research equipment and facilities con-  
7 struction, of which \$225,000,000 shall be for  
8 mid-scale projects;

9 (D) \$408,000,000 shall be made available  
10 for agency operations and award management;

11 (E) \$4,500,000 shall be made available for  
12 the Office of the National Science Board; and

13 (F) \$21,270,000 shall be made available  
14 for the Office of the Inspector General.

15 (j) FISCAL YEAR 2031.—

16 (1) IN GENERAL.—There are authorized to be  
17 appropriated to the Foundation \$16,245,538,000 for  
18 fiscal year 2031.

19 (2) SPECIFIC ALLOCATION.—Of the amount au-  
20 thorized by paragraph (1)—

21 (A) \$13,819,538,000 shall be made avail-  
22 able for research and related activities;

23 (B) \$1,609,800,000 shall be made avail-  
24 able for education and human resources includ-  
25 ing—

1 (i) \$146,200,000 for the Advanced  
2 Technical Education Program;

3 (ii) \$570,000,000 for the Graduate  
4 Research Fellowship Program;

5 (iii) \$146,400,000 for the Robert  
6 Noyce Teacher Scholarship Program;

7 (iv) \$162,200,000 for the CyberCorps  
8 Scholarship for Service Program;

9 (v) \$82,000,000 for the NSF Re-  
10 search Traineeship Program; and

11 (C) \$375,000,000 shall be made available  
12 for major research equipment and facilities con-  
13 struction, of which \$225,000,000 shall be for  
14 mid-scale projects;

15 (D) \$415,000,000 shall be made available  
16 for agency operations and award management;

17 (E) \$4,500,000 shall be made available for  
18 the Office of the National Science Board; and

19 (F) \$21,700,000 shall be made available  
20 for the Office of the Inspector General.

21 **SEC. 702. NSF ORGANIZATIONAL REVIEW.**

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

24 (1) since its establishment in 1950, the Na-  
25 tional Science Foundation has been the gold stand-

1       ard for the world in funding basic science and engi-  
2       neering research;

3           (2) the National Science Foundation should  
4       continue to fund competitive, merit-reviewed basic  
5       research across all fields of science and engineering  
6       to achieve its statutory mission;

7           (3) scientific research has become increasingly  
8       interdisciplinary, crossing the boundaries of indi-  
9       vidual fields and the divisions and directorates of the  
10      National Science Foundation that support research  
11      grants; and

12          (4) as the nature of scientific research changes,  
13      it is important for the institutions that support  
14      science like the National Science Foundation, to pe-  
15      riodically evaluate whether the organization needs to  
16      evolve to continue to fund the best science, the best  
17      scientists, and the most groundbreaking research.

18      (b) STUDY.—Not later than 60 days after the date  
19      of enactment of this Act, the Director shall contract with  
20      the National Academy of Public Administration (referred  
21      to in this section as the “National Academy”) to conduct  
22      a study on the organizational and management structure  
23      of the Foundation, to—

24           (1) evaluate and make recommendations for the  
25      structure of the Foundation’s directorates, divisions,

1 and offices of the Foundation to efficiently and ef-  
2 fectively fund and oversee research grants and edu-  
3 cation and training programs;

4 (2) evaluate and make recommendations for  
5 any structural changes needed to improve the sup-  
6 port for cross-disciplinary and trans-disciplinary re-  
7 search;

8 (3) evaluate and make recommendations for the  
9 long-term planning and development of research in-  
10 frastructure projects; and

11 (4) make recommendations for the management  
12 of the Foundation's business practices, including  
13 personnel and financial management.

14 (c) REPORT TO CONGRESS.—Upon completion of the  
15 study under subsection (b), the Director shall transmit the  
16 study to Congress along with a summary of the Director's  
17 plans, if any, to implement the recommendations of the  
18 National Academy.

19 **SEC. 703. ETHICS AND SECURITY PLANS.**

20 (a) DEVELOPMENT OF ETHICS AND SECURITY POLI-  
21 CIES.—Not later than 6 months after the date of enact-  
22 ment of this Act, the Director shall develop and implement  
23 a policy requiring that all proposals for research funding  
24 from the Foundation include, if applicable, a plan for

1 managing the risk of any potential ethical or security im-  
2 plications resulting from such research.

3 (b) REQUIREMENTS.—The policy shall—

4 (1) include clear guidance of what constitutes  
5 ethical and security risks;

6 (2) include field specific guidance as appro-  
7 priate, which may include biology, artificial intel-  
8 ligence, or cybersecurity;

9 (3) include mechanisms to ensure appropriate  
10 evaluation of the submitted ethical and security  
11 plans required under this section;

12 (4) include mechanisms to ensure that research-  
13 ers comply with approved ethical and security plans;  
14 and

15 (5) to the extent practical be harmonized with  
16 existing ethical and security policies or requirements,  
17 including the Common Rule (Federal Policy for the  
18 Protection of Human Subjects, 45 C.F.R. 690).

19 (c) LIMITATION.—The policy developed under sub-  
20 section (a) shall not factor into award decisions unless  
21 deemed necessary by the merit review panel for each pro-  
22 gram.

23 **SEC. 704. MAJOR RESEARCH INSTRUMENTATION UPDATE.**

24 Section 7036(a) of the America COMPETES Act (42  
25 U.S.C. 1862o–14(a)) is amended by striking “The max-

1 imum amount of an award under the program shall be  
2 \$4,000,000 except if the total amount appropriated for the  
3 program for a fiscal year exceeds \$125,000,000, in which  
4 case the maximum amount of an award shall be  
5 \$6,000,000” and inserting “The maximum amount of an  
6 award under the program shall be \$6,000,000”.

7 **SEC. 705. NSF RESEARCH SECURITY.**

8 (a) OFFICE OF RESEARCH SECURITY AND POLICY.—

9 The Director shall maintain a Research Security and Pol-  
10 icy office within the Office of the Director. The functions  
11 of the Research Security and Policy office shall be to co-  
12 ordinate all research security policy issues across the  
13 Foundation and coordinate with the NSF Office of Inspec-  
14 tor General, including by—

15 (1) serving as the Foundation’s primary re-  
16 source for all policy issues related to the security  
17 and integrity of the conduct of Foundation sup-  
18 ported research;

19 (2) conducting outreach and education activities  
20 for awardees on research policies and potential secu-  
21 rity risks;

22 (3) educating NSF program managers and  
23 other directorate staff on evaluating NSF awards  
24 and awardees for potential security risks;

1           (4) communicating reporting and disclosure re-  
2           quirements to awardees and applicants for funding;  
3           and

4           (5) coordinating with other Federal science  
5           agencies as appropriate and through the National  
6           Science and Technology Council in accordance with  
7           the authority provided under section 1746 of the na-  
8           tional Defense Authorization Act for Fiscal Year  
9           2020 (Public Law 116–92; 42 U.S.C. 6601 note).

10          (b) CHIEF OF RESEARCH SECURITY.—The Director  
11         shall appoint a senior agency official within the Office of  
12         the Director as a Chief of Research Security, whose pri-  
13         mary responsibility is to manage the office created in sub-  
14         section (a).

15          (c) REPORT TO CONGRESS.—No later than 180 days  
16         after the date of enactment of this Act, the Director shall  
17         provide a report to the Science, Space, and Technology  
18         Committee of the House of Representatives, the Com-  
19         mittee on Commerce, Science, and Transportation of the  
20         Senate, the Committee on Appropriations of the House of  
21         Representatives, and the Committee on Appropriations of  
22         the Senate on the resources and the number of full time  
23         employees needed to carry out the functions of the Office  
24         established in subsection (a).

1 **SEC. 706. REPRODUCIBILITY IN SCIENCE.**

2 (a) IN GENERAL.—The Director shall award grants,  
3 on a competitive basis, to institutions of higher education  
4 or nonprofit organizations (or a consortia thereof) to—

5 (1) support research and development of open  
6 source, usable tools and infrastructure that support  
7 reproducibility for a broad range of studies across  
8 different disciplines;

9 (2) support research on computational repro-  
10 ducibility, including the limits of reproducibility and  
11 the consistency of computational results in the devel-  
12 opment of new computation hardware, tools, and  
13 methods;

14 (3) support the education and training of stu-  
15 dents, faculty, and researchers on computational  
16 methods and tools to improve the quality of data  
17 and code to produce reproducible research; and

18 (4) support the education and training of stu-  
19 dents, faculty, and researchers on the knowledge,  
20 skills, and tools needed to conduct research that ad-  
21 heres to the highest scientific standard and to be  
22 able to clearly communicate methods and results ac-  
23 curately and appropriately to reflect the uncertainty  
24 involved in the research.

25 (b) DATA REPOSITORIES.—Not later than 12 months  
26 after the date of enactment of this Act, the Director of



1 the National Science Foundation shall coordinate with the  
2 heads of other Federal science agencies to develop a set  
3 of criteria for trusted open repositories to be used by the  
4 scientific community in order to facilitate the transparent  
5 sharing and availability of data and code for federally  
6 funded research studies.

7 (c) DEFINITION OF REPRODUCIBILITY.—For the  
8 purposes of this section, the term “reproducibility” means  
9 obtaining consistent results using the same input data,  
10 computational steps, methods and code, and conditions of  
11 analysis.

12 **SEC. 707. PUBLIC-PRIVATE PARTNERSHIPS.**

13 (a) IN GENERAL.—The Director shall pursue part-  
14 nerships with private industry, private foundations, and/  
15 or other appropriate private entities to—

16 (1) enhance the impact of the Foundation’s in-  
17 vestments and contributions to American economic  
18 competitiveness and security; and

19 (2) make available infrastructure, expertise, and  
20 financial resources to the United States scientific  
21 and engineering research and education enterprise.

22 (b) MERIT-REVIEW.—Nothing in this section shall be  
23 construed as altering any intellectual or broader impacts  
24 criteria at the Foundation for evaluating grant applica-  
25 tions.

