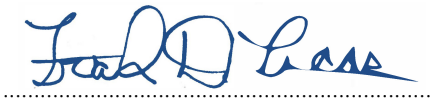

(Original Signature of Member)

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.

IN THE HOUSE OF REPRESENTATIVES

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

A BILL

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

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Securing American Leadership in Science and Technology Act of 2021''.

SEC. 2. TABLE OF CONTENTS.

The table of contents for this Act is as follows:

SEC. 3. PURPOSES.

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

(1) providing for a coordinated national science and technology strategy for the economic and national security of the United States;

(2) prioritizing investment in Federal basic research by authorizing a doubling of basic research funding over the next 10 years at the Department of Energy, the National Science Foundation, the National Institute of Standards and Technology, and the National Oceanic and Atmospheric Administration;

(3) providing for investment in key areas necessary for the competitiveness of the United States, including computing, cybersecurity, artificial intelligence and autonomous technology, materials and

advanced manufacturing, energy and climate, and the biosciences;

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

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

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

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

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

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

(10) improving technology transfer from the Federal Government and Federal laboratories to the private sector for commercialization.

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

Subtitle A—National Science and Technology Strategy

SEC. 101. NATIONAL SCIENCE AND TECHNOLOGY STRATEGY.

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

"SEC. 206. NATIONAL SCIENCE AND TECHNOLOGY STRATEGY.

''(a) IN GENERAL.—Not later than the end of each calendar year immediately after the calendar year in which a review under section 206b is completed, the Director of the Office of Science and Technology Policy, in consultation with the National Science and Technology Council, shall develop and submit to Congress a comprehensive national science and technology strategy of the United States to meet national research and development objectives for the following 4-year period (in this Act referred to as 'the national science and technology strategy').

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

eate a national science and technology strategy consistent with—

''(1) the recommendations and priorities developed by the review established in section 206b;

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

''(3) other relevant national plans; and

''(4) the strategic plans of relevant Federal departments and agencies.

''(c) CONSULTATION.—The Director shall consult as necessary with the Office of Management and Budget and other appropriate elements of the Executive Office of the President to ensure that the recommendations and priorities delineated in the science and technology strategy are incorporated in the development of annual budget requests.

''(d) REPORT.—The President shall submit to Congress each year a comprehensive report on the national science and technology strategy of the United States. Each report on the national science and technology strategy of the United States shall include a description of—

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

science and technology, including near-term, medium-term, and long-term research priorities;

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

''(3) global trends in science and technology, including potential threats to the leadership of the United States in science and technology.

''(e) PUBLICATION.—The Director shall, consistent with the protection of national security and other sensitive matters to the maximum extent practicable, make each report submitted under subsection (e) publicly available on an internet website of the Office of Science and Technology Policy.''.

SEC. 102. QUADRENNIAL SCIENCE AND TECHNOLOGY REVIEW.

The National Science and Technology Policy, Organization, and Priorities Act of 1976 (42 U.S.C. 6601 et seq.) is amended by inserting after section 206 the following:

''SEC. 206b. QUADRENNIAL SCIENCE AND TECHNOLOGY REVIEW.

''(a) REQUIREMENTS.—

''(1) QUADRENNIAL REVIEWS REQUIRED.—Not later than December 31, 2022, and every 4 years

thereafter, the Director of the Office of Science and Technology Policy shall complete a review of the science and technology enterprise of the United States (in this section referred to as the 'quadrennial science and technology review').

''(2) SCOPE.—The quadrennial science and technology review shall be a comprehensive examination of the science and technology strategy of the United States, including recommendations for maintaining global leadership in science and technology and guidance on the coordination of programs, assets, capabilities, budget, policies, and authorities across all Federal research and development programs.

''(3) CONSULTATION.—The Director of the Office of Science and Technology shall conduct each quadrennial science and technology review under this subsection in consultation with—

''(A) the National Science and Technology Council;

''(B) the heads of other relevant Federal agencies;

''(C) the President's Council of Advisors on Science and Technology;

''(D) the National Science Board;

''(E) the National Security Council; and

''(F) other relevant governmental and non-governmental entities, including representatives from industry, institutions of higher education, nonprofit institutions, Members of Congress, and other policy experts.

''(4) COORDINATION.—The Director shall ensure that each quadrennial science and technology review conducted under this section is coordinated with other relevant statutorily required reviews, and to the maximum extent practicable incorporates information and recommendations from existing reviews to avoid duplication.

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

''(1) provide an integrated view of, and recommendations for, science and technology policy across the Federal Government, while considering economic and national security;

''(2) assess and recommend priorities for research, development and demonstration programs to maintain American leadership in science and technology;

''(3) assess the global competition in science and technology and identify potential threats to the

leadership of the United States in science and technology;

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

''(5) assess and make recommendations to improve regional innovation across the United States;

''(6) assess and make recommendations to improve translation of basic research and the enhancement of technology transfer of federally funded research;

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

''(8) review administrative or legislative policies that affect the science and technology enterprise and identify and make recommendations on policies that hinder research and development in the United States.

''(c) REPORTING.—

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

''(2) PUBLICATION.—The Director shall, consistent with the protection of national security and other sensitive matters to the maximum extent possible, make each report submitted under paragraph (1) publicly available on an internet website of the Office of Science and Technology Policy.''.

Subtitle B—Office of Science and Technology Policy

SEC. 111. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated for the Office of Science and Technology Policy—

(1) $5,544,000 for fiscal year 2022;

(2) $6,100,000 for fiscal year 2023;

(3) $6,500,000 for fiscal year 2024;

(4) $6,500,000 for fiscal year 2025;

(5) $6,500,000 for fiscal year 2026;

(6) $6,500,000 for fiscal year 2027;

(7) $6,500,000 for fiscal year 2028;

(8) $6,500,000 for fiscal year 2029;

(9) $6,500,000 for fiscal year 2030; and

(10) $6,500,000 for fiscal year 2031.

TITLE II—RESEARCH SECURITY AND INTEGRITY

SEC. 201. FOREIGN TALENT PROGRAM PROHIBITION.

(a) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, each Federal research agency head shall develop a policy to prohibit all agency personnel, including Federal employees, contract employees, independent contractors, and special government employees, from participating in a foreign government talent recruitment program.

(b) COORDINATION.—The Director of the Office of Science and Technology Policy, acting through the National Science and Technology Council and in accordance with the authority provided under section 1746 of the National Defense Authorization Act for Fiscal Year 2020 (Public Law 116–92; 42 U.S.C. 6601 note) shall to the maximum extent practicable ensure that the policies developed by Federal research agencies under subsection (a) are consistent.

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

(d) DEFINITIONS.—In this section:

(1) FEDERAL RESEARCH AGENCY.—The term ''Federal research agency'' means any Federal agency with an annual extramural research expenditure of over $100,000,000.

(2) FOREIGN GOVERNMENT TALENT RECRUITMENT PROGRAM.—The term ''foreign government talent recruitment program'' means any program that includes compensation, including cash, research funding, honorific titles, promised future compensation, or other types of remuneration, provided by the foreign state or an entity sponsored by the foreign state to the targeted individual in exchange for the individual transferring knowledge and expertise to the foreign country.

SEC. 202. COMPUTING ENCLAVE PILOT PROGRAM.

(a) IN GENERAL.—The Director of the National Science Foundation, in consultation with the Director of the National Institute of Standards and Technology and the Secretary of Energy, shall award grants to establish a pilot program to ensure the security of federally supported research data and to assist regional institutions of higher education and their researchers in compliance with regulations regarding the safeguarding of sensitive information and other relevant regulations and Federal guidelines.

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

(c) REGIONALIZATION.—

(1) In selecting universities pursuant to subsection (b), the Director of the National Science Foundation shall give preference to institutions of higher education with the capability of serving other regional universities.

(2) The enclaves should be geographically dispersed to better meet the needs of regional interests.

(d) PROGRAM ELEMENTS.—The Director of the National Science Foundation shall work with institutions of higher education selected pursuant to subsection (b) to—

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

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

of the software, firmware, or product that is required to deploy additional secure computing enclaves;

(3) develop templates for all policies and procedures required to operate the secure computing enclave in a research setting;

(4) develop a system security plan template; and

(5) develop a process for managing a plan of action and milestones for the secure computing enclave.

(e) DURATION.—The pilot program established pursuant to subsection (a) shall operate for not less than 3 years.

(f) REPORT.—

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

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

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

(B) recommendations related to the value of expanding the network of secure computing enclaves; and

(C) recommendations on the efficacy of the use of secure computing enclaves by other Federal agencies in a broader effort to expand security of Federal research.

SEC. 203. PROTECTING RESEARCH FROM CYBER THEFT.

(a) IMPROVING CYBERSECURITY OF INSTITUTIONS OF HIGHER EDUCATION.—Section 2(e)(1)(A) of the National Institute of Standards and Technology Act (15 U.S.C. 272(e)(1)(A)) is amended—

(1) in clause (viii), by striking ''and'' after the semicolon;

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

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

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

(b) DISSEMINATION OF RESOURCES FOR RESEARCH INSTITUTIONS.—

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

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

(2) REQUIREMENTS.—The Director shall ensure that the resources disseminated pursuant to paragraph (1)—

(A) are generally applicable and usable by a wide range of research institutions and institutions of higher education;

(B) vary with the nature and size of the implementing research institutions or institutions of higher education, and the nature and sensitivity of the data collected or stored on the information systems or devices of the implementing research institutions or institutions of higher education;

(C) include elements that promote awareness of simple, basic controls, a workplace cybersecurity culture, and third-party stakeholder relationships, to assist research institutions or

institutions of higher education in mitigating common cybersecurity risks;

(D) include case studies of practical application;

(E) are technology-neutral and can be implemented using technologies that are commercial and off-the-shelf; and

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

(3) NATIONAL CYBERSECURITY AWARENESS AND EDUCATION PROGRAM.—The Director shall ensure that the resources disseminated under paragraph (1) are consistent with the efforts of the Director under section 401 of the Cybersecurity Enhancement Act of 2014 (15 U.S.C. 7451).

(4) UPDATES.—The Director shall review periodically and update the resources under paragraph (1) as the Director determines appropriate.

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

(6) OTHER FEDERAL CYBERSECURITY REQUIREMENTS.—Nothing in this section may be construed to supersede, alter, or otherwise affect any

cybersecurity requirements applicable to Federal agencies.

(c) DEFINITIONS.—In this section:

(1) DIRECTOR.—The term ''Director'' means the Director of the National Institute of Standards and Technology.

(2) INSTITUTION OF HIGHER EDUCATION.—The term ''institution of higher education'' has the meaning given such term in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001).

(3) RESOURCES.—The term ''resources'' means guidelines, tools, best practices, standards, methodologies, and other ways of providing information.

(4) RESEARCH INSTITUTION.—The term ''research institution''—

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

(B) includes federally funded research and development centers, as identified by the National Science Foundation in accordance with the Federal Acquisition Regulation issued in accordance with section 1303(a)(1) of title 41 (or any successor regulation).

SEC. 204. CHINESE RESEARCH FUNDS ACCOUNTING ACT.

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

(b) MATTERS TO BE INCLUDED.—The study conducted under subsection (a) shall include, to the extent practicable with respect to the study period, an assessment of—

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

(2) the total number and types of covered entities to whom such funding was made available;

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

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

(5) other matters the Comptroller General determines appropriate.

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

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

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

(e) DEFINITIONS.—In this section:

(1) COVERED ENTITY.—The term ''covered entity'' means an entity—

(A) located in the People's Republic of China; or

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

(2) STUDY PERIOD.—The term ''study period'' means the 5-year period ending on the date of enactment of this Act.

TITLE III—SUPPLY CHAIN AND CRITICAL MATERIALS SECURITY

SEC. 301. NATIONAL SUPPLY CHAIN DATABASE.

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

''NIST'') shall establish a National Supply Chain Database.

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

(c) STUDY ON NATIONAL SUPPLY CHAIN DATABASE.—In establishing the National Supply Chain Database, the Director of NIST shall take into consideration the findings and recommendations from the study authorized in section 9413 of the National Defense Authorization Act for Fiscal Year 2021 (Public Law 116–283), including measures to secure and protect the National Supply Chain Database from adversarial attacks and vulnerabilities.

(d) DATABASE AND MANUFACTURING EXTENSION PARTNERSHIP.—

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

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

(3) INDIVIDUAL STATE DATABASES.—Each State's supply chain database maintained by the NIST-recognized Manufacturing Extension Partnership Center within the State shall be complementary in design to the National Supply Chain Database.

(e) MAINTENANCE OF NATIONAL SUPPLY CHAIN DATABASE.—The Director of NIST through the Hollings Manufacturing Extension Partnership program shall maintain the National Supply Chain Database as an integration of the State level databases from each State's Manufacturing Extension Partnership Center and may be populated with information from past, current, or potential Center clients.

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

ited to the contributing company and Manufacturing Extension Partnership Center staff who sign an appropriate non-disclosure agreement.

SEC. 302. CRITICAL MINERALS MINING RESEARCH AND DEVELOPMENT AT THE NATIONAL SCIENCE FOUNDATION.

(a) IN GENERAL.—The Director of the National Science Foundation shall award grants, on a competitive basis, to institutions of higher education or nonprofit organizations (or consortium of such institutions or organizations) to support basic research that will accelerate innovation to advance critical minerals mining strategies and technologies for the purpose of making better use of domestic resources and eliminating national reliance on minerals and mineral materials that are subject to supply disruptions.

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

(1) advancing mining research and development activities to develop new mapping and mining technologies and techniques, including advanced critical mineral extraction, production, separation, alloying, or processing techniques and technologies that can decrease energy intensity, potential environmental impact and costs of those activities;

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

(3) examining the application of artificial intelligence for geological exploration of critical minerals, including what the size and diversity of data sets would be required;

(4) examining the application of machine learning for detection and sorting of critical minerals, including what the size and diversity of data sets would be required;

(5) conducting detailed isotope studies of critical minerals and the development of more refined geologic models; or

(6) providing training and researcher opportunities to undergraduate and graduate students to prepare the next generation of mining engineers and researchers.

SEC. 303. ADVANCED RECYCLING RESEARCH AND DEVELOPMENT.

(a) SHORT TITLE.—This section may be cited as the ''Advanced Recycling Research and Development Act of 2021''.