1 **SEC. 708. EPSCOR.**

2 (a) SENSE OF CONGRESS.—

3 (1) IN GENERAL.—It is the sense of Congress  
4 that—

5 (A) since maintaining the Nation’s sci-  
6 entific and economic leadership requires the  
7 participation of talented individuals nationwide,  
8 EPSCoR investments into State research and  
9 education capacities that are in the Federal in-  
10 terest and should be sustained; and

11 (B) EPSCoR should maintain its experi-  
12 mental component by supporting innovative  
13 methods for improving research capacity and  
14 competitiveness.

15 (2) DEFINITION OF EPSCOR.—In this sub-  
16 section, the term “EPSCoR” has the meaning given  
17 the term in section 502 of the America COMPETES  
18 Reauthorization Act of 2010 (42 U.S.C. 1862p  
19 note).

20 (b) UPDATE OF EPSCoR.—Section 517(f)(2) of the  
21 America COMPETES Reauthorization Act of 2010 (42  
22 U.S.C. 1862p–9(f)(2)) is amended—

23 (1) in subparagraph (A), by striking “and” at  
24 the end; and

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

1           “(C) to increase the capacity of rural com-  
2           munities to provide quality STEM education  
3           and STEM workforce development program-  
4           ming to students, and teachers; and”.

5 **SEC. 709. DEFINITIONS.**

6           In this title, unless expressly provided otherwise:

7           (1) DIRECTOR.—The term “Director” means  
8           the Director of the National Science Foundation.

9           (2) FEDERAL SCIENCE AGENCY.—The term  
10          “Federal science agency” has the meaning given the  
11          term in section 103 of the America COMPETES  
12          Reauthorization Act of 2010 (42 U.S.C. 6623).

13          (3) FOUNDATION.—The term “Foundation”  
14          means the National Science Foundation.

15          (4) INSTITUTION OF HIGHER EDUCATION.—The  
16          term “institution of higher education” has the  
17          meaning given the term in section 101(a) of the  
18          Higher Education Act of 1965 (20 U.S.C. 1001(a)).

19 **TITLE VIII—STEM WORKFORCE**  
20 **FOR THE 21ST CENTURY**

21 **SEC. 801. FINDINGS; SENSE OF CONGRESS.**

22          (a) FINDINGS.—Congress finds the following:

23               (1) Many reports over the past decade have  
24               found that it is critical to our Nation’s economic  
25               leadership and global competitiveness that the

1 United States educates and trains more scientists  
2 and engineers.

3 (2) Worldwide demand for STEM-capable  
4 workers keeps growing, driven by international op-  
5 portunities and competition, and by the rapid in-  
6 creases in the number of jobs that require STEM  
7 skills, including in lines of work that historically did  
8 not require STEM knowledge.

9 (3) By 2026 science and engineering jobs are  
10 predicted to grow by 13 percent compared with 7  
11 percent growth in the overall United States work-  
12 force.

13 (4) A recent report by ACT, the scholastic test-  
14 ing service, found that only 20 percent of United  
15 States students in the 2016 ACT-tested high school  
16 graduating class were ready for first-year STEM  
17 college courses.

18 (5) Out of the 79 countries that participate in  
19 the Organisation for Economic Co-operation and De-  
20 velopment's Programme for International Student  
21 Assessment, the United States ranks 18th in science  
22 and 37th in mathematics.

23 (6) The Federal Government spends over \$3  
24 billion annually on STEM education related re-  
25 search, programs and activities, but encouraging

1       STEM education activities beyond the scope of the  
2       Federal Government is crucial to the future tech-  
3       nical and economic competitiveness of the United  
4       States.

5       (b) SENSE OF CONGRESS.—It is the sense of Con-  
6       gress that—

7           (1) the Nation’s future economic and national  
8       security relies on building a STEM-capable work-  
9       force in order to remain competitive in the global  
10      economy, foster greater innovation, and provide a  
11      foundation for shared prosperity;

12          (2) the Federal Government plays a key role in  
13      developing and sustaining a STEM-capable work-  
14      force by working with stakeholders at all levels, in-  
15      cluding researchers, practitioners, industry, and  
16      State and local governments to support and promote  
17      evidence-based approaches to modernize elementary,  
18      secondary, and post-secondary STEM education, and  
19      support the reskilling and upskilling that workers  
20      will need throughout their careers;

21          (3) applying a more holistic view of the STEM  
22      workforce that moves beyond academic degrees and  
23      occupations will highlight the contributions and op-  
24      portunities for workers at all education levels;

1           (4) increasing the diversity and inclusion in the  
2     STEM workforce is needed to help address the  
3     STEM skills shortage;

4           (5) supporting an interdisciplinary approach to  
5     STEM learning, where academic concepts are cou-  
6     pled with real-world applications and students use  
7     STEM in contexts that make connections between  
8     school, community, work, and the wider world will  
9     improve outcomes for students in elementary, sec-  
10    ondary and post-secondary education and for skilled  
11    technical workers in different career stages;

12          (6) leveraging private and nonprofit invest-  
13    ments in STEM education will be essential to  
14    strengthening the Federal STEM portfolio;

15          (7) deepening partnerships between educational  
16    institutions and the business sector will be critical in  
17    preparing Americans for the industries of the future  
18    and support reskilling and upskilling of incumbent  
19    workers so that they can better navigate rapid  
20    changes in the world of work; and

21          (8) coordinating STEM programs and activities  
22    across the Federal Government in order to limit du-  
23    plication and engage stakeholders in STEM pro-  
24    grams and related activities for which objective out-  
25    comes can be measured will bolster results of Fed-

1 eral STEM education programs, improve the return  
2 on taxpayers' investments in STEM education pro-  
3 grams, and in turn strengthen the United States  
4 economy.

5 **SEC. 802. ADVANCED TECHNICAL EDUCATION AND**  
6 **SKILLED TECHNICAL WORKFORCE.**

7 (a) FINDINGS.—Congress finds the following:

8 (1) A National Academies of Science, Engineer-  
9 ing, and Medicine report predicts a shortfall of near-  
10 ly 3,400,000 skilled technical workers by 2022.

11 (2) The National Science Foundation's Ad-  
12 vanced Technical Education program is critical to  
13 helping improve the training of the skilled technical  
14 workforce, with an emphasis on two-year Institutions  
15 of Higher Education (IHEs) and educating techni-  
16 cians for the high-technology fields that drive our  
17 nation's economy.

18 (3) The National Science Board's 2019 report  
19 on the skilled technical workforce called for  
20 strengthening partnerships between skilled technical  
21 workforce programs and business and industry.

22 (b) ADVANCED TECHNICAL EDUCATION PROGRAM  
23 UPDATE.—Section 3(b) of the Scientific and Advanced-  
24 Technology Act of 1992 (42 U.S.C. 1862i(b)) is amended  
25 to read as follows:

1           “(b) NATIONAL COORDINATION NETWORK FOR  
2 SCIENCE AND TECHNICAL EDUCATION.—The Director  
3 shall award grants to institutions of higher education,  
4 nonprofit institutions, associate-degree granting colleges  
5 (or consortia thereof) to establish a network of centers for  
6 science and technical education. The centers shall—

7           “(1) coordinate research, training and edu-  
8 cation activities funded by awards under subsection  
9 (a) and share information and best practices across  
10 the network of awardees;

11           “(2) serve as national and regional clearing-  
12 house and resource to communicate and coordinate  
13 research, training and educational activities across  
14 disciplinary, organizational, geographic and inter-  
15 national boundaries and disseminate best practices;  
16 and

17           “(3) develop national and regional partnerships  
18 between K–12 schools, two-year colleges, institutions  
19 of higher education, workforce development pro-  
20 grams, and industry to meet workforce needs.”.

21           (c) NSF PORTFOLIO REVIEW AND COORDINATION  
22 PLAN.—

23           (1) IN GENERAL.—Not later than 1 year after  
24 the date of enactment of this Act, the Director of  
25 the National Science Foundation shall conduct a full



1 portfolio analysis of the Foundation's skilled tech-  
2 nical workforce investments and develop a plan to  
3 improve coordination and collaboration of research  
4 and education investments and the communication  
5 of those funding opportunities to the research and  
6 education community.

7 (2) SUBMISSION TO CONGRESS.—Not later than  
8 180 days after the date of the review and develop-  
9 ment of the plan under paragraph (1) is complete,  
10 the Director of the National Science Foundation  
11 shall submit to Congress and make widely available  
12 to the public a summary of the portfolio review and  
13 plan.

14 **SEC. 803. GRADUATE RESEARCH FELLOWSHIP PROGRAM**  
15 **UPDATE.**

16 (a) FINDINGS.—Congress finds the following:

17 (1) The National Science Foundation Graduate  
18 Research Fellowship Program is the nation's oldest  
19 fellowship program that directly supports American  
20 graduate students in various STEM fields and is a  
21 model for training the best innovators in the United  
22 States.

23 (2) Since 1952, NSF has funded over 50,000  
24 Graduate Research Fellowships out of more than  
25 500,000 applicants, 42 Fellows have gone on to be-

1           come Nobel laureates, and more than 450 have be-  
2           come members of the National Academy of Sciences.

3           (3) Foreign nations are increasingly investing  
4           in foreign talent programs to compete with the  
5           United States.

6           (b) SENSE OF CONGRESS.—It is the sense of Con-  
7           gress that the National Science Foundation should grow  
8           the number of new graduate research fellows supported  
9           annually over the next 10 years to no less than 3,000 fel-  
10          lows.

11          (c) PROGRAM UPDATE.—Section 10 of the National  
12          Science Foundation Act of 1950 (42 U.S.C. 1869) is  
13          amended—

14                 (1) in subsection (a), by inserting “and as will  
15                 address national workforce demand in critical STEM  
16                 fields” after “throughout the United States”;

17                 (2) in subsection (b), by striking “of \$12,000”  
18                 and inserting “\$16,000”; and

19                 (3) by adding at the end the following:

20                 “(c) OUTREACH.—The Director shall ensure program  
21                 outreach to recruit fellowship applicants from fields of  
22                 study that are in areas of critical national need, from all  
23                 regions of the country, and from historically underrep-  
24                 resented populations in STEM.”.