(b) DEFINITIONS.—In this section:

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

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

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

(4) RECYCLABLE PLASTIC.—The term ''recyclable plastic'' means plastic that is designed to be readily, economically, and efficiently recyclable or otherwise recoverable for beneficial use.

(5) CRITICAL MATERIAL.—The term ''critical material'' means material that serves an essential function in the manufacturing of a product and has a high risk of a supply disruption, such that a shortage of such material would have significant consequences for the economic or national security of the United States.

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

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

(1) IN GENERAL.—The Secretary shall carry out a research, development, and demonstration program to accelerate innovation in energy-efficient recyclable plastics, next-generation plastics, and composites recycling and upcycling strategies and technologies, in order to increase the economic value of plastics supply streams and to reduce the environmental impact of global plastics consumption.

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

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

(B) develop biological, chemical, and hybrid bio-chemical technologies and methods for deconstructing plastic and composite waste, including environmental waste, into useful chemical and material streams;

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

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

scaled for domestic manufacturability and recovery;

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

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

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

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

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

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

(5) FUNDING.—

(A) IN GENERAL.—From within funds authorized to be appropriated—

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

(ii) to the Department's Office of Energy Efficiency and Renewable Energy, there shall be made available to the Secretary to carry out the program under this subsection $25,000,000 for each of fiscal years 2022 through 2026.

(B) PROHIBITION.—In carrying out the program under this subsection, the Secretary shall not use funds made available under paragraph (1) for commercial application of energy technology.

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

(1) IN GENERAL.—The Secretary shall carry out a research, development, and demonstration program to support the development of—

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

(B) innovative technologies to reclaim and recycle critical materials from advanced and lithium-ion based battery technologies used in consumer electronics, defense, stationary storage, and transportation applications.

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

(A) promote the discovery of new domestically sourced raw materials for batteries that can degrade without causing damage to the environment;

(B) develop innovative and cost-effective technologies and processes for the collection, storage, and transportation of discarded lithium-ion batteries that use domestic mining resources and increase availability of domestically sourced raw materials for batteries; and

(C) develop cost-effective recycling processes to recover critical materials from discarded lithium-ion batteries and enable their reintroduction in new lithium-ion cell technologies and for use in other relevant industries.

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

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

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

(C) the Office of Technology Transitions.

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

(5) FUNDING.—

(A) IN GENERAL.—From within funds authorized to be appropriated—

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

(ii) to the Department's Office of Energy Efficiency and Renewable Energy, there shall be made available to the Secretary to carry out the activities under this

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

(B) PROHIBITION.—In carrying out the program under this subsection, the Secretary shall not use funds made available under subparagraph (A) for commercial application of energy technology.

SEC. 304. CRITICAL MINERALS INTERAGENCY SUBCOMMITTEE.

(a) IN GENERAL.—The Critical Minerals Subcommittee of the National Science and Technology Council (referred to in this section as ''Subcommittee'') shall coordinate Federal science and technology efforts to ensure secure and reliable supplies of critical minerals to the United States.

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

(1) to advise and assist the Committee on Homeland and National Security and the National Science and Technology Council on United States policies, procedures, and plans as it relates to critical minerals, including—

(A) Federal research, development, and deployment efforts to optimize methods for extractions, concentration, separation and purifi-

cation of conventional, secondary, and unconventional sources of critical minerals;

(B) efficient use and reuse of critical minerals;

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

(D) United States private industry investments in innovation and technology transfer from federally funded science and technology;

(2) to identify emerging opportunities, stimulate international cooperation, and foster the development of secure and reliable supply chains of critical minerals;

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

(4) to provide recommendations on coordination and collaboration among the research, development, and deployment programs and activities of Federal agencies to promote a secure and reliable supply of critical minerals necessary to maintain national security, economic well-being, and industrial production.

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

the findings and recommendations of relevant advisory committees—

(1) provide recommendations on how Federal agencies may improve the topographic, geologic, and geophysical mapping of the United States and improve the discoverability, accessibility, and usability of the resulting and existing data, to the extent permitted by law and subject to appropriate limitation for purposes of privacy and security; assess the progress towards developing critical minerals recycling and reprocessing technologies, and technological alternatives to critical minerals;

(2) examine options for accessing and developing critical minerals through investment and trade with our allies and partners and provide recommendations;

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

(4) assess the need for and make recommendations to address the challenges the United States critical minerals supply chain workforce faces, including aging and retiring personnel and faculty; public perceptions about the nature of mining and

mineral processing; and foreign competition for United States talent;

(5) develop, and update as necessary, a strategic plan to guide Federal programs and activities to enhance scientific and technical capabilities across critical mineral supply chains, including a roadmap that identifies key research and development needs and coordinates ongoing activities for source diversification, more efficient use, recycling, and substitution for critical minerals; as well as cross-cutting mining science, data science techniques, materials science, manufacturing science and engineering, computational modeling, and environmental health and safety research and development; and

(6) report to the appropriate committees of Congress on activities and findings under this section.

SEC. 305. HEAVY FREIGHT AUTONOMOUS TRUCKING RESEARCH CORRIDOR.

(a) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Secretary of Transportation shall establish a Heavy Freight Autonomous Trucking Research Initiative to lay the foundation for the broad scale adoption of autonomous freight trucking.

(b) RESPONSIBILITIES.—In carrying out the Initiative established under subsection (a), the Secretary shall—

(1) support and conduct research and development on automated and connected freight trucking with private industry, and industry associations, other Federal agencies, State and local Transportation agencies, research universities, and a National Transportation center selected under section 5505(c)(2) of title 49, United States Code; and

(2) support or establish a heavy freight autonomous trucking research and development corridor and related pilot programs.

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

(1) analyzing, modeling, and piloting the feasibility and benefits of dedicated autonomous trucking corridors, including their impact on—

(A) long distance freight movement;

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

(C) fuel economy and emissions;

(D) transportation infrastructure;

(E) vehicle miles traveled;

(F) the freight trucking workforce; and

(G) safety, accidents, and fatalities; and

(2) providing deployment guidance, including for—

(A) utilization costs models;

(B) cyber-physical security; and

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

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

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

(1) give preference to the recipient's past and current collaboration with local and state transportation agencies in activities related to section;

(2) give preference to a recipient whose geographic location offer access to long haul tucking corridors;

(3) consider the extent to which an applicant's proposal would involve participation by local, regional, and national stakeholders; and

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

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

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

SEC. 306. NIST UAV CHALLENGES AND CREDENTIALING PROGRAM.

(a) UNMANNED AERIAL VEHICLE RESEARCH CHALLENGE.—

(1) PRIZE CHALLENGE.—Pursuant to section 24 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3719), the Secretary of Commerce, acting through the Under Secretary of Commerce for Standards and Technology (referred to in this subsection as the ''Secretary''), shall, subject to appropriations, carry out a program to partner with academic institutions to award prizes competitively to stimulate research and development of innovative unmanned aerial vehicle (UAV) tech-

nologies in order to expand upon and improve emergency response operations.

(2) PLAN FOR EMERGENCY RESPONSE OPERATIONS.—Each proposal submitted pursuant to paragraph (1) shall include a plan for UAV implementation in emergency response operations.

(3) PRIZE AMOUNT.—In carrying out the program under paragraph (1), the Secretary may award not more than a total of $2,250,000 to one or more winners of the prize challenge.

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

(5) CONSULTATION.—In carrying out the program under subsection (a), the Secretary may consult with the heads of relevant departments and agencies of the Federal Government.

(b) UNMANNED AERIAL VEHICLE CREDENTIALING PROGRAM.—The Secretary shall partner with academic institutions to establish the measurements and standards infrastructure necessary for credentialing remote pilots, including implementation and demonstration of distributed

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

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

TITLE IV—DEPARTMENT OF ENERGY

Subtitle A—Office of Science

SEC. 401. DEFINITIONS.

In this title:

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

(2) DIRECTOR.—The term ''Director'' means the Director of the Office of Science of the Department.

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

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

SEC. 402. BASIC ENERGY SCIENCES.

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

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

(2) by inserting before subsection (b), as redesignated by paragraph (1), the following:

''(a) PROGRAM.—The Director shall carry out a fundamental research program in basic energy sciences, including materials sciences and engineering, chemical sciences, physical biosciences, and geosciences, in order to provide the foundations for new energy technologies and to support Department missions in energy, environment, and national security.''.

(b) BASIC ENERGY SCIENCES USER FACILITIES.—Paragraph (3) of subsection (c) of such section, as redesignated by subsection (a)(1), is amended—

(1) in subparagraph (C), by striking ''and'';

(2) by redesignating subparagraph (D) as subparagraph (E); and

(3) by inserting after subparagraph (C) the following:

''(D) autonomous chemistry and materials synthesis facilities that leverage advances in artificial intelligence; and''.

(c) BASIC ENERGY SCIENCES RESEARCH INFRASTRUCTURE.—Such section, as amended by subsection (a), is further amended by adding at the end the following:

"(g) BASIC ENERGY SCIENCES RESEARCH INFRASTRUCTURE.—

"(1) ADVANCED PHOTON SOURCE UPGRADE.—

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

"(B) DEFINITIONS.—In this paragraph:

"(i) FLUX.—The term 'flux' means the rate of flow of photons.

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

"(C) START OF OPERATIONS.—The Secretary shall, to the maximum extent practicable, ensure that the start of full operations of the

upgrade under this paragraph occurs before March 31, 2026.

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

''(i) $106,200,000 for fiscal year 2022; and

''(ii) $5,000,000 for fiscal year 2023.

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

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

''(B) PROTON POWER UPGRADE DEFINED.—For the purposes of this paragraph, the term 'proton power upgrade' means the Spallation Neutron Source power upgrade described in—

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

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

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

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

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

''(i) $25,000,000 for fiscal year 2022;

''(ii) $17,000,000 for fiscal year 2023; and

''(iii) $7,800,000 for fiscal year 2024.

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

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

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

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

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

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

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

''(D) FUNDING.—Out of funds authorized to be appropriated under section 409 for Basic Energy Sciences, there shall be made available to the Secretary to carry out activities, including construction, under this paragraph—

''(i) $50,000,000 for fiscal year 2022;

''(ii) $200,000,000 for fiscal year 2023;

''(iii) $275,000,000 for fiscal year 2024;

''(iv) $275,000,000 for fiscal year 2025;

''(v) $275,000,000 for fiscal year 2026;

''(vi) $250,000,000 for fiscal year 2027; and

''(vii) $120,000,000 for fiscal year 2028.

''(4) ADVANCED LIGHT SOURCE UPGRADE.—

''(A) IN GENERAL.—The Secretary shall provide for the upgrade to the Advanced Light Source described in the publication approved by the Basic Energy Sciences Advisory Committee on June 9, 2016, titled 'Report on Facility Upgrades', including the development of a multi-bend achromat lattice to produce a high flux of coherent x-rays within the soft x-ray energy region.

''(B) DEFINITIONS.—In this paragraph:

''(i) FLUX.—The term 'flux' means the rate of flow of photons.

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

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

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

''(i) $100,000,000 for fiscal year 2022;

''(ii) $130,000,000 for fiscal year 2023;

''(iii) $102,500,000 for fiscal year 2024; and

''(iv) $21,500,000 for fiscal year 2025.

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

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

''(B) DEFINITIONS.—In this paragraph:

''(i) HIGH ENERGY X-RAY.—The term 'high energy x-ray' means a photon with

an energy in the 5 to 13 kiloelectron volt range.

''(ii) HIGH REPETITION RATE.—The term 'high repetition rate' means the delivery of x-ray pulses up to 1 million pulses per second.

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

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

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

''(i) $87,000,000 for fiscal year 2022;

''(ii) $100,000,000 for fiscal year 2023;

''(iii) $100,000,000 for fiscal year 2024;

''(iv) $100,000,000 for fiscal year 2025; and

''(v) $83,000,000 for fiscal year 2026.''.

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

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

''(4)(A) FUNDING.—From within funds authorized to be appropriated under section 409 of the Securing American Leadership in Science and Technology Act of 2021 for Basic Energy Sciences, the Secretary shall make available for carrying out activities under this subsection $50,000,000 for each of fiscal years 2022 through 2031.

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

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

''(4)(A) FUNDING.—From within funds authorized to be appropriated under section 409 of the Securing American Leadership in Science and Tech-

nology Act of 2021 for Basic Energy Sciences and Biological and Environmental Research, the Secretary shall make available for carrying out activities under this subsection $50,000,000 for each of fiscal years 2022 through 2031.

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

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

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

''(4)(A) FUNDING.—From within funds authorized to be appropriated under section 409 of the Securing American Leadership in Science and Technology Act of 2021 for Basic Energy Sciences, the Secretary shall make available for carrying out activities under this subsection $50,000,000 for each of fiscal years 2022 through 2031.

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

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

''(4)(A) FUNDING.—From within funds authorized to be appropriated under section 409 of the Securing American Leadership in Science and Technology Act of 2021 for Basic Energy Sciences and Advanced Scientific Computing Research, the Secretary shall make available for carrying out activities under this subsection $30,000,000 for each of fiscal years 2022 through 2031.

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

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

''(4)(A) FUNDING.—From within funds authorized to be appropriated under section 409 of the Securing American Leadership in Science and Technology Act of 2021 for Basic Energy Sciences and Biological and Environmental Research, the Secretary shall make available for carrying out activities under this subsection $20,000,000 for each of fiscal years 2022 through 2031.

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

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

''(1) IN GENERAL.—The Director shall support a program of fundamental research for the application of advanced computing practices to foundational and emerging research problems in chemistry and materials science.

''(2) COMPUTATIONAL MATERIALS AND CHEMISTRY SCIENCE CENTERS.—

''(A) IN GENERAL.—In carrying out the activities authorized under paragraph (1), the Director shall select and establish up to four computational materials and chemistry science centers to develop open-source, robust, and validated computational codes and user-friendly software, coupled with innovative use of experimental and theoretical data, to enable the design, discovery, and development of new materials and chemical systems including chemical

catalysis research and development. These centers shall also focus on overcoming challenges and maximizing the benefits of exascale and other high performance computing systems.

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

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

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

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

''(3) MATERIALS RESEARCH DATABASE.—

''(A) IN GENERAL.—The Director shall support the development of a web-based platform to provide access to a database of computed information on known and predicted materials properties and computational tools to accelerate breakthroughs in materials discovery and design.

''(B) PROGRAM.—In carrying out this section, the Director shall—

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

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

''(iii) advance understanding, prediction, and manipulation of materials;

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

''(v) drive the development of advanced materials for applications that span

the Department's missions in energy, environment, and national security.

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

''(D) FUNDING.—Out of funds authorized to be appropriated under section 409 for Basic Energy Sciences there shall be made available to the Secretary to carry out activities under this subsection $10,000,000 for each of the fiscal years 2022 through 2031.''.

SEC. 403. ADVANCED SCIENTIFIC COMPUTING RESEARCH.

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

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

(2) by inserting before subsection (b), as redesignated by paragraph (1), the following:

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

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

''(e) BEYOND EXASCALE COMPUTING PROGRAM.—

''(1) IN GENERAL.—The Secretary shall establish a program to develop and implement a strategy for achieving computing systems with capabilities beyond exascale computing systems. In establishing this program, the Secretary shall—

''(A) maintain foundational research programs in mathematical, computational, and computer sciences focused on new and emerging computing needs within the mission of the Department, including but not limited to post-Moore's law computing architectures, novel approaches to modeling and simulation, artificial intelligence and scientific machine learning, quantum computing, and extreme heterogeneity; and

''(B) retain best practices and maintain support for essential hardware and software elements of the Exascale Computing Project that are necessary for sustaining the vitality of a long-term exascale ecosystem.

''(2) REPORT.—Not later than one year after the date of the enactment of this Act, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives, and the Committee on Energy and Natural Resources of the Senate, a report on the development and implementation of the strategy outlined in paragraph (1).

''(f) ENERGY EFFICIENT COMPUTING PROGRAM.—

''(1) IN GENERAL.—The Secretary shall support a program of fundamental research, development, and demonstration of energy efficient computing technologies relevant to advanced computing applications in high performance computing, artificial intelligence, and scientific machine learning.

''(2) EXECUTION.—

''(A) PROGRAM.—In carrying out the program, the Secretary shall—

''(i) establish a partnership for National Laboratories, industry partners, and institutions of higher education for co-design of energy efficient hardware, technology, software, and applications across all applicable program offices of the Department;

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

''(iii) consider multiple heterogeneous computing architectures, including neuromorphic computing, persistent computing, and ultrafast networking; and

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

''(B) SELECTION OF PARTNERS.—In selecting participants for the partnership established under subparagraph (A)(i), the Secretary shall select participants through a competitive, merit-review process.

''(3) REPORT.—Not later than one year after the date of the enactment of this Act, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives, and the Committee on Energy and Natural Resources of the Senate, a report on—

''(A) the activities conducted under subparagraph (A); and

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

''(g) ARTIFICIAL INTELLIGENCE, DATA ANALYTICS, AND COMPUTATIONAL RESEARCH.—

''(1) IN GENERAL.—The Secretary shall carry out a program to develop tools for big data analytics by utilizing data sets generated by Federal agencies, institutions of higher education, nonprofit research organizations, and industry in order to advance artificial intelligence technologies to solve complex, big data challenges. The Secretary shall carry out this program through a competitive, merit-reviewed process, and consider applications from National Laboratories, institutions of higher education, multi-institutional collaborations, and other appropriate entities.

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

''(A) establish a cross-cutting research initiative to prevent duplication and coordinate research efforts in artificial intelligence and data analytics across the Department;

''(B) conduct basic research in modeling and simulation, artificial intelligence, machine learning, large-scale data analytics, natural language processing, and predictive analysis in order to develop novel or optimized predictive algorithms suitable for high-performance computing systems and large biomedical data sets;

''(C) develop multivariate optimization models to accommodate large data sets with variable quality and scale in order to visualize complex systems;

''(D) establish multiple scientific computing facilities to serve as data enclaves capable of securely storing data sets created by Federal agencies, institutions of higher education, nonprofit organizations, or industry at National Laboratories; and

''(E) promote collaboration and data sharing between National Laboratories, research entities, and facilities of the Department by providing the necessary access and secure data transfer capabilities.

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

and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report evaluating the effectiveness of the program under paragraph (1), including basic research discoveries achieved in the course of the program and potential opportunities to expand the technical capabilities of the Department through the development of artificial intelligence and data analytics technologies.

''(h) ENERGY SCIENCES NETWORK.—

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

''(2) CAPABILITIES.—In carrying out paragraph (1), the Secretary shall ensure the following capabilities:

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

''(B) To maximize network reliability.

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

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

''(E) To integrate heterogeneous computing frameworks and systems.

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

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

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

''(j) COMPUTATIONAL SCIENCE GRADUATE FELLOWSHIP.—

''(1) IN GENERAL.—The Secretary shall support the Computational Science Graduate Fellowship program in order to facilitate collaboration between graduate students and researchers at the National Laboratories, and contribute to the development of a computational workforce to help advance research in areas relevant to the mission of the Department.

''(2) FUNDING.—From within funds authorized to be appropriated under section 409 of the Securing American Leadership in Science and Technology Act of 2021 for Advanced Scientific Computing Research Program, the Secretary shall make available for carrying out the activities under this section—

''(A) $21,000,000 for fiscal year 2022;

''(B) $22,050,000 for fiscal year 2023;

''(C) $23,152,500 for fiscal year 2024; and

''(D) 24,310,125 for fiscal year 2025.''.

(c) APPLIED MATHEMATICS AND SOFTWARE DEVELOPMENT.—Subsection (d) of such section, as redesignated by subsection (a)(1), is amended to read as follows:

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

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

''(A) mathematics, models, statistics, and algorithms for modeling complex systems on advanced computing architectures; and

''(B) tools, languages, programming environments, and operations for high-end computing systems (as defined in section 2 of the

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

''(2) PORTFOLIO BALANCE.—The Director shall maintain a balanced portfolio within the advanced scientific computing research and development program established under section 976 of the Energy Policy Act of 2005 (42 U.S.C. 16316) that supports robust investment in—

''(A) applied mathematical, computational, and computer sciences research needs relevant to the mission of the Department, including activities related to data science, artificial intelligence, scientific machine learning, quantum information science, and other emerging areas; and

''(B) associated high-performance computing hardware and facilities.''.

(d) QUANTUM SCIENCE NETWORK.—

(1) DEFINITIONS.—Section 2 of the National Quantum Initiative Act (15 U.S.C. 8801) is amended—

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

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

''(7) QUANTUM NETWORK INFRASTRUCTURE.—The term 'quantum network infrastructure' means any facility, expertise, or capability that is necessary to enable the development and deployment of scalable and diverse quantum network technologies.''.

(2) DEPARTMENT OF ENERGY QUANTUM NETWORK INFRASTRUCTURE RESEARCH AND DEVELOPMENT PROGRAM.—Title IV of the National Quantum Initiative Act (15 U.S.C. 8851 et seq.) is amended by adding at the end the following:

''SEC. 403. DEPARTMENT OF ENERGY QUANTUM NETWORK INFRASTRUCTURE RESEARCH AND DEVELOPMENT PROGRAM.

''(a) IN GENERAL.—The Secretary of Energy (referred to in this section as the 'Secretary') shall carry out a research, development, and demonstration program to accelerate innovation in quantum network infrastructure in order to—

''(1) facilitate the advancement of distributed quantum computing systems through the internet and intranet;

''(2) improve the precision of measurements of scientific phenomena and physical imaging technologies; and

''(3) develop secure national quantum communications technologies and strategies.

''(b) PROGRAM.—In carrying out this section, the Secretary shall—

''(1) coordinate with—

''(A) the Director of the National Science Foundation;

''(B) the Director of the National Institute of Standards and Technology;

''(C) the Chair of the subcommittee on Quantum Information Science of the National Science and Technology Council established under section 103(a); and

''(D) the Chair of the subcommittee on the Economic and Security Implications of Quantum Science;

''(2) conduct cooperative research with industry, National Laboratories, institutions of higher education, and other research institutions to facilitate new quantum infrastructure methods and technologies, including—

''(A) quantum-limited detectors, ultra-low loss optical channels, space-to-ground connections, and classical networking and cybersecurity protocols;

"(B) entanglement and hyper-entangled state sources and transmission, control, and measurement of quantum states;

"(C) quantum interconnects that allow short range local connections between quantum processors;

"(D) transducers for quantum sources and signals between optical and telecommunications regimes and quantum computer-relevant domains, including microwaves;

"(E) development of quantum memory buffers and small-scale quantum computers that are compatible with photon-based quantum bits in the optical or telecommunications wavelengths;

"(F) long-range entanglement distribution at both the terrestrial and space-based level using quantum repeaters, allowing entanglement-based protocols between small- and large-scale quantum processors;

"(G) quantum routers, multiplexers, repeaters, and related technologies necessary to create secure long-distance quantum communication; and

''(H) integration of systems across the quantum technology stack into traditional computing networks, including the development of remote controlled, high performance, and reliable implementations of key quantum network components;

''(3) engage with the Quantum Economic Development Consortium (QED–C) to transition component technologies to help facilitate as appropriate the development of a quantum supply chain for quantum network technologies;

''(4) advance basic research in advanced scientific computing and material science to enhance the understanding, prediction, and manipulation of materials and processes relevant to quantum network infrastructure;

''(5) develop experimental tools and testbeds necessary to support cross-cutting fundamental research and development activities with diverse stakeholders from industry and institutions of higher education; and

''(6) consider quantum network infrastructure applications that span the Department of Energy's missions in energy, environment, and national security.

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

''(1) the National Institute of Standards and Technology;

''(2) the National Science Foundation;

''(3) the National Aeronautics and Space Administration;

''(4) other relevant Federal agencies;

''(5) the National Laboratories;

''(6) industry stakeholders;

''(7) institutions of higher education; and

''(8) the National Quantum Information Science Research Centers.

''(d) RESEARCH PLAN.—Not later than 180 days after the date of the enactment of the Securing American Leadership in Science and Technology Act of 2021, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate, a 4-year research plan that identifies and prioritizes basic research needs relating to quantum network infrastructure.

''(e) STANDARD OF REVIEW.—The Secretary shall review activities carried out under this section to determine the achievement of technical milestones.

''(f) FUNDING.—Funds authorized to be appropriated for the Department of Energy's Office of Science, there shall be made available to the Secretary to carry out the activities under this section, $100,000,000 for each of fiscal years 2022 through 2026.

"SEC. 404. DEPARTMENT OF ENERGY QUANTUM USER EXPANSION FOR SCIENCE AND TECHNOLOGY PROGRAM.

''(a) IN GENERAL.—Not later than 90 days of the date of the enactment of the Securing American Leadership in Science and Technology Act, the Secretary of Energy (referred to in this section as the 'Secretary') shall, establish and carry out a program (to be known as the 'Quantum User Expansion for Science and Technology program' or 'QUEST program') to encourage and facilitate access to United States quantum computing hardware and quantum computing clouds for research purposes in order to—

''(1) enhance the United States quantum research enterprise;

''(2) educate the future quantum computing workforce; and

''(3) accelerate the advancement of United States quantum computing capabilities.

''(b) PROGRAM.—In carrying out this section, the Secretary shall—

''(1) coordinate with—

''(A) the Director of the National Science Foundation;

''(B) the Director of the National Institute of Standards and Technology;

''(C) the Chair of the Quantum Information Science of the National Science and Technology Council established under section 103(a); and

''(D) the Chair of the subcommittee on the Economic and Security Implications of Quantum Science;

''(2) provide researchers based within the United States with access to, and use of, United States quantum computing resources through a competitive, merit-reviewed process;

''(3) consider applications from the National Laboratories, multi-institutional collaborations, institutions of higher education, industry stakeholders, and any other entities that the Secretary determines

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

''(4) consult and coordinate with private sector stakeholders, the user community, and interagency partners on program development and best management practices.

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

''(1) the National Institute of Standards and Technology;

''(2) the National Science Foundation;

''(3) the National Aeronautics and Space Administration;

''(4) other relevant Federal agencies;

''(5) the National Laboratories;

''(6) industry stakeholders;

''(7) institutions of higher education; and

''(8) the National Quantum Information Science Research Centers.

''(d) SECURITY.—In carrying out the activities authorized by this section, the Secretary, in consultation with the Director of the National Science Foundation and the Director of the National Institute of Standards and

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

''(e) REPORT.—Not later than 180 days after the date of the enactment of the Securing American Leadership in Science and Technology Act of 2021, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate, a report on the results of the QUEST program activities and any other information the Secretary determines appropriate.

''(f) FUNDING.—Funds authorized to be appropriated for the Department of Energy's Office of Science, there shall be made available to the Secretary to carry out the activities under this section,

''(1) $30,000,000 for fiscal year 2022;

''(2) $50,000,000 for fiscal year 2023;

''(3) $70,000,000 for fiscal year 2024;

''(4) $90,000,000 for fiscal year 2025; and

''(5) $100,000,000 for fiscal year 2026.''.

SEC. 404. HIGH ENERGY PHYSICS.

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

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

(2) by inserting before subsection (b), as redesignated by paragraph (1), the following:

''(a) PROGRAM.—The Director shall carry out a research program on the fundamental constituents of matter and energy and the nature of space and time in order to support theoretical and experimental research in both elementary particle physics and fundamental accelerator science and technology and understand fundamental properties of the universe.'';

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

''(c) INTERNATIONAL COLLABORATION.—The Director shall—

''(1) as practicable and in coordination with other appropriate Federal agencies as necessary, ensure the access of United States researchers to the most advanced accelerator facilities and research capabilities in the world, including the Large Hadron Collider;

''(2) to the maximum extent practicable, continue to leverage United States participation in the Large Hadron Collider, and prioritize expanding international partnerships and investments in the

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

''(3) to the maximum extent practicable, prioritize engagement in collaborative efforts in support of future international facilities that would provide access to United States researchers of the most advanced accelerator facilities in the world.''; and

(4) by adding at the end the following:

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

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

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

''(A) A neutrino beam with wideband capability of 1.2 megawatts (MW) of beam power and upgradable to 2.4 MW of beam power.

''(B) Three caverns excavated for a 70 kiloton fiducial detector mass and supporting surface buildings and utilities.

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

''(D) Cryogenic systems to support neutrino detectors.