1 **SEC. 804. ROBERT NOYCE TEACHER SCHOLARSHIP PRO-**  
2 **GRAM SENSE OF CONGRESS.**

3 It is the sense of Congress that—

4 (1) the Robert Noyce Teacher Scholarship Pro-  
5 gram plays an important role in supporting the de-  
6 velopment and dissemination of evidence-based  
7 teacher preparation models and the recruitment,  
8 preparation, and retention of STEM educators;

9 (2) the Robert Noyce Teacher Scholarship Pro-  
10 gram improves recruitment of underrepresented and  
11 STEM-trained students into teaching, encourages  
12 teachers to work in high-need areas, and can im-  
13 prove relationships between teacher preparation pro-  
14 grams and industry; and

15 (3) the Robert Noyce Teacher Scholarship Pro-  
16 gram which currently supports between 1,000 to  
17 1,500 new math and science teachers a year, includ-  
18 ing in high-need districts should be doubled over the  
19 next ten years to meet the growing demand for  
20 STEM capable educators.

21 **SEC. 805. INNOVATIONS IN INFORMAL STEM LEARNING.**

22 (a) **PERMISSIBLE SUPPORT.**—Section 3(b) of the  
23 STEM Education Act of 2015 (42 U.S.C. 1862q(b)) is  
24 amended—

25 (1) in paragraph (3), by striking “; and” at the  
26 end and inserting a semicolon;

1           (2) in paragraph (4), by striking the period at  
2           the end and inserting “; and”; and

3           (3) by adding at the end the following:

4           “(5) supporting the participation of students in  
5           nonprofit competitions, out-of-school activities, and  
6           field experiences related to STEM subjects (such as  
7           robotics, science research, invention, mathematics,  
8           and technology competitions), which may include—

9                   “(A) the purchase of parts and supplies  
10                   needed to participate in such competitions;

11                   “(B) incentives and stipends for teachers  
12                   and instructional leaders who are involved in  
13                   assisting students and preparing students for  
14                   such competitions, if such activities fall outside  
15                   the regular duties and responsibilities of such  
16                   teachers and instructional leaders; or

17                   “(C) incentivizes and stipends for profes-  
18                   sional training for teachers and instructional  
19                   leaders of before-school, after-school, out-of-  
20                   school or summer STEM programs; and

21           “(6) broadening secondary school students’ ac-  
22           cess to, and interest in, careers that require aca-  
23           demic preparation in STEM subjects.”.

24           (b) SUPPORTING PRE-K–8 INFORMAL STEM OPPOR-  
25           TUNITIES.—Section 3 of the STEM Education Act of

1 2015 (42 U.S.C. 1862q) is amended by adding at the end  
2 the following:

3 “(c) PRE-K-8 INFORMAL STEM PROGRAM.—

4 “(1) IN GENERAL.—The Director of the Na-  
5 tional Science Foundation shall provide grants on a  
6 merit-reviewed, competitive basis for research on  
7 programming that engages students in grades pre-  
8 kindergarten through 8, including underrepresented  
9 and rural students, in STEM in order to prepare  
10 such students to pursue degrees or careers in  
11 STEM.

12 “(2) USE OF FUNDS.—

13 “(A) IN GENERAL.—Grants awarded under  
14 this section shall be used toward research to ad-  
15 vance the engagement of students in grades  
16 pre-kindergarten through 8 in STEM through  
17 providing before-school, after-school, out-of-  
18 school, or summer activities that are designed  
19 to encourage interest, engagement, and skills  
20 development for students in STEM.

21 “(B) PERMITTED ACTIVITIES.—The activi-  
22 ties described in subparagraph (A) may in-  
23 clude—

24 “(i) the provision of programming de-  
25 scribed in such subparagraph for the pur-

1 pose of research described in such subpara-  
2 graph;

3 “(ii) the use of a variety of engage-  
4 ment methods, including cooperative and  
5 hands-on learning;

6 “(iii) exposure of students to role  
7 models in the fields of STEM and near-  
8 peer mentors;

9 “(iv) training of informal learning  
10 educators, youth-serving professionals, and  
11 volunteers who lead informal STEM pro-  
12 grams in using evidence-based methods  
13 consistent with the target student popu-  
14 lation being served;

15 “(v) education of students on the rel-  
16 evance and significance of STEM careers,  
17 provision of academic advice and assist-  
18 ance, and activities designed to help stu-  
19 dents make real-world connections to  
20 STEM content;

21 “(vi) the attendance of students at  
22 events, competitions, and academic pro-  
23 grams to provide content expertise and en-  
24 courage career exposure in STEM;

1           “(vii) activities designed to engage  
2           parents and families of students in grades  
3           pre-kindergarten through 8 in STEM;

4           “(viii) innovative strategies to engage  
5           students, such as using leadership skills  
6           and outcome measures to impart youth  
7           with the confidence to pursue STEM  
8           coursework and academic study;

9           “(ix) coordination with STEM-rich  
10          environments, including other nonprofit,  
11          nongovernmental organizations, out-of-  
12          classroom settings, single-gender environ-  
13          ments, institutions of higher education, vo-  
14          cational facilities, corporations, museums,  
15          or science centers; and

16          “(x) the acquisition of instructional  
17          materials or technology-based tools to con-  
18          duct applicable grant activity.

19          “(3) APPLICATION.—An applicant seeking  
20          funding under the section shall submit an applica-  
21          tion at such time, in such manner, and containing  
22          such information as may be required. Applications  
23          that include or partner with a nonprofit, nongovern-  
24          mental organization that has extensive experience  
25          and expertise in increasing the participation of stu-

1       dents in pre-kindergarten through grade 8 in STEM  
2       are encouraged. The application may include the fol-  
3       lowing:

4               “(A) A description of the target audience  
5       to be served by the research activity or activi-  
6       ties for which such funding is sought.

7               “(B) A description of the process for re-  
8       cruitment and selection of students to partici-  
9       pate in such activities.

10              “(C) A description of how such activity or  
11       activities may inform programming that en-  
12       gages students in grades pre-kindergarten  
13       through 8 in STEM.

14              “(D) A description of how such activity or  
15       activities may inform programming that pro-  
16       motes student academic achievement in STEM.

17              “(E) An evaluation plan that includes, at  
18       a minimum, the use of outcome-oriented meas-  
19       ures to determine the impact and efficacy of  
20       programming being researched.

21              “(4) EVALUATIONS.—Each recipient of a grant  
22       under this section shall provide, at the conclusion of  
23       every year during which the grant funds are re-  
24       ceived, an evaluation in a form prescribed by the Di-  
25       rector.



1           “(5) ACCOUNTABILITY AND DISSEMINATION.—

2                   “(A) EVALUATION REQUIRED.—The Direc-  
3           tor shall evaluate the activities established  
4           under this section. Such evaluation shall—

5                           “(i) use a common set of benchmarks  
6                           and tools to assess the results of research  
7                           conducted under such grants; and

8                           “(ii) to the extent practicable, inte-  
9                           grate the findings of the research resulting  
10                          from the activity or activities funded  
11                          through the grant with the current re-  
12                          search on serving students with respect to  
13                          the pursuit of degrees or careers in STEM,  
14                          including underrepresented and rural stu-  
15                          dents, in grades pre-kindergarten through  
16                          8.

17                          “(B) REPORT ON EVALUATIONS.—Not  
18           later than 180 days after the completion of the  
19           evaluation under subparagraph (A), the Direc-  
20           tor shall submit to Congress and make widely  
21           available to the public a report that includes—

22                           “(i) the results of the evaluation; and

23                           “(ii) any recommendations for admin-  
24           istrative and legislative action that could

1           optimize the effectiveness of the program  
2           under this section.

3           “(6) COORDINATION.—In carrying out this sec-  
4           tion, the Director shall, for purposes of enhancing  
5           program effectiveness and avoiding duplication of ac-  
6           tivities, consult, cooperate, and coordinate with the  
7           programs and policies of other relevant Federal  
8           agencies.”.

9   **SEC. 806. AI TRAINEESHIPS AND FELLOWSHIPS.**

10   (a) ARTIFICIAL INTELLIGENCE TRAINEESHIPS.—

11           (1) IN GENERAL.—The Director of the National  
12           Science Foundation shall award grants to institu-  
13           tions of higher education to establish traineeship  
14           programs for graduate students who pursue artificial  
15           intelligence-related research leading to a masters or  
16           doctorate degree by providing funding and other as-  
17           sistance, and by providing graduate students oppor-  
18           tunities for research experiences in government or  
19           industry related to the students’ artificial intel-  
20           ligence studies.

21           (2) USE OF FUNDS.—An institution of higher  
22           education shall use grant funds provided under para-  
23           graph (1) for the purposes of—

1 (A) providing traineeships to students who  
2 are pursuing research in artificial intelligence  
3 leading to a masters or doctorate degree;

4 (B) paying tuition and fees for students  
5 receiving traineeships who are citizens, nation-  
6 als, or lawfully admitted permanent resident  
7 aliens of the United States;

8 (C) creating and requiring courses or  
9 training programs in technology ethics for stu-  
10 dents receiving traineeships;

11 (D) creating opportunities for research in  
12 technology ethics for students receiving  
13 traineeships;

14 (E) establishing scientific internship pro-  
15 grams for students receiving traineeships in ar-  
16 tificial intelligence at for-profit institutions,  
17 nonprofit research institutions, or government  
18 laboratories; and

19 (F) other costs associated with the admin-  
20 istration of the program.