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

''(4) FUNDING.—Out of funds authorized to be appropriated under section 409 for High Energy Physics, there shall be made available to the Secretary to carry out activities, including construction of the facility, under this subsection—

''(A) $200,000,000 for fiscal year 2022;

''(B) $325,000,000 for fiscal year 2023;

''(C) $400,000,000 for fiscal year 2024;

''(D) $375,000,000 for fiscal year 2025;

''(E) $250,000,000 for fiscal year 2026;

''(F) $250,000,000 for fiscal year 2027;

''(G) $250,000,000 for fiscal year 2028; and

''(H) $208,000,000 for fiscal year 2029.

''(g) PROTON IMPROVEMENT PLAN–II ACCELERATOR UPGRADE PROJECT.—

''(1) IN GENERAL.—The Secretary of Energy shall provide for the Proton Improvement Plan II (PIP–II), an upgrade to the Fermilab accelerator complex identified in the 2014 Particle Physics Project Prioritization Panel (P5) report titled 'Building for Discovery', to provide the world's most intense beam of neutrinos to the international LBNF/DUNE experiment as well as a broad range of future high energy physics experiments. The Secretary of Energy shall work with international partners to provide key contributions.

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

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

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

''(C) A flexible design to enable high power beam delivery to multiple users simultaneously and customized beams tailored to specific scientific needs.

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

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

''(4) FUNDING.—Out of funds authorized to be appropriated under section 409 for High Energy Physics, there shall be made available to the Secretary to carry out activities, including construction of the facility, under this subsection—

''(A) $100,000,000 for fiscal year 2022;

''(B) $120,000,000 for fiscal year 2023;

''(C) $120,000,000 for fiscal year 2024;

''(D) $120,000,000 for fiscal year 2025;

''(E) $115,000,000 for fiscal year 2026;

''(F) $110,000,000 for fiscal year 2027; and

''(G) $56,500,000 for fiscal year 2028;

''(h) ACCELERATOR AND DETECTOR UPGRADES.—The Director shall upgrade accelerator facilities and detec-

tors, as necessary and appropriate, to increase beam power, sustain high reliability, and improve precision measurement to advance the highest priority particle physics research programs. In carrying out facility upgrades, the Director shall continue to work with international partners, when appropriate and in the United States interest, to leverage investments and expertise in critical technologies to maintain leading facilities in the United States.

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

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

''(1) consider the requirements necessary to support translational research and development for medical, industrial, security, and defense applications; and

''(2) leverage investments in accelerator technologies and basic research in particle physics by partnering with institutes of higher education, industry, and other Federal agencies to help commercialize technologies with promising applications.

''(k) COSMIC MICROWAVE BACKGROUND STAGE 4.—

''(1) IN GENERAL.—The Secretary, in coordination with the Director of the National Science Foundation shall provide for the construction of the Cosmic Microwave Background Stage 4 experiment as described in the 2014 Particle Physics Prioritization Panel (P5) report titled 'Building for Discovery: Strategic Plan for U.S. Particle Physics in the Global Context.' The Secretary shall consult with the private sector, universities, National Laboratories, and relevant Federal agencies to ensure that this experiment is capable of meeting Federal research needs in accessing the ultra-high energy physics of inflation and important neutrino properties.

''(2) EXPERIMENTAL CAPABILITIES.—The Secretary shall ensure that the facility described in subsection (a) will provide at minimum, 500,000 superconducting detectors deployed on an array of mm-wave telescopes with the required range in frequency, sensitivity, and survey speed to enable an order of magnitude advance in observations of the Cosmic Microwave Background, delivering transformative discoveries in fundamental physics, cosmology, and astrophysics.

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

''(4) FUNDING.—Out of funds authorized to be appropriated under section 409 for High Energy Physics, there shall be made available to the Secretary to complete construction of the facility, under this subsection—

''(A) $37,000,000 for fiscal year 2022;

''(B) $45,000,000 for fiscal year 2023;

''(C) $71,000,000 for fiscal year 2024; and

''(D) $50,000,000 for fiscal year 2025.

''(l) CRYOMODULE REPAIR AND MAINTENANCE FACILITY.—The Secretary shall provide for the construction of a cryomodule repair and maintenance facility, including SRF cryomodules that make up the new superconducting accelerator being constructed by the LCLS–II and LCLS–II–HE projects, to service the Linac Coherent Light Source. The Secretary shall consult with the private sector, universities, National Laboratories, and relevant Federal agencies to ensure that this facility has the capability to maintain, repair, and test superconducting radio-frequency (SRF) accelerator components.''.

SEC. 405. BIOLOGICAL AND ENVIRONMENTAL RESEARCH.

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

"SEC. 306. BIOLOGICAL AND ENVIRONMENTAL RESEARCH.

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

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

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

"(A) biomass-based liquid transportation fuels;

"(B) bioenergy; and

"(C) biobased materials;

"(2) to improve understanding of the global carbon cycle, including processes for removing carbon dioxide from the atmosphere, through photosyn-

thesis and other biological processes, for sequestration and storage; and

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

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

''(d) BIOENERGY RESEARCH CENTERS.—

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

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

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

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

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

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

''(e) LOW-DOSE RADIATION RESEARCH PROGRAM.—

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

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

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

''(2) PROGRAM COMPONENTS.—In carrying out the program required under paragraph (1), the Secretary shall—

''(A) support and carry out the directives under section 106(b) of the American Innovation and Competitiveness Act (42 U.S.C. 6601 note), except that such section shall be treated for purposes of this subsection as applying to low dose and low-dose rate radiation research, in coordination with the Physical Science Subcommittee of the National Science and Technology Council;

''(B) identify and, to the extent possible, quantify, potential monetary and health-related impacts to Federal agencies, the general public, industry, research communities, and other users of information produced by such research program;

''(C) leverage the collective body of knowledge from existing low-dose and low dose-rate radiation research;

''(D) engage with other Federal agencies, research communities, and potential users of information produced under this section, including institutions performing or utilizing radiation research, medical physics, radiology, health physics, and emergency response measures; and

''(E) support education and outreach activities to disseminate information and promote public understanding of low-dose radiation, with a focus on non-emergency situations such as medical physics, space exploration, and naturally occurring radiation.

''(3) RESEARCH PLAN.—

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

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

the Secretary shall transmit this research plan developed in subparagraph (A) to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate.

''(4) GAO STUDY.—Not later than 3 years after the date of enactment of the Energy Act of 2020, the Comptroller General shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate, a report on:

''(A) an evaluation of the program activities carried out under this section;

''(B) the effectiveness of the coordination and management of the program; and

''(C) the implementation of the research plan outlined in paragraph (3).

''(5) DEFINITIONS.—In this subsection:

''(A) LOW-DOSE RADIATION.—.—The term 'low-dose radiation' means a radiation dose of less than 100 millisieverts.

''(B) LOW DOSE-RATE RADIATION.—.—The term 'low dose-rate radiation' means a ra-

diation dose rate of less than 5 millisieverts per hour.

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

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

''(A) $20,000,000 for fiscal year 2021;

''(B) $20,000,000 for fiscal year 2022;

''(C) $30,000,000 for fiscal year 2023;

''(D) $40,000,000 for fiscal year 2024.

''(E) $40,000,000 for fiscal year 2025;

''(F) $50,000,000 for fiscal year 2026;

''(G) $50,000,000 for fiscal year 2027;

''(H) $60,000,000 for fiscal year 2028;

''(I) $60,000,000 for fiscal year 2029;

''(J) $70,000,000 for fiscal year 2030; and

''(K) $70,000,000 for fiscal year 2031.

''(f) EARTH AND ENVIRONMENTAL SYSTEMS RESEARCH.—

''(1) IN GENERAL.—The Director shall carry out a program of fundamental research to develop high-resolution Earth system modeling, analysis, and intercomparison capabilities, in order to further the understanding of the biological, biogeochemical, and physical processes across the multiple scales that control the flux of environmentally relevant compounds between the terrestrial surface and the atmosphere.

''(2) PRIORITIZATION.—In carrying out the program authorized under paragraph (1), the Director shall prioritize—

''(A) the development of software and algorithms to enable the productive application of environmental systems and extreme weather prediction models in high-performance computing systems; and

''(B) capabilities that support the Department's mission needs for energy and infrastructure security, resilience, and reliability.

''(3) USER FACILITIES.—

''(A) IN GENERAL.—In carrying out the activities authorized under paragraph (1), the Director shall establish and operate user facilities to advance the collection, validation, and

analysis of atmospheric data, including activities to advance knowledge and improve model representations and measure the impact of atmospheric gases, aerosols, and clouds on earth and environmental systems.

''(B) EXISTING FACILITIES.—To the maximum extent practicable, the Director shall utilize existing facilities to carry out this subsection.

''(C) SELECTION.—The Director shall select user facilities under paragraph (1) on a competitive, merit-reviewed basis. The Director shall consider applications from the National Laboratories, institutes of higher education, multi-institutional collaborations, and other appropriate entities.

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

''(4) COORDINATION.—In carrying out the program authorized in paragraph (1), the Director shall ensure that the Office of Science—

''(A) consults and coordinates with the National Oceanic Atmospheric Administration, the Environmental Protection Agency, and any other relevant Federal agency on the collection, validation, and analysis of atmospheric data; and

''(B) coordinates with relevant stakeholders, including institutes of higher education, nonprofit research institutions, industry, State, local, and tribal governments, and other appropriate entities to ensure access to the best available relevant atmospheric and environmental data, including historical weather data.

''(g) COASTAL ZONE RESEARCH INITIATIVE.—

''(1) IN GENERAL.—The Director shall carry out a basic research program to enhance the understanding of coastal ecosystems. In carrying out this program, the Director shall prioritize efforts to enhance the collection of observational data, and shall develop models to analyze the ecological, biogeochemical, hydrological and physical processes that interact in coastal zones.

''(2) NATIONAL SYSTEM FOR COASTAL DATA COLLECTION.—The Director shall establish an integrated system of field research sites in order to im-

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

''(A) the Great Lakes region;

''(B) the Pacific coast;

''(C) the Atlantic coast;

''(D) the Arctic; and

''(E) the Gulf coast.

''(3) EXISTING INFRASTRUCTURE.—In carrying out the programs and establishing the field research sites under paragraph (1) and (2), the Secretary shall leverage existing Department of Energy infrastructure, including the Department's existing marine sciences lab.

''(4) COORDINATION.—For the purposes of carrying out the programs and establishing the field research sites under the Initiative, the Secretary may enter into agreements with Federal Departments and agencies with complementary capabilities.

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

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

''(h) BIOLOGICAL AND ENVIRONMENTAL RESEARCH USER FACILITIES.—

''(1) IN GENERAL.—The Director shall carry out a program for the development, construction, operation, and maintenance of user facilities to enhance the collection and analysis of observational data related to complex biological, earth, and environmental systems.

''(2) FACILITY REQUIREMENTS.—To the maximum extent practicable, the user facilities developed, constructed, operated, or maintained under paragraph (1) shall include—

''(A) distributed field research and observation platforms for understanding earth system processes;

''(B) instruments and modeling resources for understanding the physical, chemical, and cellular processes of biological and environmental systems;

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

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

''(3) EXISTING FACILITIES.—In carrying out the program established in paragraph (1), the Director is encouraged to evaluate the capabilities of existing user facilities and, to the maximum extent practicable, invest in modernization of those capabilities to address emerging research priorities.

''(i) LOW-DOSE RADIATION AND SPACE RADIATION RESEARCH PROGRAM.—

''(1) IN GENERAL.—The Secretary of Energy, in consultation with the Administrator of the National Aeronautics and Space Administration shall carry out a basic research program on the similarities and differences between the effects of exposure to low dose radiation on Earth, in low Earth orbit, and in the space environment.

''(2) PURPOSE.—The purpose of this program is to accelerate breakthroughs in low dose and low-dose rate radiation research and development as described in section (e) and to inform the advancement of new tools, technologies, and advanced materials needed to facilitate long-duration space exploration.

''(j) EMERGING TECHNOLOGIES.—

''(1) IN GENERAL.—The Secretary shall establish within the Biological and Environmental Research program an initiative focused on the development of engineered ecosystems through the application of artificial intelligence, novel sensing capabilities, and other emerging technologies.

''(2) INTERAGENCY COORDINATION.—The Secretary shall coordinate with the Director of the National Science Foundation, the Administrator of the National Oceanic and Atmospheric Administration, the Director of the U.S. Geological Survey, and other relevant officials to avoid duplication of research and observational activities and to ensure that activities carried out under this initiative are complimentary to those currently being undertaken by other agencies.

''(3) REPORT.—Not later than 180 days after the enactment of this Act, the Secretary shall provide a report to the Committee on Science, Space, and Technology of the House, and the Committee on Energy and Natural Resources of the Senate, on the activity mandated in subsection (j).

''(k) EMERGING INFECTIOUS DISEASE RESEARCH PROGRAM.—

''(1) IN GENERAL.—The Secretary, in coordination with the Director of the National Science Foundation and the Administrator of the National Aeronautics and Space Administration, shall carry out a research program to leverage the Federal Government's innovative analytical resources and tools, user facilities, and advanced computational and networking capabilities in order to prevent, prepare for, and respond to emerging infectious diseases, including COVID–19. The Secretary shall carry out this program through a competitive, merit reviewed process, and consider applications from National Laboratories, institutions of higher education, multi-institutional collaborations, industry partners and other appropriate entities.

''(2) PROGRAM COMPONENTS.—In carrying out the program established under paragraph (1), the Secretary shall coordinate with relevant Federal agencies to determine a comprehensive set of technical milestones for these research activities and prioritize the following objectives—

''(A) supporting fundamental research and development in advanced analytics, experimental studies, materials synthesis, high-performance computing technologies needed to

characterize, model, simulate, and predict complex phenomena and biological materials related to emerging infectious diseases, including COVID–19 mitigation challenges, including a focus on bioinformatics, epidemiology, and molecular modeling;

''(B) using expertise from the private sector and institutions of higher education, and the National Laboratories to develop computational software and capabilities that prospective users may accelerate emerging infectious diseases research and development;

''(C) increasing the utility of the research infrastructure of the Department, including scientific computing user facilities, x-ray light sources, neutron scattering facilities, nanoscale science research centers, and sequencing and bio-characterization facilities by coordinating with the Advanced Scientific Computing Research, Basic Energy Sciences, and Biological and Environmental Research programs within the Office of Science;

''(D) leveraging experience from existing modeling and simulation research and work sponsored by the Department and promoting

collaboration and data sharing between National Laboratories, research entities, and user facilities of the Department by providing the necessary access and secure data transfer capabilities; and

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

''(3) COORDINATION.—In carrying out these programs, the Secretary shall ensure, to the maximum extent practicable, coordination of these activities with the Department of Energy National Laboratories, institutions of higher education, and the private sector.