21 (b) ARTIFICIAL INTELLIGENCE FELLOWSHIPS.—The  
22 Director of the National Science Foundation shall award  
23 fellowships to masters and doctoral students and  
24 postdoctoral researchers at institutions of higher edu-  
25 cation who are pursuing degrees or research in artificial

1 intelligence and related fields, including in the field of  
2 technology ethics. In making such awards, the Director  
3 shall—

4 (1) ensure recipients of artificial intelligence fel-  
5 lowships are citizens, nationals, or lawfully admitted  
6 permanent resident aliens of the United States; and

7 (2) conduct outreach, including through formal  
8 solicitations, to solicit proposals from students and  
9 postdoctoral researchers seeking to carry out re-  
10 search in aspects of technology ethics with relevance  
11 to artificial intelligence systems.

12 **SEC. 807. CYBERSECURITY WORKFORCE DEVELOPMENT AT**  
13 **FEDERAL SCIENCE AGENCIES.**

14 (a) CYBERSECURITY WORKFORCE DEVELOPMENT AT  
15 THE DEPARTMENT OF ENERGY.—

16 (1) IN GENERAL.—The Secretary of Energy  
17 shall support the development of a cybersecurity  
18 workforce through a program that—

19 (A) facilitates collaboration between under-  
20 graduate and graduate students, researchers at  
21 the National Laboratories (as defined in section  
22 2 of the Energy Policy Act of 2005), and the  
23 private sector;

24 (B) prioritizes science and technology in  
25 areas relevant to the mission of the Department

1 of Energy through the design and application of  
2 cybersecurity technologies;

3 (C) develops, or facilitates private sector  
4 development of, voluntary cybersecurity training  
5 and retraining standards, lessons, and rec-  
6 ommendations for the energy sector that mini-  
7 mize duplication of cybersecurity compliance  
8 training programs; and

9 (D) maintains a public database of cyber-  
10 security education, training, and certification  
11 programs.

12 (2) COLLABORATION.—In carrying out the pro-  
13 gram authorized in paragraph (1), the Secretary of  
14 Energy shall leverage programs and activities car-  
15 ried out across the Department of Energy, other rel-  
16 evant Federal agencies, institutions of higher edu-  
17 cation, and other appropriate entities best suited to  
18 provide national leadership on cybersecurity related  
19 issues.

20 (b) CYBERSECURITY IN DEPARTMENT OF TRANSPOR-  
21 TATION PROGRAMS.—

22 (1) UNIVERSITY TRANSPORTATION CENTERS  
23 PROGRAM.—Section 5505 of title 49, United States  
24 Code, is amended—

1 (A) in subsection (a)(2)(C), by inserting  
2 “in the matters described in subparagraphs (A)  
3 through (G) of section 6503(c)(1)” after  
4 “transportation leaders”; and

5 (B) in subsection (c)(3)(E)—

6 (i) by inserting “, including the cyber-  
7 security implications of technologies relat-  
8 ing to connected vehicles, connected infra-  
9 structure, and autonomous vehicles” after  
10 “autonomous vehicles”; and

11 (ii) by striking “The Secretary” and  
12 inserting the following:

13 “(1) IN GENERAL.—A regional university trans-  
14 portation center receiving a grant under this para-  
15 graph shall carry out research focusing on 1 or more  
16 of the matters described in subparagraphs (A)  
17 through (G) of section 6503(c)(1).

18 “(2) FOCUSED OBJECTIVES.—The Secretary”.

19 (2) TRANSPORTATION RESEARCH AND DEVEL-  
20 OPMENT 5-YEAR STRATEGIC PLAN.—Section  
21 6503(c)(1) of title 49, United States Code, is  
22 amended—

23 (A) in subparagraph (E), by striking  
24 “and” at the end;

1 (B) in subparagraph (F), by inserting  
2 “and” after the semicolon at the end; and  
3 (C) by adding at the end the following:  
4 “(G) reducing transportation cybersecurity  
5 risks;”.

6 **SEC. 808. BROADENING PARTICIPATION.**

7 (a) **PRESIDENTIAL AWARDS FOR EXCELLENCE IN**  
8 **MATHEMATICS AND SCIENCE TEACHING.**—Section  
9 117(a)(1) of the National Science Foundation Authoriza-  
10 tion Act of 1988 (42 U.S.C.1881b(a)(1)) is amended—

11 (1) in subparagraph (B)—

12 (A) by striking “108” and inserting  
13 “110”;

14 (B) by striking clause (iv);

15 (C) in clause (v), by striking the period at  
16 the end and inserting “; and”;

17 (D) by redesignating clauses (i), (ii), (iii),  
18 and (v) as subclauses (I), (II), (III), and (IV),  
19 respectively, and moving the margins of such  
20 subclauses (as so redesignated) two ems to the  
21 right; and

22 (E) by striking “In selecting teachers” and  
23 all that follows through “two teachers—” and  
24 inserting the following:

1           “(C) In selecting teachers for an award au-  
2           thorized by this subsection, the President shall  
3           select—

4                     “(i) at least two teachers—;” and  
5           (2) in subparagraph (C), as designated by para-  
6           graph (1)(E), by adding at the end the following:

7                     “(ii) at least one teacher—

8                             “(I) from the Commonwealth of  
9                             the Northern Mariana Islands;

10                            “(II) from American Samoa;

11                            “(III) from the Virgin Islands of  
12                            the United States; and

13                            “(IV) from Guam.”.

14           (b) **EFFECTIVE DATE.**—The amendments made by  
15           subsection (a) shall apply with respect to awards made on  
16           or after the date of the enactment of this Act.

17                            **TITLE I—TECHNOLOGY**  
18                            **TRANSFER AND INNOVATION**

19           **SEC. 901. FEDERAL LABORATORY COMPUTER PROGRAMS**  
20                            **UPDATE.**

21           (a) **UTILIZATION OF FEDERAL TECHNOLOGY UP-**  
22           **DATE.**—Section 11 of the Stevenson-Wydler Technology  
23           Innovation Act of 1980 (15 U.S.C. 3710) is amended by  
24           adding at the end the following:



1       “(j)(1) COPYRIGHT PROTECTION.—Pursuant to sec-  
2 tion 105(b)(1) of title 17, United States Code, and subject  
3 to the requirements therein, the director of any Govern-  
4 ment-operated Federal laboratory may seek copyright pro-  
5 tection on behalf of the United States in a work described  
6 in that section.

7       “(2) GUIDELINES.—The Secretary is authorized to  
8 provide guidelines to implement paragraph (1) of this sec-  
9 tion and to provide guidance for the management of works  
10 in which copyright protection is obtained.”.

11       (b) GOVERNMENT WORKS COPYRIGHT UPDATE.—  
12 Section 105 of title 17, United States Code, is amended—

13           (1) by striking “Copyright protection” and in-  
14 sserting “(a) Copyright protection”; and

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

16       “(b) Notwithstanding subsection (a), copyright pro-  
17 tection under this title is available for—

18           “(1) a computer program that is a work of the  
19 United States Government and is created at a Fed-  
20 eral laboratory, as defined in section 4 of the Ste-  
21 venson-Wydler Technology Innovation Act of 1980  
22 (15 U.S.C. 3703), and which is a result of research,  
23 development, or engineering at the Federal labora-  
24 tory, provided that the United States Government  
25 makes application for copyright registration under

1 section 409 pursuant to the authority granted under  
2 section 11(k) of such Act within 6 months from em-  
3 ployee disclosure of the work to the Federal labora-  
4 tory, and provided further that a certificate of reg-  
5 istration is issued pursuant to section 410 of this  
6 title or following judicial review pursuant to chapter  
7 7 of title 5; and

8 “(2) standard reference data prepared or made  
9 available by the Department of Commerce, provided  
10 the copyright is secured by the Secretary of Com-  
11 merce in the manner set forth in section 6 of the  
12 Standard Reference Data Act (15 U.S.C. 290e).”.

13 **SEC. 902. EXTEND CRADA INFORMATION PROTECTION PE-**  
14 **RIOD.**

15 Section 12(c)(7)(B) of the Stevenson-Wydler Tech-  
16 nology Innovation Act of 1980 (15 U.S.C.  
17 3710a(c)(7)(B)) is amended by striking “5” and inserting  
18 “12”.

19 **SEC. 903. STEVENSON-WYDLER ACT AUTHORITY UPDATE.**

20 Section 11 of the Stevenson-Wydler Technology Inno-  
21 vation Act of 1980 (15 U.S.C. 3710(g)) is amended to  
22 read as follows:

23 “(g) FUNCTIONS OF SECRETARY.—The Secretary  
24 shall convene an Interagency Working Group for Tech-

1 nology Transfer comprising those agencies with at least  
2 one Federal laboratory to—

3 “(1) share best practices for realizing the com-  
4 mercial potential of inventions and methods and op-  
5 tions for commercialization which are available to  
6 the Federal laboratories, including research and de-  
7 velopment limited partnerships and cooperative re-  
8 search and development agreements; and

9 “(2) issue such guidelines as may be necessary  
10 to carry out this chapter, acting through the Direc-  
11 tor of the National Institute of Standards and Tech-  
12 nology and with the concurrence of the Interagency  
13 Working Group for Technology Transfer.”.

14 **SEC. 904. ROYALTY PAYMENTS TO FEDERAL EMPLOYEES**  
15 **UPDATE.**

16 Section 14 of the Stevenson-Wydler Technology Inno-  
17 vation Act of 1980 (15 U.S.C. 3710c) is amended—

18 (1) by striking “inventions” each place the term  
19 appears and inserting “inventions or works”;

20 (2) by striking “invention” each place the term  
21 appears and inserting “invention or work”;

22 (3) by striking “inventors” each place the term  
23 appears and inserting “inventors or contributors”;

24 (4) in subsection (a)(1) after “shall be” insert-  
25 ing “non-appropriated funds and shall be”;

1           (5) in subsection (a)(1)(A)(i) inserting at the  
2           end “, or to the contributor or co-contributors if a  
3           certificate of copyright registration is issued to the  
4           United States”;

5           (6) in subsection (a)(1)(A)(ii) after “inventor  
6           of” inserting “or contributor to”;

7           (7) in subsection (a)(3) by striking “inventor”  
8           each place the term appears and inserting “inventor  
9           or contributor”;

10          (8) in subsection (a)(3) by striking “\$150,000”  
11          each place the term appears and inserting  
12          “500,000”;

13          (9) at the end of subsection (a) by inserting the  
14          following new paragraph:

15          “(5) Any royalties or other payments received by a  
16          Federal agency from the licensing and assignment of  
17          works under agreements entered into by Federal labora-  
18          tories under section 12 of this Act, and from the licensing  
19          of works by Federal laboratories under any provision of  
20          law shall be retained by the agency licensing or assigning  
21          the work on behalf of the United States Government and  
22          shall be disposed of after payment of any copyright reg-  
23          istration costs. The head of the agency is authorized to dis-  
24          pose of such royalties or other payments through transfer  
25          by the agency to its bureaus or laboratories, with the ma-

1 jority share of the royalties or other payments from any  
2 copyright going to the bureau or laboratory where or for  
3 which the copyrighted work was made.