''(4) EMERGING INFECTIOUS DISEASES HIGH PERFORMANCE COMPUTING RESEARCH CONSORTIUM.—

''(A) IN GENERAL.—The Secretary in coordination with the Director of the National Science Foundation and the Director of the Office of Science and Technology Policy shall establish and operate an Emerging Infectious

Diseases High Performance Computing Research Consortium (referred to in this section as the 'Consortium'), in order to support the program under paragraph (1) by providing, to the extent practicable, a centralized location for multidisciplinary, collaborative, emerging infectious disease research and development through high performance computing and advanced data analytics technologies and processes.

''(B) MEMBERSHIP.—The members of such consortium shall be representatives from relevant Federal agencies, the private sector, institutions of higher education, which can each contribute relevant compute time, capabilities, or other resources.

''(C) ACTIVITIES.—The Consortium shall—

''(i) match applicants with available Federal and private sector computing resources;

''(ii) consider supplemental awards for computing partnerships with Consortium members to qualifying entities on a competitive merit-review basis;

''(iii) encourage collaboration and communication among member representatives of the consortium and awardees;

''(iv) make available the high-performance computing capabilities, expertise, and user facilities of the Department and the National Laboratories; and

''(v) submit an annual report to the Secretary summarizing the activities of the Consortium, including—

''(I) describing each project undertaken by the Consortium;

''(II) detailing organizational expenditures; and

''(III) evaluating contribution to the achievement of technical milestones as determined in paragraph (1).

''(D) COORDINATION.—The Secretary shall ensure the coordination of, and avoid unnecessary duplication of, the activities of the Consortium with the activities of other research entities of the Department, institutions of higher education and the private sector.

''(5) REPORT.—Not later than 2 years after the date of enactment of this Act, the Secretary shall submit to the Committee on Science, Space, and Technology of the House, and the Committee on Energy and Natural Resources of the Senate, and the Committee on Commerce, Science, and Transportation of the Senate a report detailing the effectiveness of—

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

''(B) the collaborative research achievements of the program, including the achievement of the technical milestones determined under paragraph (1); and

''(C) potential opportunities to expand the technical capabilities of the Department.

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

''(7) FUNDING.—From within funds authorized to be appropriated for the Department's Office of Science, there shall be made available to the Secretary to carry out the activities under this sub-

section, $50,000,000 for fiscal years 2022 and 2023.''.

SEC. 406. FUSION ENERGY.

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

''(p) HIGH-PERFORMANCE COMPUTATION COLLABORATIVE RESEARCH PROGRAM.—

''(1) IN GENERAL.—The Secretary shall carry out a program to conduct and support collaborative research, development, and demonstration of fusion energy technologies, through high-performance computation modeling and simulation techniques, in order to—

''(A) support basic science research in plasmas and matter at very high temperatures and densities;

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

''(C) facilitate the translation of basic research results in fusion energy science to industry.

''(2) COORDINATION.—In carrying out the program under paragraph (1), the Secretary shall co-

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

"(A) Using expertise from the private sector, institutions of higher education, and the National Laboratories to develop computational software and capabilities that prospective users may use to accelerate research and development of fusion energy systems.

"(B) Developing computational tools to simulate and predict fusion energy science phenomena that may be validated through physical experimentation.

"(C) Increasing the utility of the research infrastructure of the Department by coordinating with the Advanced Scientific Computing Research program within the Office of Science.

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

"(E) Ensuring that new experimental and computational tools are accessible to relevant research communities, including private sector entities engaged in fusion energy technology development.

''(3) DUPLICATION.—The Secretary shall ensure the coordination of, and avoid unnecessary duplication of, the activities of this program with the activities of—

''(A) other research entities of the Department, including the National Laboratories, the Advanced Research Projects Agency–Energy, the Advanced Scientific Computing Research program; and

''(B) industry.

''(4) HIGH-PERFORMANCE COMPUTING FOR FUSION INNOVATION HUB.—In carrying out the program under paragraph (1), the Secretary shall establish and operate a national High-Performance Computing for Fusion Innovation Hub (referred to in this section as the 'Hub'), which shall focus on the early stage research and development activities described under paragraph (1).

''(5) SELECTION.—The Secretary shall select the Hub under this subsection on a competitive, merit-reviewed basis. The Secretary shall consider applications from National Laboratories, institutions of higher education, multi-institutional collaborations, and other appropriate entities.

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

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

''(8) TERMINATION.—Consistent with the existing authorities of the Department, the Secretary may terminate the Hub for cause during the performance period.

''(q) BRIGHTEST LIGHT RESEARCH INITIATIVE.—

''(1) IN GENERAL.—The Secretary shall establish a high intensity laser research initiative consistent with the recommendations of the National Academies report, 'Opportunities in Intense Ultrafast Lasers: Reaching for the Brightest Light', and the Brightest Light Initiative workshop report, 'The Future of Intense Ultrafast Lasers in the U.S.'. This initiative should include research and development of multi petawatt-scale laser technologies necessary for discovery science and to advance energy technologies and investments in future facilities, including an open-access laser user facility in

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

''(2) AUTHORIZATION OF APPROPRIATIONS.—Out of funds authorized to be appropriated under subsection (o), there are authorized to be appropriated to the Secretary to carry out the activities described in this subsection—

''(A) $50,000,000 for fiscal year 2022;

''(B) $100,000,000 for fiscal year 2023;

''(C) $150,000,000 for fiscal year 2024;

''(D) $200,000,000 for fiscal year 2025; and

''(E) $250,000,000 for fiscal year 2026.

''(r) MATERIAL PLASMA EXPOSURE EXPERIMENT.—

''(1) IN GENERAL.—The Secretary shall construct a Material Plasma Exposure Experiment facility as described in the 2020 publication approved by the Fusion Energy Sciences Advisory Committee titled 'Powering the Future: Fusion and Plasmas'.

The Secretary shall consult with the private sector, universities, National Laboratories, and relevant Federal agencies to ensure that this facility is capable of meeting Federal research needs for steady-state, high-heat-flux and plasma-material interaction testing of fusion materials over a range of fusion energy relevant parameters.

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

''(A) A magnetic field at the target of 1 Tesla.

''(B) An energy flux at the target of 10 MW/m2.

''(C) The ability to expose previously irradiated plasma facing material samples to plasma.

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

''(4) FUNDING.—Out of funds authorized to be appropriated under section 409 for Fusion Energy Sciences, there are funds authorized to be appropriated to the Secretary for the Office of Fusion En-

ergy Science to carry out to completion the construction of the facility under this section:

"(A) $32,800,000 for fiscal year 2022;

"(B) $13,400,000 for fiscal year 2023;

"(C) $12,600,000 for fiscal year 2024; and

"(D) $400,000 for fiscal year 2025.

"(s) MATTER IN EXTREME CONDITIONS INSTRUMENT UPGRADE.—

"(1) IN GENERAL.—The Secretary shall provide for the upgrade to the Matter in Extreme Conditions endstation at the Linac Coherent Light Source as described in the 2020 publication approved by the Fusion Energy Sciences Advisory Committee titled 'Powering the Future: Fusion and Plasmas'. The Secretary shall consult with the private sector, universities, National Laboratories, and relevant Federal agencies to ensure that this facility is capable of meeting Federal research needs for understanding physical and chemical changes to plasmas at fundamental timescales, and explore new regimes of dense material physics, astrophysics, planetary physics, and short-pulse laser-plasma interactions.

"(2) START OF OPERATIONS.—The Secretary shall, to the maximum extent practicable, ensure

that the start of full operations of the facility under this section occurs before December 31, 2028.''.

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

''(C) $281,000,000 for fiscal year 2026;

''(D) $281,000,000 for fiscal year 2027;

''(E) $281,000,000 for fiscal year 2028;

''(F) $281,000,000 for fiscal year 2029;

''(G) $281,000,000 for fiscal year 2030; and

''(H) $281,000,000 for fiscal year 2031.''.

SEC. 407. NUCLEAR PHYSICS.

Section 308 of the Department of Energy Research and Innovation Act (42 U.S.C. 18646) is amended by inserting at the end the following:

''(c) FACILITY FOR RARE ISOTOPE BEAMS INSTRUMENTATION.—The Secretary shall provide for the construction of a high rigidity spectrometer and a gamma-ray energy tracking array for use at the Facility for Rare Isotope Beams to maximize the capabilities of this facility and advance the understanding of rare nuclear isotopes and the evolution of the cosmos.

''(d) ELECTRON-ION COLLIDER.—

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

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

''(A) at least 70 percent polarized beams of electrons and light ions;

''(B) ion beams from deuterium to the heaviest nuclei;

''(C) variable center of mass energy from 20 to 140 GeV; high luminosity of 1033–1034 cm–2s–1; and

''(D) the possibility of more than one interaction region.

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

that the start of full operations of the facility under this section occurs before December 31, 2030.''.

SEC. 408. SCIENCE LABORATORIES INFRASTRUCTURE PROGRAM.

Section 309 of the Department of Energy Research and Innovation Act (42 U.S.C. 18647) is amended by adding at the end the following:

''(c) USE OF AVAILABLE APPROACHES AND MECHANISMS.—In carrying out this section, the Director shall utilize all available approaches and mechanisms, including capital line items, minor construction projects, energy savings performance contracts, utility energy service contracts, alternative financing, and expense funding, as appropriate.

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

SEC. 409. AUTHORIZATION OF APPROPRIATIONS.

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

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

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

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

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

(5) $1,136,800,000 shall be for Advanced Scientific Computing Research;

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

(7) $264,000,000 shall be for Science Laboratories Infrastructure;

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

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

(10) $29,580,000 shall be for Workforce Development for Teachers and Scientists.

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

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

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

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

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

(5) $1,258,600,000 shall be for Advanced Scientific Computing Research;

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

(7) $288,000,000 shall be for Science Laboratories Infrastructure;

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

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

(10) $30,171,600 shall be for Workforce Development for Teachers and Scientists.

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

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

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

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

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

(5) $1,380,400,000 shall be for Advanced Scientific Computing Research;

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

(7) $312,000,000 shall be for Science Laboratories Infrastructure;

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

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

(10) $30,775,032 shall be for Workforce Development for Teachers and Scientists.

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

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

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

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

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

(5) $1,502,200,000 shall be for Advanced Scientific Computing Research;

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

(7) $336,000,000 shall be for Science Laboratories Infrastructure;

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

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

(10) $31,390,533 shall be for Workforce Development for Teachers and Scientists.

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

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

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

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

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

(5) $1,624,000,000 shall be for Advanced Scientific Computing Research;

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

(7) $360,000,000 shall be for Science Laboratories Infrastructure;

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

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

(10) $32,018,343 shall be for Workforce Development for Teachers and Scientists.

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

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

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

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

(4) $1,052,362,553 shall be for Nuclear Physics;

(5) $1,745,800,000 shall be for Advanced Scientific Computing Research;

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

(7) $384,000,000 shall be for Science Laboratories Infrastructure;

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

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

(10) $32,658,710 shall be for Workforce Development for Teachers and Scientists.

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

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

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

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

(4) $1,108,922,978 shall be for Nuclear Physics;

(5) $1,867,600,000 shall be for Advanced Scientific Computing Research;

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

(7) $408,000,000 shall be for Science Laboratories Infrastructure;

(8) $220,547,648 shall be for Science Program Direction;

(9) $138,990,966 shall be for Safeguards and Security; and

(10) $33,311,884 shall be for Workforce Development for Teachers and Scientists.

(h) FISCAL YEAR 2029.—There are authorized to be appropriated to the Secretary for the Office of Science for fiscal year 2029 $12,645,590,635, of which—

(1) $4,400,200,000 shall be for Basic Energy Sciences;

(2) $1,709,811,557 shall be for High Energy Physics;

(3) $1,230,868,167 shall be for Biological and Environmental Research;

(4) $1,165,483,403 shall be for Nuclear Physics;

(5) $1,989,400,000 shall be for Advanced Scientific Computing Research;

(6) $1,317,120,000 shall be for Fusion Energy Sciences;

(7) $432,000,000 shall be for Science Laboratories Infrastructure;

(8) $224,958,601 shall be for Science Program Direction;

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

(10) $33,978,122 shall be for Workforce Development for Teachers and Scientists.

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

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

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

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

(4) $1,222,043,829 shall be for Nuclear Physics;

(5) $2,111,200,000 shall be for Advanced Scientific Computing Research;

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

(7) $456,000,000 shall be for Science Laboratories Infrastructure;

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

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

(10) $34,657,684 shall be for Workforce Development for Teachers and Scientists.

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

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

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

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

(4) $1,278,604,254 shall be for Nuclear Physics;

(5) $2,233,000,000 shall be for Advanced Scientific Computing Research;

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

(7) $480,000,000 shall be for Science Laboratories Infrastructure;

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

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

(10) $35,350,838 shall be for Workforce Development for Teachers and Scientists.

Subtitle B—Advanced Research Projects Agency–Energy

SEC. 411. ADVANCED RESEARCH PROJECTS AGENCY–ENERGY UPDATE.

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

''(F) $800,833,333 for fiscal year 2026;

''(G) $840,666,667 for fiscal year 2027;

''(H) $880,500,000 for fiscal year 2028;

''(I) $920,333,333 for fiscal year 2029;

''(J) $960,166,667 for fiscal year 2030; and

''(K) $1,000,000,000 for fiscal year 2031.''.

Subtitle C—DOE Clean Energy Infrastructure

SEC. 421. REGIONAL ENERGY INNOVATION CENTERS.

(a) DEFINITIONS.—In this section:

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

(A) an innovative technology—

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

(ii) that produces nuclear energy;

(iii) for carbon capture and sequestration;

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

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

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

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

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

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

(A) an institution of higher education;

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

(C) a nonprofit research institution;

(D) a multi-institutional collaboration; or

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

(b) AUTHORIZATION OF PROGRAM.—

(1) IN GENERAL.—

(A) The Secretary shall carry out a program to enhance the economic, environmental, and energy security of the United States by establishing and operating Regional Energy Innovation Centers in diverse regions of the United States, in order to provide, to the maximum extent practicable, one centralized location for multidisciplinary, collaborative research, development, and demonstration of advanced energy technologies most suited to commercial application in each region of the United States.