4           “(A) The royalties or other payments so trans-  
5 ferred to any bureau or laboratory may be used or  
6 obligated by that bureau or laboratory during the  
7 fiscal year in which they are received or during the  
8 2 succeeding fiscal years—

9           “(i) to reward contributors of copyrighted  
10 computer programs;

11           “(ii) to further information exchange  
12 among bureaus and laboratories of the agency  
13 or with another agency;

14           “(iii) for education and training of employ-  
15 ees consistent with the missions and objectives  
16 of the agency, bureau, or laboratory;

17           “(iv) for payment of expenses incidental to  
18 the administration and licensing of intellectual  
19 property by the agency or laboratory with re-  
20 spect to copyrighted computer programs made  
21 at that bureau or laboratory, including the fees  
22 or other costs for the services of other agencies,  
23 persons, or organizations for intellectual prop-  
24 erty management and licensing services; or

1           “(v) for scientific research and develop-  
2           ment consistent with the research and develop-  
3           ment missions and objectives of the bureau or  
4           laboratory.

5           “(B) All royalties or other payments retained  
6           by the agency, bureau, or laboratory after payments  
7           have been made pursuant to subparagraph (A) that  
8           is unobligated and unexpended at the end of the sec-  
9           ond fiscal year succeeding the fiscal year in which  
10          the royalties and other payments were received shall  
11          be paid into the Treasury.

12          “(C) As used in the section, the term ‘contrib-  
13          utor’ means a laboratory employee who is a creator  
14          of an original expression in a copyrighted computer  
15          program.”; and

16          (10) in subsection (a)(1)(B)—

17                 (A) by striking “; or” at the end of clause  
18                 (iv) and inserting a semicolon;

19                 (B) by striking the period at the end of  
20                 clause (v) and inserting “; or”; and

21                 (C) by inserting at the end the following:

22                         “(vi) for the acquisition, administra-  
23                         tion and licensing of intellectual prop-  
24                         erty.”.

1 **SEC. 905. GOVERNMENT INTELLECTUAL PROPERTY CLARI-**  
2 **FICATION.**

3 Section 15 of the Stevenson-Wydler Technology Inno-  
4 vation Act of 1980 (15 U.S.C. 3710d) is amended in sub-  
5 section (a) to read as follows:

6 “(a) IN GENERAL.—

7 “(1) INVENTION RIGHTS.—The Government  
8 shall obtain the entire right, title and interest in and  
9 to all inventions made by any Federal employee—

10 “(A) during working hours;

11 “(B) with a contribution by the Govern-  
12 ment of facilities, equipment, materials, funds,  
13 or information, or of time or services of other  
14 Federal employees on official duty; or

15 “(C) within his or her field of research or  
16 within his or her official employment responsi-  
17 bility and activity.

18 “(2) DISCLOSURE.—Any invention made by a  
19 Federal employee as described in paragraph (1) shall  
20 be disclosed by the Federal employee to the agency  
21 that employs the Federal employee within 10 months  
22 of the earlier of the date of conception or actual re-  
23 duction to practice of the invention. The Govern-  
24 ment shall obtain the entire right, title, and interest  
25 in and to any invention conceived or actually re-  
26 duced to practice by a Federal employee that is not

1 disclosed to the Government within 10 months or  
2 shorter disclosure period required by agency regula-  
3 tion, from the earlier of the date of conception or ac-  
4 tual reduction to practice of the invention.

5 “(3) PRESUMPTION.—Any invention made by a  
6 Federal employee as described in paragraph (1) shall  
7 be presumed to be owned by the Government, and  
8 the Federal employee shall assign the entire right,  
9 title, and interest in and to the invention to the Gov-  
10 ernment. A Federal employee that disagrees with the  
11 presumption of ownership and obligation of assign-  
12 ment may request, from the agency employing the  
13 Federal employee, a determination of rights in and  
14 to the invention and shall do so within 30 days of  
15 the disclosure pursuant to paragraph (2), which may  
16 be extended by the head of an agency for good cause  
17 shown. The request shall provide all grounds and  
18 justification for leaving rights with the Federal em-  
19 ployee. If the request is not made by the employee  
20 within the 30-day or extended period, the Govern-  
21 ment shall retain all right, title, and interest to the  
22 invention, and the Federal employee shall assign the  
23 entire right, title, and interest in and to the inven-  
24 tion to the Government.



1           “(4) PATENT RIGHTS.—If a Federal agency  
2           which has ownership of or the right of ownership to  
3           an invention made by a Federal employee does not  
4           intend to file for a patent application or otherwise  
5           promote commercialization of such invention, the  
6           agency shall (upon request) allow the inventor, if the  
7           inventor is a Federal employee or former employee  
8           who made the invention during the course of employ-  
9           ment with the Government, to obtain or retain title  
10          to the invention (subject to reservation by the Gov-  
11          ernment of a nonexclusive, nontransferable, irrev-  
12          ocable, paid-up license to practice the invention or  
13          have the invention practiced throughout the world by  
14          or on behalf of the Government). In addition, the  
15          agency may condition the inventor’s right to title on  
16          the timely filing of a patent application.

17          “(5) COMPUTER PROGRAM DISCLOSURE.—Any  
18          computer program that is a work of the United  
19          States Government and is created at a Federal lab-  
20          oratory within section 105(b)(1) of title 17, United  
21          States Code, shall be disclosed by the Federal em-  
22          ployee who created such program to the Federal lab-  
23          oratory that employs the Federal employee.

24          “(6) AUTHOR RIGHTS.—Any program described  
25          in paragraph (5) prepared by a Federal employee

1 within the scope of his or her employment shall be  
2 considered a work made for hire and the Govern-  
3 ment shall be the author. A Federal employee who  
4 discloses as required under paragraph (5) but who  
5 contests that the Government is the author may re-  
6 quest, from the agency employing the Federal em-  
7 ployee, a determination of rights in and to the pro-  
8 gram and shall do so within 30 days of the disclo-  
9 sure pursuant to paragraph (5), which may be ex-  
10 tended by the head of an agency for good cause  
11 shown. The request shall provide all grounds and  
12 justification for leaving rights with the Federal em-  
13 ployee. If the request is not made by the Federal  
14 employee within the 30-day period, the Government  
15 shall remain and shall be the author of such pro-  
16 gram.

17 “(7) REPORTING EXEMPTION.—Such reporting  
18 requirements shall not apply to Federal employees  
19 who are otherwise prohibited from applying for or  
20 obtaining a patent. The Secretary may issue guide-  
21 lines to implement this section.”

22 **SEC. 906. CLARIFYING CRADA AUTHORITY.**

23 Section 12 of the Stevenson-Wydler Technology Inno-  
24 vation Act of 1980 (15 U.S.C. 3710a) is amended—

1           (1) by inserting at the end of the section the  
2 following new subsection:

3           “(h) PATENT OBLIGATION.—Under an agreement  
4 entered into pursuant to this section, there is an obligation  
5 on the part of the collaborating party, in the event a  
6 United States patent application is filed by or on behalf  
7 of the collaborating party or by any assignee of the col-  
8 laborating party, to include within the specification of  
9 such application and any patent issuing thereon, a state-  
10 ment specifying that the invention was made with Govern-  
11 ment support and that the Government has certain rights  
12 in the invention.”; and

13           (2) by striking subsection (d).

14 **SEC. 907. EXPANSION OF AGREEMENTS FOR COMMER-**  
15 **CIALIZING TECHNOLOGY AUTHORITY.**

16           The Stevenson-Wydler Technology Innovation Act of  
17 1980 (15 U.S.C. 3701 et seq.) is amended by inserting  
18 after section 14 the following:

19 **“SEC. 14A. AGREEMENTS FOR COMMERCIALIZING TECH-**  
20 **NOLOGY.**

21           “(a) AGREEMENTS WITH NON-FEDERAL ENTI-  
22 TIES.—The head of each Federal agency may permit the  
23 director of any of its Government-owned, contractor-oper-  
24 ated laboratories to perform work for non-Federal entities  
25 (sponsors) on a fully reimbursable basis and to execute

1 agreements with a non-Federal entity, including a non-  
2 Federal entity already receiving Federal funding that will  
3 be used to support activities under the agreements, pro-  
4 vided that such funding is solely used to carry out the  
5 purposes of the Federal award.

6 “(b) RESTRICTION.—The requirements of chapter 18  
7 of title 35, United States Code (commonly known as the  
8 ‘Bayh-Dole Act’), shall apply if—

9 “(1) the agreement is a funding agreement (as  
10 that term is defined in section 201 of such title);  
11 and

12 “(2) at least one of the parties to the funding  
13 agreement is eligible to receive rights under that  
14 chapter.

15 “(c) SUBMISSION TO AGENCY.—Each affected direc-  
16 tor of a Government-owned, contractor-operated labora-  
17 tory shall submit to the head of the Federal agency, with  
18 respect to each agreement entered into under this sec-  
19 tion—

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

22 “(2) the total estimated costs of the project;

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

1           “(4) other documentation determined to be ap-  
2           propriate by the head of the Federal agency.

3           “(d) CERTIFICATION.—The head of the Federal  
4 agency shall require the contractor of the affected Govern-  
5 ment-owned, contractor-operated laboratory to certify that  
6 each activity carried out under a project for which an  
7 agreement is entered into under this section—

8           “(1) is not in direct competition with the pri-  
9           vate sector; and

10           “(2) does not present, or minimizes, any appar-  
11 ent conflict of interest, and avoids or neutralizes any  
12 actual conflict of interest, as a result of the agree-  
13 ment under this section.

14           “(e) LIMITATION.—This authority only pertains to  
15 Federal agencies that do not have agency-specific authori-  
16 ties for Agreements for Commercializing Technology else-  
17 where in statute.”.

18 **SEC. 908. OTHER TRANSACTION AUTHORITY.**

19           The Stevenson-Wydler Technology Innovation Act of  
20 1980 (15 U.S.C. 3701 et seq.) is amended by inserting  
21 after section 15 the following:

22 **“SEC. 15A. OTHER TRANSACTIONS.**

23           “(a) GENERAL AUTHORITY.—

24           “(1) PERMISSION.—Each Federal agency may  
25           permit the director of any of its Government-oper-

1       ated Federal laboratories to enter into such other  
2       transactions as may be necessary in the conduct of  
3       the work of the Federal laboratory and on such  
4       terms as the director of the Federal laboratory con-  
5       siders appropriate, in furtherance of the purposes of  
6       this Act.

7               “(2) DISCLOSURE.—The Federal agency may  
8       protect from disclosure, for up to 12 years after the  
9       date on which the information is developed, any in-  
10      formation developed pursuant to a transaction under  
11      this section that would be protected from disclosure  
12      under section 552(b)(4) of title 5, United States  
13      Code, if obtained from a person other than a Fed-  
14      eral agency.

15              “(3) AUTHORITY LIMITATION.—This authority  
16      only pertains to Federal agencies that do not have  
17      agency-specific authorities for other transactions  
18      elsewhere in statute.

19              “(b) LIMITATIONS.—A Federal laboratory using the  
20      authorities granted in subsection (a) may only enter into  
21      such other transactions when—

22              “(1) a warranted contracting officer determines  
23      that use of other authority of the Federal agency  
24      would be insufficient to achieve the purposes of this  
25      Act; and

1           “(2) use of such other transaction is approved  
2           by the Federal agency.”.

3 **SEC. 909. NONPROFIT FOUNDATIONS.**

4           The Stevenson-Wydler Technology Innovation Act of  
5 1980 (15 U.S.C. 3701 et seq.) is amended by adding after  
6 section 28 the following:

7 **“SEC. 29. FOUNDATIONS.**

8           “(a) IN GENERAL.—A Government-owned Federal  
9 laboratory may establish or enter into an agreement with  
10 a nonprofit organization to establish a Federal laboratory  
11 Foundation in support of its mission. Such a Foundation  
12 shall not be an agency or instrumentality of the United  
13 States Government, and the United States shall not be  
14 liable for any debts, defaults, acts, or omissions of the  
15 Foundation.

16           “(b) PURPOSE.—The purpose of a Foundation estab-  
17 lished under this section shall be to support the Govern-  
18 ment-owned Federal laboratory in its mission.

19           “(c) ACTIVITIES.—Activities of the Foundation may  
20 include the following:

21           “(1) The receipt, administration, solicitation,  
22 acceptance and use of funds, gifts, devises, or be-  
23 quests, either absolutely or in trust of real or per-  
24 sonal property or any income therefrom or other in-  
25 terest or equity therein for the benefit of, or in con-

1        nection with, the mission of the Government-owned  
2        Federal laboratory. A gift, devise, or bequest may be  
3        accepted by the Foundation even though it is encum-  
4        bered, restricted, or subject to beneficial interests of  
5        private persons if any current or future interest  
6        therein is for the benefit of the Federal laboratory  
7        in its research and development activities. Contribu-  
8        tions, gifts, and other transfers made to or for the  
9        use of a Foundation established under this section  
10       shall be regarded as contributions, gifts, or transfers  
11       to or for the use of the United States.

12            “(2) The conduct of support studies, competi-  
13       tions, projects, research and other activities that fur-  
14       ther the purposes of the Foundation.

15            “(3) Programs for fostering collaboration and  
16       partnerships with researches from the Federal and  
17       State governments, institutions of higher education,  
18       federally funded research and development centers,  
19       industry and nonprofit organizations for the re-  
20       search, development or commercialization of feder-  
21       ally supported technologies.

22            “(4) Programs for leveraging technologies to  
23       support new product development that supports re-  
24       gional economic development.



1           “(5) Administering prize competitions to accel-  
2           erate private sector competition and investment.

3           “(6) Provision of fellowships and grants to re-  
4           search and development personnel at, or affiliated  
5           with, federally funded centers. Such fellowships and  
6           grants may include stipends, travel, health insurance  
7           benefits and other appropriate expenses. The recipi-  
8           ents of fellowships shall be selected by the donors  
9           and the Foundation upon the recommendation of the  
10          employees in the Federal laboratory where the fellow  
11          would serve, and shall be subject to agreement of the  
12          head of the agency whose mission is supported by  
13          the Foundation.

14          “(7) Supplementary programs to provide for—

15               “(A) scientists of other countries to serve  
16               in research capacities in the United States in  
17               association with the Federal laboratory whose  
18               mission the Foundation supports, or elsewhere,  
19               or opportunities for employees of the Federal  
20               laboratory whose mission the Foundation sup-  
21               ports to serve in such capacities in other coun-  
22               tries, or both;

23               “(B) the conduct and support of studies,  
24               projects, and research, that may include sti-  
25               pends, travel and other support for personnel in

1 collaboration with national and international  
2 nonprofit and for-profit organizations;

3 “(C) the conduct and support of forums,  
4 meetings, conferences, courses, and training  
5 workshops that may include undergraduate,  
6 graduate, post-graduate, and post-doctoral ac-  
7 credited courses and the maintenance of accred-  
8 itation of such courses by the Foundation at  
9 the State and national level for college or con-  
10 tinuing education credits or for degrees;

11 “(D) programs to support and encourage  
12 teachers and students of science at all levels of  
13 education and programs for the general public  
14 which promote the understanding of science;

15 “(E) programs for writing, editing, print-  
16 ing, publishing, and vending of books and other  
17 materials; and

18 “(F) the conduct of other activities to  
19 carry out and support the purpose described in  
20 subsection (b).

21 “(d) TRANSFER OF FUNDS.—Notwithstanding any  
22 other provision of law, a Foundation established under  
23 this section may transfer funds to the Government-owned  
24 Federal laboratory and the Government-owned Federal

1 laboratory may accept transfers of funds from the Foun-  
2 dation.”.

3 **SEC. 910. IMPROVING REPORTING AND METRICS.**

4 Section 11 of the Stevenson-Wydler Technology Inno-  
5 vation Act of 1980 (15 U.S.C. 3710) is amended by strik-  
6 ing subsections (f) and (g) and inserting the following:

7 “(f) AGENCY REPORTS ON UTILIZATION.—

8 “(1) IN GENERAL.—Each Federal agency which  
9 operates or directs one or more Federal laboratories  
10 or which conducts activities under subsection (k) of  
11 this section or sections 207 and 209 of title 35,  
12 United States Code, shall report annually to the Of-  
13 fice of Management and Budget, on the activities  
14 performed by that agency and its Federal labora-  
15 tories under the provisions of this section and of sec-  
16 tions 207 and 209 of such title 35.

17 “(2) CONTENTS.—The report shall include—

18 “(A) an explanation of the agency’s tech-  
19 nology transfer activities for the preceding fis-  
20 cal year and the agency’s plans to manage inno-  
21 vations with commercial promise consistent with  
22 the agency’s mission and benefitting the com-  
23 petitiveness of United States industry; and

1           “(B) information on technology transfer  
2 activities for the preceding fiscal year, includ-  
3 ing—

4           “(i) the number of patent applications  
5 filed;

6           “(ii) the number of patents received;

7           “(iii) the number of works registered  
8 for copyright protection in the United  
9 States on behalf of the United States, pur-  
10 suant to section 105(b) of title 17, United  
11 States Code;

12           “(iv) the number of fully-executed li-  
13 censes which received income from licens-  
14 ing in the preceding fiscal year;

15           “(v) the total income from licensing;

16           “(vi) the number of licenses termi-  
17 nated for cause;

18           “(vii) the number of collaborative re-  
19 search and development relationships; and

20           “(viii) any other parameters or discus-  
21 sion that the agency deems relevant or  
22 unique to its practice of technology trans-  
23 fer.

24           “(3) COPY TO SECRETARY.—The agency shall  
25 transmit a copy of the report to the Secretary of

1 Commerce for inclusion in the annual summary re-  
2 quired by subsection (g)(2).

3 “(4) PUBLIC AVAILABILITY.—Each Federal  
4 agency reporting under this subsection shall make  
5 available to the public through internet sites, up-  
6 dated at least annually—

7 “(A) the information contained in such re-  
8 port;

9 “(B) information on intellectual property  
10 which is available for licensing from the Federal  
11 agency; and

12 “(C) information on Federal research and  
13 development programs, facilities, equipment and  
14 tools, expertise, services, and other relevant as-  
15 sets which are made available to the public by  
16 the Federal agency.

17 “(5) PUBLICATION BY NIST.—The Director of  
18 the National Institute of Standards and Technology  
19 is authorized to provide the summary required by  
20 subsection (g)(2) to the public through internet  
21 sites.”.

22 **SEC. 911. INNOVATIVE APPROACHES TO TECHNOLOGY**  
23 **TRANSFER.**

24 Section 9(jj) of the Small Business Act (15 U.S.C.  
25 638(jj)) is amended to read as follows:

1           “(jj) INNOVATIVE APPROACHES TO TECHNOLOGY  
2 TRANSFER.—

3                   “(1) GRANT PROGRAM.—

4                           “(A) IN GENERAL.—Each Federal agency  
5 required by subsection (n) to establish an  
6 STTR program shall carry out a grant program  
7 to support innovative approaches to technology  
8 transfer at institutions of higher education (as  
9 defined in section 101(a) of the Higher Edu-  
10 cation Act of 1965 (20 U.S.C. 1001(a))), non-  
11 profit research institutions and Federal labora-  
12 tories in order to accelerate the commercializa-  
13 tion of federally funded research and technology  
14 by small business concerns, including new busi-  
15 nesses.