(B) In establishing the centers authorized in subparagraph (A), the Secretary shall consider the diverse natural resources available throughout the United States, and maximize

the opportunities for cooperation between institutes of higher education, industry, State and local governments, and nonprofit research institutions with shared areas of energy expertise.

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

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

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

(B) institutions of higher education; and

(C) industry.

(c) APPLICATION PROCESS.—

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

ter established under subsection (b)(1)(A), a consortium shall—

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

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

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

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

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

(C) operate as a nonprofit organization.

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

(3) DURATION.—A center established under this section shall receive support for a period of not

more than 5 years, subject to the availability of appropriations.

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

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

(d) CENTER OPERATIONS.—

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

(2) ACTIVITIES.—Each center shall—

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

(B) develop and make publicly available proposed plans and programs; and

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

(i) detailing organizational expenditures; and

(ii) describing each project undertaken by the center.

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

(4) PROHIBITION ON CONSTRUCTION.—

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

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

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

(B) TEST BED AND RENOVATION EXCEPTION.—Nothing in this paragraph prohibits the use of funds provided under this section or non-Federal cost share funds for the construction of

a test bed or renovations to existing user facilities if the Secretary determines such facilities are necessary and applicable to conduct research within the focus areas identified for each center.

SEC. 422. VERSATILE NEUTRON SOURCE.

Section 955(c) of the Energy Policy Act of 2005 (U.S.C. 16275) is amended—

(1) in paragraph (4), by striking ''2026'' and inserting ''2030''; and

(2) in paragraph (7), by adding at the end the following:

''(F) $639,000,000 for fiscal year 2026;

''(G) $1,005,000,000 for fiscal year 2027;

''(H) $1,081,000,000 for fiscal year 2028;

''(I) $910,000,000 for fiscal year 2029; and

''(J) $654,000,000 for fiscal year 2030.''.

SEC. 423. CARBON SEQUESTRATION RESEARCH AND DEVELOPMENT PROGRAM.

(a) SENSE OF CONGRESS.—It is the sense of Congress that power produced from fossil fuels is essential for maintaining the global competitiveness of United States manufacturing and industrial processes, and that these

domestic industries are critical to the prosperity and national security of the United States.

(b) CARBON SEQUESTRATION RESEARCH INITIATIVE.—

(1) IN GENERAL.—The Secretary of Energy, in coordination with the Secretary of the Interior, shall establish an initiative focused on the evaluation the sequestration of carbon dioxide in geologic formations in order to—

(A) enhance the scientific understanding of, and reduce uncertainties associated with, the effects of carbon dioxide stored in geologic formations for long and short term periods; and

(B) inform improved risk-assessment methods, risk-management practices, and standards with respect to the storage of carbon dioxide in geologic formations on large and small scale.

(2) PROGRAM COMPONENTS.—In carrying out the initiative under subsection (a), the Secretary of Energy shall—

(A) identify ongoing scientific challenges for understanding the long and short term effects of sequestered carbon dioxide, especially in

shallow geologic formations and sites not used for enhanced oil recovery;

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

(C) leverage the collective body of knowledge from existing carbon utilization and sequestration research, including from the United States Geological Survey and the national Carbon Utilization Research Center; and

(D) engage with other Federal agencies, research communities, and potential users of information produced under this section.

(3) COORDINATION.—In carrying out the initiative under subsection (a), the Secretary of Energy shall ensure coordination with relevant Federal agencies, including the Department of the Interior, the Environmental Protection Agency, and the Department of Agriculture, and prioritize the following objectives:

(A) leveraging experience from existing entities, demonstrations, and research sponsored by the Department, including Regional Carbon Sequestration Partnerships;

(B) increasing the understanding and development of permanent soil carbon sequestration;

(C) providing a coordinated update of carbon storage potential across the United States by integrating data with DOE's Carbon Storage Atlas; and

(D) developing computational tools, in coordination with DOE's Office of Advanced Scientific Computing Research and the National Risk Assessment Partnership, to assess and manage potential environmental impacts at geologic carbon dioxide storage sites.

(4) DUPLICATION.—The Secretary shall ensure the coordination of, and avoid unnecessary duplication of, the activities of this initiative with the activities of—

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

(B) industry.

(5) RESEARCH PLAN.—Not later than 1 year after the date of enactment of this Act, the Secretary shall transmit to the Committee on Science,

Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a 4-year research plan that identifies and prioritizes basic research needs relating to carbon sequestration in geologic formations.

SEC. 424. FRONTIER OBSERVATORY FOR RESEARCH IN GEOTHERMAL ENERGY.

Section 615 (c)(7)(A) of the Energy Independence and Security Act of 2007 (42 U.S.C. 17194) is amended by adding at the end the following:

''(vi) $70,000,000 for fiscal year 2026;

''(vii) $70,000,000 for fiscal year 2027;

''(viii) $70,000,000 for fiscal year 2028;

''(ix) $70,000,000 for fiscal year 2029;

''(x) $70,000,000 for fiscal year 2030; and

''(xi) $70,000,000 for fiscal year 2031.''.

SEC. 425. ENERGY STORAGE GRAND CHALLENGE.

(a) IN GENERAL.—The Secretary shall carry out a research challenge to be known as the ''Energy Storage

Grand Challenge'' (referred to in this section as the ''Challenge'') to support and accelerate the research, development, and demonstration of advanced energy storage technologies, in order to—

(1) support basic research in capabilities that enable temporal flexibility in the conversion of energy resources to useful energy services;

(2) inform the development of a broad range of energy storage systems, including batteries, chemical storage, and thermal storage, with emphasis on innovative materials, manufacturing, and recycling; and

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

(b) LEVERAGING.—In carrying out programs and activities under the Challenge, the Secretary shall leverage expertise and resources and facilitate collaboration between—

(1) the Office of Electricity;

(2) the Office of Energy Efficiency and Renewable Energy;

(3) the Office of Fossil Energy;

(4) the Office of Nuclear Energy; and

(5) the Basic Energy Sciences Program and Advanced Scientific Computing Program of the Office of Science.

The Secretary may organize additional activities under this subsection through Energy Frontier Research Centers, Energy Innovation Hubs, or cross-cutting research programs.

(c) GRID SCALE ENERGY STORAGE USER FACILITIES.—Not later than 180 days after the date of enactment of this Act, the Secretary shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a 4-year research plan that identifies and prioritizes basic research needs relating to the development, construction, operation, and maintenance of grid scale energy storage technology demonstration projects, which shall operate as national user facilities.

SEC. 426. CRITICAL INFRASTRUCTURE RESEARCH AND CONSTRUCTION.

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

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

(1) the Office of Electricity;

(2) the Office of Cybersecurity, Energy Security, and Emergency Response;

(3) the Office of Science;

(4) the Department of Defense; and

(5) the Department of Homeland Security.

(c) CRITICAL INFRASTRUCTURE TEST RANGE.—In carrying out the program under subsection (a), the Secretary shall establish and operate a Critical Infrastructure Test Range (referred to in this section as the ''Test Range'') that allows for scalable physical and cyber performance testing to be conducted on industry-scale infrastructure systems. This facility shall include a focus on—

(1) cyber security test beds; and

(2) electric grid test beds.

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

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

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

(g) TERMINATION.—Consistent with the existing authorities of the Department, the Secretary may terminate the Test Range for cause during the performance period.

TITLE V—NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

SEC. 501. FINDINGS.

Congress finds the following:

(1) The National Institute of Standards and Technology (NIST) promotes United States innovation and industrial competitiveness by advancing measurement science, standards and technology in ways that enhance economic security and improve Americans' quality of life.

(2) NIST's leadership in a broad range of cutting-edge scientific endeavors including but not limited to quantum science and engineering, cybersecurity, biologics, artificial intelligence (AI), machine

learning, additive manufacturing, disaster resilience, and international standards development is critical to America's leadership in the industries of the future.

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

SEC. 502. AUTHORIZATION OF APPROPRIATIONS.

(a) FISCAL YEAR 2022.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce $1,244,800,000 for the National Institute of Standards and Technology for fiscal year 2022.

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

(A) $866,800,000 shall be for scientific and technical research and services laboratory activities, of which $9,900,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities, of which $120,000,000 shall be for Safety, Capacity, Maintenance, and Major Repairs, including $20,000,000 for IT infrastructure; and

(C) $178,000,000 shall be for industrial technology services activities, of which $153,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Standards and Technology Act (15 U.S.C. 278k and 278l) and $25,000,000 shall be for the Network for Manufacturing Innovation Program under section 34 of the National Institute of Standards and Technology Act (15 U.S.C. 278s).

(b) FISCAL YEAR 2023.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce $1,326,600,000 for the National Institute of Standards and Technology for fiscal year 2023.

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

(A) $945,600,000 shall be for scientific and technical research and services laboratory activities, of which $10,800,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities, of which $120,000,000 shall be for Safety, Capacity,

Maintenance, and Major Repairs, including $20,000,000 for IT infrastructure; and

(C) $181,000,000 shall be for industrial technology services activities, of which $156,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Standards and Technology Act (15 U.S.C. 278k and 278l) and $25,000,000 shall be for the Network for Manufacturing Innovation Program under section 34 of the National Institute of Standards and Technology Act (15 U.S.C. 278s).

(c) FISCAL YEAR 2024.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce $1,408,400,000 for the National Institute of Standards and Technology for fiscal year 2024.

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

(A) $1,024,000,000 shall be for scientific and technical research and services laboratory activities, of which $11,700,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities, of which $120,000,000 shall be for Safety, Capacity, Maintenance, and Major Repairs, including $10,000,000 for IT infrastructure; and

(C) $184,000,000 shall be for industrial technology services activities, of which $159,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Standards and Technology Act (15 U.S.C. 278k and 278I) and $25,000,000 shall be for the Network for Manufacturing Innovation Program under section 34 of the National Institute of Standards and Technology Act (15 U.S.C. 278s).

(d) FISCAL YEAR 2025.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce $1,490,200,000 for the National Institute of Standards and Technology for fiscal year 2025.

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

(A) $1,103,200,000 shall be for scientific and technical research and services laboratory

activities, of which $12,600,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities of which $120,000,000 shall be for Safety, Capacity, Maintenance, and Major Repairs, including $10,000,000 for IT infrastructure; and

(C) $187,000,000 shall be for industrial technology services activities, of which $162,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Standards and Technology Act (15 U.S.C. 278k and 278I) and $25,000,000 shall be for the Network for Manufacturing Innovation Program under section 34 of the National Institute of Standards and Technology Act (15 U.S.C. 278s).

(e) FISCAL YEAR 2026.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce $1,572,000,000 for the National Institute of Standards and Technology for fiscal year 2026.

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

(A) $1,182,000,000 shall be for scientific and technical research and services laboratory activities, of which $13,500,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities, of which $120,000,000 shall be for Safety, Capacity, Maintenance, and Major Repairs, including $10,000,000 for IT infrastructure; and

(C) $190,000,000 shall be for industrial technology services activities, of which $165,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Standards and Technology Act (15 U.S.C. 278k and 278I) and $25,000,000 shall be for the Network for Manufacturing Innovation Program under section 34 of the National Institute of Standards and Technology Act (15 U.S.C. 278s).

(f) FISCAL YEAR 2027.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce $1,653,800,000 for the National Institute of Standards and Technology for fiscal year 2027.

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

(A) $1,260,800,000 shall be for scientific and technical research and services laboratory activities, of which $14,400,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities, of which $120,000,000 shall be for Safety, Capacity, Maintenance, and Major Repairs, including $10,000,000 for IT infrastructure; and

(C) $193,000,000 shall be for industrial technology services activities, of which $168,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Standards and Technology Act (15 U.S.C. 278k and 278I) and $25,000,000 shall be for the Network for Manufacturing Innovation Program under section 34 of the National Institute of Standards and Technology Act (15 U.S.C. 278s).

(g) FISCAL YEAR 2028.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce

$1,735,600,000 for the National Institute of Standards and Technology for fiscal year 2028.

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

(A) $1,339,600,000 shall be for scientific and technical research and services laboratory activities, of which $15,300,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities, of which $120,000,000 shall be for Safety, Capacity, Maintenance, and Major Repairs, including $10,000,000 for IT infrastructure; and

(C) $196,000,000 shall be for industrial technology services activities, of which $174,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Standards and Technology Act (15 U.S.C. 278k and 278I) and $25,000,000 shall be for the Network for Manufacturing Innovation Program under section 34 of the National Institute of Standards and Technology Act (15 U.S.C. 278s).

(h) FISCAL YEAR 2029.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce $1,817,400,000 for the National Institute of Standards and Technology for fiscal year 2029.

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

(A) $1,418,000,000 shall be for scientific and technical research and services laboratory activities, of which $16,200,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities, of which $120,000,000 shall be for Safety, Capacity, Maintenance, and Major Repairs, including $10,000,000 for IT infrastructure; and

(C) $199,000,000 shall be for industrial technology services activities, of which $174,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Standards and Technology Act (15 U.S.C. 278k and 278I) and $25,000,000 shall be for the Network for Manufacturing Innovation Program under section 34 of the National Institute of

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

(i) FISCAL YEAR 2030.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce $1,899,200,000 for the National Institute of Standards and Technology for fiscal year 2030.

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

(A) $1,497,200,000 shall be for scientific and technical research and services laboratory activities, of which $17,100,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities, of which $120,000,000 shall be for Safety, Capacity, Maintenance, and Major Repairs, including $10,000,000 for IT infrastructure; and

(C) $202,000,000 shall be for industrial technology services activities, of which $177,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Standards and Technology Act (15 U.S.C. 278k and 278l) and $25,000,000 shall be for the Net-

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

(j) FISCAL YEAR 2031.—

(1) IN GENERAL.—There are authorized to be appropriated to the Secretary of Commerce $1,981,000,000 for the National Institute of Standards and Technology for fiscal year 2031.