16                           “(B) AWARDING OF GRANTS AND  
17 AWARDS.—

18                           “(i) IN GENERAL.—Each Federal  
19 agency required by subparagraph (A) to  
20 participate in this program, shall award,  
21 through a competitive, merit-based process,  
22 grants, in the amounts listed in subpara-  
23 graph (C) to institutions of higher edu-  
24 cation, technology transfer organizations  
25 that facilitate the commercialization of

1 technologies developed by one or more such  
2 institutions of higher education, Federal  
3 laboratories, other public and private non-  
4 profit entities, and consortia thereof, for  
5 initiatives that help identify high-quality,  
6 commercially viable federally funded re-  
7 search and technologies and to facilitate  
8 and accelerate their transfer into the mar-  
9 ketplace.

10 “(ii) USE OF FUNDS.—Activities sup-  
11 ported by grants under this subsection  
12 may include—

13 “(I) providing early-stage proof  
14 of concept funding for translational  
15 research;

16 “(II) identifying research and  
17 technologies at recipient institutions  
18 that have the potential for accelerated  
19 commercialization;

20 “(III) technology maturation  
21 funding to support activities such as  
22 prototype construction, experiment  
23 analysis, product comparison, and col-  
24 lecting performance data;

1                   “(IV) technical validations, mar-  
2                   ket research, clarifying intellectual  
3                   property rights position and strategy,  
4                   and investigating commercial and  
5                   business opportunities; and

6                   “(V) programs to provide advice,  
7                   mentoring, entrepreneurial education,  
8                   project management, and technology  
9                   and business development expertise to  
10                  innovators and recipients of tech-  
11                  nology transfer licenses to maximize  
12                  commercialization potential.

13                  “(iii) SELECTION PROCESS AND AP-  
14                  PLICATIONS.—Qualifying institutions seek-  
15                  ing a grant under this subsection shall  
16                  submit an application to a Federal agency  
17                  required by subparagraph (A) to partici-  
18                  pate in this program at such time, in such  
19                  manner, and containing such information  
20                  as the agency may require. The application  
21                  shall include, at a minimum—

22                         “(I) a description of innovative  
23                         approaches to technology transfer,  
24                         technology development, and commer-  
25                         cial readiness that have the potential



1 to increase or accelerate technology  
2 transfer outcomes and can be adopted  
3 by other qualifying institutions, or a  
4 demonstration of proven technology  
5 transfer and commercialization strate-  
6 gies, or a plan to implement proven  
7 technology transfer and commer-  
8 cialization strategies, that can achieve  
9 greater commercialization of federally  
10 funded research and technologies with  
11 program funding;

12 “(II) a description of how the  
13 qualifying institution will contribute  
14 to local and regional economic devel-  
15 opment efforts; and

16 “(III) a plan for sustainability  
17 beyond the duration of the funding  
18 award.

19 “(iv) PROGRAM OVERSIGHT  
20 BOARDS.—

21 “(I) IN GENERAL.—Successful  
22 proposals shall include a plan to as-  
23 semble a Program Oversight Board,  
24 the members of which shall have tech-  
25 nical, scientific, or business expertise

1 and shall be drawn from industry,  
2 start-up companies, venture capital,  
3 technical enterprises, financial institu-  
4 tions, and business development orga-  
5 nizations.

6 “(II) PROGRAM OVERSIGHT  
7 BOARDS RESPONSIBILITIES.—Pro-  
8 gram Oversight Boards shall—

9 “(aa) establish award pro-  
10 grams for individual projects;

11 “(bb) provide rigorous eval-  
12 uation of project applications;

13 “(cc) determine which  
14 projects should receive awards, in  
15 accordance with guidelines estab-  
16 lished under subparagraph  
17 (C)(ii);

18 “(dd) establish milestones  
19 and associated award amounts  
20 for projects that reach mile-  
21 stones;

22 “(ee) determine whether  
23 awarded projects are reaching  
24 milestones; and

1                   “(ff) develop a process to re-  
2                   allocate outstanding award  
3                   amounts from projects that are  
4                   not reaching milestones to other  
5                   projects with more potential.

6                   “(C) GRANT AND AWARD AMOUNTS.—

7                   “(i) GRANT AMOUNTS.—Each Federal  
8                   agency required by subparagraph (A) to  
9                   carry out a grant program may make  
10                  grants to a qualifying institution for up to  
11                  \$1,000,000 per year for up to 3 years.

12                  “(ii) AWARD AMOUNTS.—Each quali-  
13                  fying institution that receives a grant  
14                  under subparagraph (B) shall provide  
15                  awards for individual projects of not more  
16                  than \$150,000, to be provided in phased  
17                  amounts, based on reaching the milestones  
18                  established by the qualifying institution’s  
19                  Program Oversight Board.

20                  “(D) AUTHORIZED EXPENDITURES FOR  
21                  INNOVATIVE APPROACHES TO TECHNOLOGY  
22                  TRANSFER GRANT PROGRAM.—

23                  “(i) PERCENTAGE.—The percentage  
24                  of the extramural budget each Federal  
25                  agency required by subsection (n) to estab-

1           lish an STTR program shall expend on the  
2           Innovative Approaches to Technology  
3           Transfer Grant Program shall be—

4                   “(I) 0.05 percent for each of fis-  
5                   cal years 2012 and 2013; and

6                   “(II) 0.1 percent for each of fis-  
7                   cal years 2014 and 2015.

8                   “(ii) TREATMENT OF EXPENDI-  
9                   TURES.—Any portion of the extramural  
10                  budget expended by a Federal agency on  
11                  the Innovative Approaches to Technology  
12                  Transfer Grant Program shall apply to-  
13                  wards the agency’s expenditure require-  
14                  ments under subsection (n).

15                  “(2) PROGRAM EVALUATION AND DATA COL-  
16                  LECTION AND DISSEMINATION.—

17                   “(A) EVALUATION PLAN AND DATA COL-  
18                   LECTION.—Each Federal agency required by  
19                   paragraph (1)(A) to establish an Innovative Ap-  
20                   proaches to Technology Transfer Grant Pro-  
21                   gram shall develop a program evaluation plan  
22                   and collect annually such information from  
23                   grantees as is necessary to assess the Program.  
24                   Program evaluation plans shall require the col-  
25                   lection of data aimed at identifying outcomes

1           resulting from the transfer of technology with  
2           assistance from the Innovative Approaches to  
3           Technology Transfer Grant Program, such as—  
4                   “(i) specific follow-on funding identi-  
5                   fied or obtained, including follow-on fund-  
6                   ing sources, such as Federal sources or  
7                   private sources;  
8                   “(ii) number of projects which result  
9                   in a license to a start-up company or an  
10                  established company with sufficient re-  
11                  sources for effective commercialization  
12                  within 5 years of receiving an award under  
13                  paragraph (1);  
14                  “(iii) invention disclosures and pat-  
15                  ents;  
16                  “(iv) number of projects supported by  
17                  qualifying institutions receiving a grant  
18                  under paragraph (1) that secure Phase I  
19                  or Phase II SBIR or STTR awards;  
20                  “(v) available information on revenue,  
21                  sales or other measures of products that  
22                  have been commercialized as a result of  
23                  projects awarded under paragraph (1);

1           “(vi) number and location of jobs cre-  
2           ated resulting from projects awarded under  
3           paragraph (1); and

4           “(vii) other data as deemed appro-  
5           priate by a Federal agency required by this  
6           subparagraph to develop a program evalua-  
7           tion plan.

8           “(B) EVALUATIVE REPORT TO CON-  
9           GRESS.—The head of each Federal agency that  
10          participates in the Innovative Approaches to  
11          Technology Transfer Grant Program shall sub-  
12          mit to the Committee on Science, Space, and  
13          Technology and the Committee on Small Busi-  
14          ness of the House of Representatives and the  
15          Committee on Small Business and Entrepre-  
16          neurship of the Senate an evaluative report re-  
17          garding the activities of the program. The re-  
18          port shall include—

19               “(i) a detailed description of the im-  
20               plementation of the program;

21               “(ii) a detailed description of the  
22               grantee selection process;

23               “(iii) an accounting of the funds used  
24               in the program; and

1                   “(iv) a summary of the data collected  
2                   under subparagraph (A).

3                   “(C) DATA DISSEMINATION.—For the pur-  
4                   poses of program transparency and dissemina-  
5                   tion of best practices, the Administrator shall  
6                   include on the public database under subsection  
7                   (k)(1) information on the Innovative Ap-  
8                   proaches to Technology Transfer Grant Pro-  
9                   gram, including—

10                   “(i) the program evaluation plan re-  
11                   quired under subparagraph (A);

12                   “(ii) a list of recipients of awards  
13                   under paragraph (1); and

14                   “(iii) information on the use of grants  
15                   under paragraph (1) by recipient institu-  
16                   tions.”.

17 **SEC. 912. DOE PUBLIC-PRIVATE PARTNERSHIPS FOR COM-**  
18 **MERCIALIZATION.**

19                   (a) IN GENERAL.—Subject to subsections (b) and (c),  
20 the Secretary of Energy shall delegate to directors of the  
21 National Laboratories signature authority with respect to  
22 any agreement described in subsection (b) the total cost  
23 of which (including the National Laboratory contributions  
24 and project recipient cost share) is less than \$1,000,000,  
25 if such an agreement falls within the scope of—

1           (1) a strategic plan for the National Laboratory  
2           that has been approved by the Department of En-  
3           ergy; or

4           (2) the most recent congressionally approved  
5           budget for Department of Energy activities to be  
6           carried out by the National Laboratory.