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

(A) $1,576,000,000 shall be for scientific and technical research and services laboratory activities, of which $18,000,000 may be transferred to the Working Capital Fund;

(B) $200,000,000 shall be for the construction and maintenance of facilities, of which $120,000,000 shall be for Safety, Capacity, Maintenance, and Major Repairs, including $10,000,000 for IT infrastructure; and

(C) $205,000,000 shall be for industrial technology services activities, of which $180,000,000 shall be for the Manufacturing Extension Partnership program under sections 25 and 26 of the National Institute of Stand-

ards and Technology Act (15 U.S.C. 278k and 278l) and $25,000,000 shall be for the Network for Manufacturing Innovation Program under section 34 of the National Institute of Standards and Technology Act (15 U.S.C. 278s).

SEC. 503. NIST FACILITIES MODERNIZATION FUND.

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

(b) USE OF FUNDS.—Amounts in the Fund shall be available to Secretary, acting through the Director, for Capital Projects on the National Institute of Standards and Technology's campuses for the modernization and construction of research facilities needed to conduct leading edge scientific and technical research.

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

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

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

(d) AUTHORIZATION OF FUNDS.—Of the funds authorized to be appropriated in section 302 of this Act for the construction and maintenance of facilities,

$80,000,000 for each of the fiscal years 2022 through 2031 shall be provided for the Fund established in subsection (a).

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

(f) NOTIFICATION TO COMMITTEES.—Upon making any obligation or expenditure of any amount in the Fund, the Secretary, through the Director, shall notify the House of Representatives Science, Space, and Technology Committee, the Senate Committee on Commerce, Science, and Transportation, the Committee on Appropriations of the House of Representatives and the Committee on Appropriations of the Senate of the amount and purpose of the obligation or expenditure.

(g) NIST FACILITIES MODERNIZATION AND MAINTENANCE PLAN.—

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

(2) TIMING.—The modernization and maintenance plan required in paragraph (1) shall be sub-

mitted to Congress within 30 days of enactment of this Act, and updated on an annual basis.

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

(A) A list of Capitol Construction Projects expected to be undertaken in the next 5 years, the core capabilities these facilities will provide, anticipated schedule of construction, and anticipated funding requirements.

(B) A list of planned utility infrastructure projects expected to be undertaken in the next 5 years, anticipated schedule of construction, and anticipated funding requirements.

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

(D) A list of the deferred maintenance, a list of deferred maintenance projects expected to be undertaken in the next 5 years, anticipated schedule of construction, anticipated funding requirements, and an evaluation of progress made in reducing the deferred maintenance backlog.

SEC. 504. CYBERSECURITY RESEARCH.

(a) RESEARCH.—The Secretary, acting through the Director, shall expand the fundamental and applied research carried out by the Institute to address key questions relating the measurement of privacy, security, and vulnerability of software tools and communications networks, including through—

(1) the development of research and engineering capabilities to provide practical solutions, including measurement techniques and engineering toolkits, to solve cybersecurity challenges such as human factors, identity management, network security, privacy, and software;

(2) investment in tools to help private and public sector organizations, including institutions of higher education and research organizations, measure and manage cybersecurity risks and ensure workforce preparedness for new cybersecurity challenges; and

(3) investment in programs to prepare the United States with strong cybersecurity and encryption technologies to apply to emerging technologies such as artificial intelligence, the internet of things, and quantum computing.

(b) ASSISTANCE TO FEDERAL AGENCIES.—The Director shall enhance and expand the Institute's guidance

and assistance to Federal agencies to help agencies effectively implement the Framework for Improving Critical Infrastructure Cybersecurity, including—

(1) technical guidance on the requirements in the Executive order;

(2) technical guidance and education and training of agency staff responsible for cyber security, consultative services, and other assistance at individual Federal agencies; and

(3) technical guidance and education and training of individual Federal agency Inspectors General and staff who are responsible for the annual independent evaluation they are required to perform of the information security program and practices of Federal agencies under section 3555 of title 44, United States Code.

(c) REPORT.—The Director shall provide the House Science, Space, and Technology Committee and the Senate Committee on Commerce, Science, and Transportation a report, not later than 12 months after the date of the enactment of this Act, describing how the National Institute of Standards and Technology carried out the activities described in subsection (b) in as much detail as possible, including identification of agencies assisted and the types of consultative services, education, guidance, assist-

ance, and training provided to individual agencies and Inspectors General.

SEC. 505. INTERNET OF THINGS.

The Secretary, acting through the Director, shall continue to conduct research with respect to and support the expanded connectivity, interoperability, and security of interconnected systems and other aspects of the internet of things, including through—

(1) the development of new tools and methodologies for cybersecurity of the internet of things;

(2) the development of technologies to address network congestion and device interference, such as the development of testing tools for next generation wireless communications, internet of things protocols, coexistence of wireless communications systems, and spectrum sharing;

(3) convening experts in the public and private sectors to develop recommendations for accelerating the adoption of sound interoperability standards, guidelines, and best practices for the internet of things; and

(4) the development and publication of new cybersecurity tools, encryption methods, and best practices for internet of things security.

SEC. 506. COMPOSITES RESEARCH.

(a) RESEARCH.—The Secretary, acting through the Director, shall implement the recommendations contained in the December 2017 report entitled ''Road Mapping Workshop Report on Overcoming Barriers to Adoption of Composites in Sustainable Infrastructure'', as appropriate, to help facilitate the adoption of composite technology in infrastructure in the United States. In implementing such recommendations, the Secretary, acting through the Director shall, with respect to the use of composite technology in infrastructure—

(1) not later than 6 months after the date of enactment of this Act, initiate the establishment of a design data clearinghouse to identify, gather, validate, and disseminate existing design criteria, tools, guidelines, and standards; and

(2) develop methods and resources required for testing an evaluation of safe and appropriate uses of composite materials for infrastructure, including—

(A) conditioning protocols, procedures and models;

(B) screening and acceptance tools; and

(C) minimum allowable design data sets that can be converted into design tools.

(b) STANDARDS COORDINATION.—The Secretary, acting through the Director, shall assure that the appro-

priate Institute staff consult regularly with standards developers, members of the composites industry, institutions of higher education, and other stakeholders in order to facilitate the adoption of standards for use of composite materials in infrastructure that are based on the research and testing results and other information developed by the Institute.

SEC. 507. ENABLING THE FUTURE BIOECONOMY.

The Secretary, acting through the Director, shall continue to support the research and development of engineering biology, including through—

(1) building up NIST's core capabilities in measurement science supporting synthetic biology by investing in foundational measurement tools;

(2) delivering the necessary measurement methods, standards and related services required to impart confidence in emerging engineering biology capabilities; and

(3) developing and evaluating computation tools in order to develop and deploy predictive models that will ink biological blueprints with biological outcomes.

SEC. 508. INTERNATIONAL STANDARDS DEVELOPMENT.

(a) FINDINGS.—Congress finds the following:

(1) Widespread use of standards facilitates technology advancement by defining and establishing common foundations for product differentiation, technological innovation, and other value-added services.

(2) Standards also promote an expanded, more interoperable, and efficient marketplace.

(3) Global cooperation and coordination on standards for emerging technologies will be critical for having a consistent set of rules to enable market competition, preclude barriers to trade, and allow innovation to flourish.

(4) China's ''Standardization Reform Plan'' and ''Five-Year Plan for Standardization'' highlight its high-level goals to establish China as a ''standards power'' by 2020, participate in at least half of all standards drafting and revision efforts in recognized international standards setting organizations, and to strengthen China's participation in the governance of international standards setting organizations.

(5) As emerging technologies develop for global deployment, it is critical that the Unite States and its allies continue to shape standards that underpin

the technologies themselves, and the future international governance of these technologies.

(6) United States position on standardization in emerging technologies will be critical to United States economic competitiveness.

(7) NIST is in a unique position to strengthen United States leadership in standards development, particularly for emerging technologies, to ensure continuing United States economic competitiveness and national security.

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

(1) while United States experts have historically been leaders in international standards development activities, there is concern that the United States is losing its edge;

(2) strengthening the unique United States public-private partnerships approach to standards development is critical to United States economic competitiveness; and

(3) the United States Government should ensure cooperation and coordination across Federal agencies to partner with and support private sector stakeholders to continue to shape international dia-

logues in regard to standards development for emerging technologies.

(c) RESEARCH ACTIVITIES AND ENGAGEMENT.—The Secretary, acting through the Director, shall—

(1) build capacity and training opportunities to help create a pipeline of talent and leadership in key standards development positions, including standards education and training related activities targeted at integrating standards content into undergraduate and graduate curricula in science, engineering, business, public policy, and law;

(2) partner with private sector entities to support strategically increased engagement and leadership in the development of international standards for digital economy technologies, including partnering with industry to incentivize private sector partners to develop standards strategies and support engagement and participation in the relevant standards activities; and

(3) develop approaches to prioritize standardization for emerging technologies, identify organization in which to develop these standards, identify leadership positions of interest to the United States, and identify key contributors for technical and leadership expertise in these areas.

SEC. 509. REVIEW OF THE CENTER FOR NEUTRON RESEARCH.

Not later than 1 year after the date of enactment of this Act, the Comptroller of the United States shall conduct an evaluation of NIST's Center for Neutron Research, including the following:

(1) An assessment of what progress NIST has made in planning for the future of the Center for Neutron Research's nuclear reactor since the release of the 2018 National Academies report, and what steps NIST has taken to implement the Academies report.

(2) An analysis of the extent to which NIST's planning efforts align with leading practices.

(3) An assessment of the extent to which NIST has worked with the Department of Energy to identify the scientific community's long-term needs for neutron research facilities and discuss the coordination of future facilities, and how these agencies are factoring these needs into their decision-making process.

(4) Recommendations for NIST and the Department of Energy on how best to continue to support civilian nuclear research reactors.

SEC. 510. HIRING AND MANAGEMENT.

(a) DIRECT HIRE AUTHORITY.—The Secretary, acting through the Director, may—

(1) appoint, without regard to the provisions of subchapter I of chapter 33 of title 5, United States Code (other than sections 3303, 3328, and 3330e of such chapter), qualified candidates to scientific, engineering, and professional positions for carrying out research and development functions which require the services of specially qualified personnel relating to cybersecurity and quantum information science and technology and such other areas of national research priorities as the Secretary, acting through the Director, may determine; and

(2) fix the rate of basic pay of any individual appointed under paragraph (1), at a rate not in excess of the basic rate of pay of the Vice President under section 104 of title 3, United States Code, without regard to title 5, United States Code.

(b) LIMITATION.—The Director may appoint not more than 10 individuals under subsection (a).

(c) SUNSET.—The authority under subsection (a) shall expire on the date that is 10 years after the date of enactment of this Act.

(d) OTHER TRANSACTION AUTHORITY.—Section 2(b)(4) of the National Institute of Standards and Tech-

nology Act (15 U.S.C. 272(b)(4)) is amended to read as follows:

''(4) to enter into and perform such contracts, including cooperative research and development arrangements and grants and cooperative agreements or other transactions, as may be necessary in the conduct of its work and on such terms as it may deem appropriate, in furtherance of the purposes of this Act;''.

SEC. 511. NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY FOUNDATION.

(a) IN GENERAL.—The Secretary of Commerce, acting through the Director, may establish or enter into an agreement with a nonprofit organization to establish a National Institute of Standards and Technology Foundation. The Foundation shall not be an agency or instrumentality of the United States Government.

(b) PURPOSE.—The purpose of the Foundation shall be to support the National Institute of Standards and Technology in its mission.

(c) ACTIVITIES.—Activities of the Foundation may include the solicitation and acceptance of funds—

(1) to support international metrology and standards engagement activities;

(2) to conduct education and outreach activities; and

(3) to offer direct support to NIST associates, including through activities such as the provision of fellowships, grants, and occupational safety and awareness training.

(d) TRANSFER OF FUNDS.—The Director may authorize, under the agreement under subsection (a), the transfer of funds from the National Institute of Standards and Technology to the nonprofit organization to offset any administrative costs of the Foundation.

(e) LIABILITY.—The United States shall not be liable for any debts, defaults, acts, or omissions of the Foundation. The full faith and credit of the United States shall not extend to any obligations of the Foundation.

SEC. 512. MEP OUTREACH.

Section 25 of the National Institute of Standards and Technology Act (15 U.S.C. 278k) is amended—

(1) in subsection (c)—

(A) in paragraph (6), by striking ''community colleges and area career and technical education schools'' and inserting the following: ''secondary schools (as defined in section 8101 of the Elementary and Secondary Education Act of 1965 (20 U.S.C. 7801)), community col-

leges, and area career and technical education schools, including those in underserved and rural communities,''; and

(B) in paragraph (7)—

(i) by striking ''and local colleges'' and inserting the following: ''local high schools and local colleges, including those in underserved and rural communities,''; and

(ii) by inserting ''or other applied learning opportunities'' after ''apprenticeships''; and

(2) in subsection (d)(3), by striking '', community colleges, and area career and technical education schools,'' and inserting the following: ''and local high schools, community colleges, and area career and technical education schools, including those in underserved and rural communities,''.

SEC. 513. DEFINITIONS.

In this title:

(1) DIRECTOR.—The term ''Director'' means the Director of the National Institute of Standards and Technology.

(2) FRAMEWORK.—The term ''Framework'' means the Framework for Improving Critical Infra-

structure Cybersecurity developed by the National Institute of Standards and Technology and referred to in Executive Order 13800 issued on May 11, 2017 (82 Fed. Reg. 22391 et seq.).

(3) INSTITUTE.—The term ''Institute'' means the National Institute of Standards and Technology.

(4) INSTITUTION OF HIGHER EDUCATION.—The term ''institution of higher education'' has the meaning given such term in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001).

(5) NIST ASSOCIATE.—The term ''NIST associate'' means any guest researcher, research associate, facility user, or volunteer who conducts research at a National Institute of Standards and Technology facility, but is not an employee of the National Institute of Standards and Technology or of another Federal department or agency.

(6) SECRETARY.—The term ''Secretary'' means the Secretary of Commerce.

TITLE VI—NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

SEC. 601. ESTABLISHMENT OF A TECHNOLOGY TRANSFER OFFICE.

(a) TECHNOLOGY TRANSFER OFFICE.—The Under Secretary shall establish a technology transfer office at the corporate agency level.

(b) TECHNOLOGY TRANSFER COORDINATOR.—The Under Secretary shall appoint a Technology Transfer Coordinator to be the principal advisor to the Under Secretary on all matters relating to technology transfer and commercialization and will serve as director of the technology transfer office.

(c) QUALIFICATIONS.—The Coordinator shall be an individual who, by reason of professional background and experience, is specially qualified to advise the Under Secretary on matters pertaining to technology transfer at the Agency.