7           (b) AGREEMENTS.—Subsection (a) applies to—

8           (1) a cooperative research and development  
9           agreement;

10          (2) a non-Federal work-for-others agreement;  
11          and

12          (3) any other agreement determined to be ap-  
13          propriate by the Secretary of Energy, in collabora-  
14          tion with the directors of the National Laboratories.

15          (c) ADMINISTRATION.—

16          (1) ACCOUNTABILITY.—The director of the af-  
17          fected National Laboratory and the affected con-  
18          tractor shall carry out an agreement under this sec-  
19          tion in accordance with applicable policies of the De-  
20          partment of Energy, including by ensuring that the  
21          agreement does not compromise any national secu-  
22          rity, economic, or environmental interest of the  
23          United States.

24          (2) CERTIFICATION.—The director of the af-  
25          fected National Laboratory and the affected con-



1 tractor shall certify that each activity carried out  
2 under a project for which an agreement is entered  
3 into under this section does not present, or mini-  
4 mizes, any apparent conflict of interest, and avoids  
5 or neutralizes any actual conflict of interest, as a re-  
6 sult of the agreement under this section.

7 (3) AVAILABILITY OF RECORDS.—Within 30  
8 days of entering an agreement under this section,  
9 the director of a National Laboratory shall submit  
10 to the Secretary of Energy for monitoring and re-  
11 view all records of the National Laboratory relating  
12 to the agreement.

13 (4) RATES.—The director of a National Lab-  
14 oratory may charge higher rates for services per-  
15 formed under a partnership agreement entered into  
16 pursuant to this section, regardless of the full cost  
17 of recovery, if such funds are used exclusively to  
18 support further research and development activities  
19 at the respective National Laboratory.

20 (d) EXCEPTION.—This section does not apply to any  
21 agreement with a majority foreign-owned company.

22 (e) CONFORMING AMENDMENT.—Section 12 of the  
23 Stevenson-Wydler Technology Innovation Act of 1980 (15  
24 U.S.C. 3710a) is amended—

25 (1) in subsection (a)—

1 (A) by redesignating paragraphs (1) and  
2 (2) as subparagraphs (A) and (B), respectively;  
3 (B) by striking “Each Federal agency”  
4 and inserting the following:

5 “(1) IN GENERAL.—Except as provided in para-  
6 graph (2), each Federal agency”; and

7 (C) by adding at the end the following:

8 “(2) EXCEPTION.—Notwithstanding paragraph  
9 (1), in accordance with section 813(a) of the Secur-  
10 ing American Leadership in Science and Technology  
11 Act of 2021, approval by the Secretary of Energy  
12 shall not be required for any technology transfer  
13 agreement proposed to be entered into by a National  
14 Laboratory of the Department of Energy, the total  
15 cost of which (including the National Laboratory  
16 contributions and project recipient cost share) is less  
17 than \$1,000,000.”; and

18 (2) in subsection (b), by striking “subsection  
19 (a)(1)” each place it appears and inserting “sub-  
20 section (a)(1)(A)”.

21 (f) SAVINGS CLAUSE.—Nothing in this section or an  
22 amendment made by this section abrogates or otherwise  
23 affects the primary responsibilities of any National Lab-  
24 oratory to the Department of Energy.

1 **SEC. 913. DEPARTMENT OF ENERGY FOUNDATION.**

2 (a) DEFINITIONS.—In this section:

3 (1) BOARD.—The term “Board” means the  
4 Board of Directors for the Foundation described in  
5 section 3(c).

6 (2) CHAIR.—The term “Chair” means the  
7 Chair of the Board described in section 3(c)(2).

8 (3) EXECUTIVE DIRECTOR.—The term “Execu-  
9 tive Director” means the Executive Director of the  
10 Board described in section 3(f)(2).

11 (4) FOUNDATION.—The term “Foundation”  
12 means the Energy Foundation established under sec-  
13 tion 3(a).

14 (5) SECRETARY.—The term “Secretary” means  
15 the Secretary of Energy.

16 (b) ESTABLISHMENT OF ENERGY FOUNDATION.—

17 (1) IN GENERAL.—Not later than December 31,  
18 2021, the Secretary shall establish a nonprofit cor-  
19 poration to be known as the Energy Foundation re-  
20 ferred to in this section as “the Foundation”.

21 (2) LIMITATION.—The Foundation shall not be  
22 an agency or instrumentality of the Federal Govern-  
23 ment.

24 (3) NONAPPLICABILITY OF FACA.—The Federal  
25 Advisory Committee Act (5 U.S.C. App.) shall not  
26 apply to the Foundation.

1           (4) NONPROFIT STATUS.—The Foundation  
2 shall be an organization described in section 501(c)  
3 of the Internal Revenue Code of 1986 and exempt  
4 from taxation under section 501(a) of that Code.

5           (5) BOARD OF DIRECTORS.—

6           (A) IN GENERAL.—The Foundation shall  
7 operate under a board of directors.

8           (B) INITIAL APPOINTMENT.—The initial  
9 appointment of the board of directors shall be  
10 facilitated by the Secretary.

11           (C) COMPOSITION.—To the maximum ex-  
12 tent practicable, the board of directors shall in-  
13 clude representatives from a diverse range of  
14 communities, including—

15                   (i) the academic community;

16                   (ii) the business community;

17                   (iii) nonprofit organizations;

18                   (iv) the communities surrounding the  
19 laboratories and facilities of the Depart-  
20 ment; and

21                   (v) the technology transfer and com-  
22 mercialization community.

23           (D) RESTRICTION ON MEMBERSHIP.—No  
24 employee of the Department shall be appointed  
25 as a member of the board of directors.

1           (6) PURPOSE AND ACTIVITIES OF FOUNDA-  
2           TION.—the purpose of the Foundation is to channel  
3           private sector investments that support efforts to  
4           create, develop, and commercialize innovative tech-  
5           nologies that address diverse energy challenges, by  
6           methods that may include—

7                   (A) fostering collaboration and partner-  
8                   ships between the Federal Government, State  
9                   governments, institutions of higher education,  
10                  federally funded research and development cen-  
11                  ters, industry, and nonprofit organizations for  
12                  the research, development, or commercialization  
13                  of next-generation energy technologies;

14                  (B) leveraging technologies to support new  
15                  product development that supports regional in-  
16                  novation and economic development; and

17                  (C) administering prize competitions to ac-  
18                  celerate private sector competition and invest-  
19                  ment.

20           (7) ACTIVITIES.—

21                   (A) IN GENERAL.—The Foundation may  
22                   solicit and accept gifts, grants, and other dona-  
23                   tions, establish accounts, and invest and expend  
24                   funds in support of the programs and activities  
25                   described in subparagraphs (B) through (D).

1           (B) STUDIES, COMPETITIONS, AND  
2 PROJECTS.—The Foundation may conduct and  
3 support studies, competitions, projects, re-  
4 search, development, commercialization, and  
5 other activities that further the purpose of the  
6 Foundation described in paragraph (1).

7           (C) FELLOWSHIPS AND GRANTS.—the  
8 Foundation may award fellowships and grants  
9 to recipients selected under clause (iii) for ac-  
10 tivities relating to research, development, proto-  
11 typing, maturing, or commercializing of energy  
12 technologies.

13           (i) USES OF FELLOWSHIPS AND  
14 GRANTS.—A fellowship or grant under  
15 clause (i) may include stipends, travel,  
16 health insurance benefits, and other appro-  
17 priate expenses.

18           (ii) SELECTION.—

19           (I) IN GENERAL.—The Founda-  
20 tion shall award a fellowship or grant  
21 under clause (i) based on the technical  
22 and commercialization merits of the  
23 proposed project.

24           (II) INPUT.—In selecting recipi-  
25 ents of a fellowship or grant under

1 clause (i), the Foundation may con-  
2 sult with potential recipients regard-  
3 ing the ability to carry out various  
4 projects that would further the pur-  
5 pose of the Foundation described in  
6 paragraph (1).

7 (ii) FEDERAL LABORATORIES.—

8 (I) IN GENERAL.—Federal Lab-  
9 oratories, including laboratories of the  
10 Department of Energy, may apply for  
11 and accept grants under clause (i).

12 (II) EFFECT.—A Federal labora-  
13 tory that applies for or accepts a  
14 grant under subclause (I) shall not be  
15 considered to be engaging in a com-  
16 petitive procedure.

17 (D) SUPPLEMENTARY PROGRAMS.—The  
18 Foundation may carry out supplementary pro-  
19 grams—

20 (i) to conduct and support forums,  
21 meetings, conferences, courses, and train-  
22 ing workshops consistent with the purpose  
23 of the Foundation described in paragraph  
24 (1);

1 (ii) to support and encourage the un-  
2 derstanding and development of—

3 (I) data reporting models that  
4 promote the translation of tech-  
5 nologies from the research stage,  
6 through development and maturation,  
7 and to the market; and

8 (II) policies that make regulation  
9 more effective and efficient by  
10 leveraging the technology translation  
11 data described in subclause (I) for the  
12 regulation of relevant technology sec-  
13 tors;

14 (iii) for writing, editing, printing, pub-  
15 lishing, and vending books and other mate-  
16 rials relating to research carried out under  
17 the Foundation; and

18 (iv) to conduct other activities to  
19 carry out and support the purpose de-  
20 scribed in paragraph (1).

21 (E) AUTHORITY OF FOUNDATION.—The  
22 Foundation shall be the sole entity responsible  
23 for carrying out the activities described in this  
24 paragraph.



1           (F) ADMINISTRATIVE CONTROL.—No par-  
2           ticipant in a program under this paragraph or  
3           employee of the Foundation shall exercise any  
4           administrative control over any Federal em-  
5           ployee.

6           (G) SUPPORT SERVICES.—The Secretary  
7           may provide facilities, utilities, and support  
8           services to the Foundation if it is determined by  
9           the Secretary to be advantageous to the re-  
10          search programs of the Department.