(d) DUTIES OF THE COORDINATOR.—The Coordinator shall oversee—

(1) the expenditure of funds allocated for technology transfer within the Agency;

(2) efforts to improve research to operations within the Office of Oceanic and Atmospheric Research and other Agency line offices;

(3) efforts to engage private sector entities, including venture capital companies;

(4) efforts to engage State and local governments;

(5) coordinate efforts across the Agency; and

(6) facilitate knowledge transfer from the Agency on Federal standards to commercial, State, and local governments.

(e) TECHNOLOGY TRANSFER RESPONSIBILITY.—Nothing in this section affects the technology transfer responsibilities of Federal employees under the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3701 et seq.).

(f) PLANNING AND REPORTING.—

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Under Secretary shall submit to Congress a technology transfer execution plan.

(2) UPDATES.—Each year after the submission of the plan under paragraph (1), the Under Secretary shall submit to Congress an updated execution plan and reports that describe progress toward

meeting goals set forth in the execution plan and the funds expended under subsection (e).

SEC. 602. TECHNOLOGY TRANSFER AND TRANSITIONS ASSESSMENT.

Not later than 1 year after the date of enactment of this Act, and annually thereafter, the Under Secretary shall transmit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report which shall include—

(1) report on the Agency's research to operations activities during the previous fiscal year; and

(2) recommended agency policy changes to increase research to operations activities in the coming fiscal year.

SEC. 603. NATIONAL MESONET PROGRAM.

(a) FINDINGS.—Congress finds that—

(1) since the initial establishment of a private-public partnership demonstration program, the National Mesonet Program has leveraged data collected by existing weather station networks to—

(A) provide accurate, real-time observation for weather forecasters and emergency response personnel in metropolitan areas across the United States;

(B) address persistent impediments, identified in a National Academy of Sciences Report released in 2009, to fulfill the need for broader and denser weather observation networks to improve severe weather lead-times;

(C) achieve major improvements for the National Oceanic and Atmospheric Administration and the broader American Weather Enterprise, despite some significant development issues and cost overruns, according to a National Academy of Sciences Report released in 2011;

(D) increase the amount of non-Federal weather data available to government by orders of magnitude; and

(E) improve understanding of the impact, the size and duration of mesoscale weather events; and

(2) the National Mesonet Program is a critical component of agency operations and provides reliable, real-time prediction and observation capabilities for the physical environment that enhances response and prevention strategies to severe weather events.

(b) PROGRAM.—The National Weather Service shall carry out the National Mesonet Program under law to improve understanding of and forecast capabilities for atmospheric events, placing priority on leveraging available commercial and other non-Federal weather data to enhance coordination across the private, public, and academic sectors of the American weather enterprise.

(c) PROGRAM ELEMENTS.—The program described in subsection (b) shall focus on the following activities:

(1) Improving the National Oceanic and Atmospheric Administration and the National Weather Service's ability to provide the baseline forecasts and warnings that protect the Nation's citizens, businesses, military, and government agencies and enable them to operate and perform in safe, efficient, and orderly manners.

(2) Yielding significant amounts of boundary-layer data to result in dramatic improvements in numerical weather prediction performance.

(3) Providing the critical technical and administrative infrastructure needed to facilitate rapid integration of new and emerging surface, boundary layer, and space-based networks anticipated in coming years.

(4) Utilizing and integrating existing National Oceanic and Atmospheric Administration data, including, but not limited to, National Ocean Service water level stations into existing forecasts.

(5) Leveraging existing networks of environmental monitoring stations to dramatically increase the quantity and density of weather observations available to the National Weather Service at a highly cost-effective price.

(6) Supporting the National Weather Service in reaching its target of a 30-minute warning time for severe weather through better predictive algorithms driven by increasingly effective observations.

(d) AUTHORIZATION OF APPROPRIATIONS.—Of amounts otherwise made available to the National Weather Service, there are authorized to carry out this section $25,000,000 for fiscal year 2022, $26,000,000 for fiscal year 2023, $27,000,000 for fiscal year 2024, $28,000,000 for fiscal year 2025, $29,000,000 for fiscal year 2026, and $30,000,000 for fiscal year 2027.

SEC. 604. SEVERE WEATHER EXTRAMURAL TESTBEDS.

(a) FINDINGS.—Congress finds the following:

(1) The Weather Research and Forecasting Innovation Act of 2017 instructs NOAA to prioritize improving weather data, modeling, computing, fore-

casting and warnings for the protection of life and property and for the enhancement of the national economy.

(2) The Weather Research and Forecasting Innovation Act of 2017 has also mandated that the NOAA Office of Oceanic and Atmospheric Research prioritize involving extramural partners to leverage existing public and private resources to expand and improve weather forecasting and modeling as quickly and efficiently as possible.

(3) There is a need for additional weather research and forecasting innovation given the increasing number of severe weather events and their increasing effect on public health, safety, and national and regional economic well-being.

(b) PROGRAM.—Not later than 180 days after the enactment of this Act, the Assistant Administrator for the Office of Oceanic and Atmospheric Research shall establish a program to create one or more weather research testbeds, hosted by extramural university based partners, to develop improved understanding of and forecast capabilities for atmospheric events and their impacts. Resources for such testbeds shall not be taken from the existing NOAA cooperative institutes.

(c) PROGRAM ELEMENTS.—The program described in subsection (b) shall focus on the following activities:

(1) Improving the fundamental understanding of weather, including the boundary layer and other processes affecting high impact weather events.

(2) Improving the understanding of how the public receives, interprets, and responds to warnings and forecasts of high impact weather events that endanger life and property.

(3) Research and development, and transfer of knowledge, technologies, and applications to the National Weather Service and other appropriate agencies and entities, including the United States weather industry and academic partners.

(d) EXTRAMURAL RESEARCH.—

(1) IN GENERAL.—In carrying out the program under this section, the Assistant Administrator for Oceanic and Atmospheric Research shall collaborate with and support the non-Federal weather research community, which includes institutions of higher education, private entities, and nongovernmental organizations, by making funds available through competitive grants, contracts, and cooperative agreements. Preference shall be given to applicants with significant expertise in severe weather research that

are co-located with existing NOAA intramural weather related laboratories.

(2) EXTRAMURAL ACADEMIC PARTNERS.—Of the funds authorized in subsection (e), not less than 80 percent shall be dedicated to research of extramural academic partners.

(e) AUTHORIZATION OF APPROPRIATIONS.—For each of fiscal years 2022 and 2023, there are authorized out of funds appropriated to the National Oceanic and Atmospheric Administration, $10,000,000 to carry out the activities of this section.

SEC. 605. NEXT GENERATION DIGITAL RADAR.

(a) FINDINGS.—Congress finds that—

(1) the national weather radar network is aging, and procurement and replacement must begin by early in the decade commencing with the year 2030;

(2) research by the National Oceanic and Atmospheric Administration on next generation radar systems has largely focused on the development of a phased array radar for severe weather forecasting;

(3) a phased array radar system can achieve precise measurements of precipitation rates and conditions through a rapid scan of the atmosphere to

reveal critical weather thumbprints that point to the potential of severe weather;

(4) though initially established through the joint collaboration between the Federal Aviation Administration and the National Oceanic and Atmospheric Administration, the potential for use of the phased array radar for severe weather observations has emerged as the focus;

(5) lifetime operations and maintenance costs will be significantly reduced due to the simple, digital process for updating the digital array radar system; and

(6) the National Oceanic and Atmospheric Administration must continue to conduct crucial technical risk reduction research to be ready for the next generation of radar networks.

(b) PROGRAM.—The Under Secretary shall develop, in collaboration with the Assistant Administrators for Weather Services and Oceanic and Atmospheric Research, and utilizing NOAA's existing academic partners for implementation, a technical risk reduction program, that will lead to the baseline requirements to procure an all-digital ground based phased array radar system for initial deployment by no later than 2032. At a minimum, such a program must demonstrate the ability to significantly im-

prove the accuracy of severe weather forecasts while lowering long term Federal operating costs.

(c) PROGRAM ELEMENTS.—The program described in subsection (b) shall focus on the following activities:

(1) Definition of key system requirements needed to cost effectively lead to significantly improve weather forecasting accuracy and precision through a nationwide all-digital ground based phased array weather radar system.

(2) Identification of critical technologies and subsystems on the critical path to the development of an all-digital phased array system, and an investment schedule to reduce risk in each designated area.

(3) Development of a full-scale digital phased array radar demonstrator that will meet requirements set in paragraph (1).

(4) Development of a multi-year effort to strengthen ties between NOAA and its public university based academic partners so as to maintain an ongoing reservoir of science and technology talent to help to guide and advise Federal program managers on the implementation and use of an all-digital phased array radar system.

(d) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts otherwise made available to the National Oceanic and Atmospheric Administration's Operations, Research, and Facilities Action, there are authorized to carry out this section $20,000,000 for each of fiscal years 2022 and 2023.

SEC. 606. FELLOWSHIPS.

(a) IN GENERAL.—To carry out the educational and training objectives of this Act, the Under Secretary shall support a program of weather fellowships for qualified individuals at the graduate and postgraduate level. The fellowships shall be related to meteorology, atmospheric science, space weather, and climatology and awarded pursuant to guidelines established by the Under Secretary.

(b) WEATHER FELLOWSHIP.—The Under Secretary may award weather fellowships to support the placement of individuals at the graduate level of education in fields related to meteorology, atmospheric science, space weather, and climatology within NOAA. A fellowship awarded under this subsection shall be for a period of not more than 1 year.

SEC. 607. COMMERCIAL DATA REPORT UPDATE.

Section 302(d)(4) of the Weather Research and Forecasting Innovation Act of 2017 (15 U.S.C. 8532(d)(4))

is amended by striking the period and inserting: ", including—

"(A) if the Under Secretary determines that existing commercial data does not meet National Oceanic and Atmospheric Administration needs, an explanation of why the commercial data was not sufficient; and

"(B) if the Under Secretary determines that no commercial data will be purchased in a fiscal year, guidance to Congress about potential uses of commercial data.".

SEC. 608. REPORT ON NATIONAL WEATHER SERVICE INTERNET BANDWIDTH SHORTAGE.

(a) IN GENERAL.—Not later than six months after the date of enactment of this Act, the Under Secretary shall issue a report to the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science, Space, and Technology of the House, a report on internet bandwidth issues at the National Center for Environmental Prediction.

(b) CONTENTS.—The report required under subsection (a) shall include—

(1) an assessment of the cause of any internet bandwidth issues experienced by the National Weather Service;

(2) recommended solutions to mitigate ongoing bandwidth issues;

(3) potential impacts on commercial data users; and

(4) estimated costs of recommended solutions.

SEC. 609. NAPA STUDY.

(a) IN GENERAL.—The Under Secretary shall contract with the National Academy of Public Administration to conduct a study examining the feasibility of transferring Marine Protection services to the Department of the Interior.

(b) REPORT.—Not later than 180 days after the date of enactment of this Act, the Under Secretary shall submit to Congress a report on the results of the study conducted under subsection (a).

SEC. 610. AUTHORIZATION OF APPROPRIATIONS.

(a) FINDINGS.—Congress finds the following:

(1) The National Oceanic and Atmospheric Administration promotes United States science and innovation by providing weather forecasts, severe storm warnings, and climate monitoring that support and affect more than one-third of the national gross domestic product.

(2) The Office of Oceanic and Atmospheric Research provides science that enables better forecasts,

earlier warnings for natural disasters, and a greater understanding of the Earth.

(3) The cutting-edge research conducted at OAR provides citizens, planners, and emergency managers reliable information that is critical to daily life.

(b) AUTHORIZATION OF APPROPRIATIONS.—Of amounts otherwise available to the National Oceanic and Atmospheric Administration, there are authorized to be appropriated for the Office of Oceanic and Atmospheric Research—

(1) $614,000,000 for fiscal year 2022;

(2) $665,000,000 for fiscal year 2023;

(3) $720,000,000 for fiscal year 2024;

(4) $780,000,000 for fiscal year 2025;

(5) $845,000,000 for fiscal year 2026;

(6) $915,000,000 for fiscal year 2027;

(7) $990,000,000 for fiscal year 2028;

(8) $1,072,000,000 for fiscal year 2029;

(9) $1,146,000,000 for fiscal year 2030; and

(10) $1,228,000,000 for fiscal year 2031.

SEC. 611. DEFINITIONS.

In this title:

(1) AGENCY.—The term ''Agency'' means the National Oceanic and Atmospheric Administration.

(2) NOAA.—The term ''NOAA'' means the National Oceanic and Atmospheric Administration.

(3) UNDER SECRETARY.—The term ''Under Secretary'' means the Under Secretary of Commerce for Oceans and Atmosphere.

TITLE VII—NATIONAL SCIENCE FOUNDATION

SEC. 701. AUTHORIZATION OF APPROPRIATIONS.

(a) FISCAL YEAR 2022.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $9,288,351,900 for fiscal year 2022.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $7,600,745,900 shall be made available for research and related activities;

(B) $1,057,950,000 shall be made available for education and human resources including—

(i) $85,800,000 for the Advanced Technical Education Program;

(ii) $315,000,000 for the Graduate Research Fellowship Program;

(iii) $83,250,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $82,500,000 for the CyberCorps Scholarship for Service Program; and

(v) $64,000,000 for the NSF Research Traineeship Program;

(C) $255,000,000 shall be made available for major research equipment and facilities construction, of which $90,000,000 shall be for mid-scale projects;

(D) $352,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $18,156,000 shall be made available for the Office of the Inspector General.

(b) FISCAL YEAR 2023.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $10,058,692,800 for fiscal year 2023.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $8,291,722,800 shall be made available for research and related activities;

(B) $1,129,950,000 shall be made available for education and human resources including—

(i) $92,400,000 for the Advanced Technical Education Program;

(ii) $342,000,000 for the Graduate Research Fellowship Program;

(iii) $97,500,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $96,250,000 for the CyberCorps Scholarship for Service Program; and

(v) $66,000,000 for the NSF Research Traineeship Program;

(C) $255,000,000 shall be made available for major research equipment and facilities construction, of which $90,000,000 shall be for mid-scale projects;

(D) $359,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $18,520,000 shall be made available for the Office of the Inspector General.

(c) FISCAL YEAR 2024.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $10,862,529,700 for fiscal year 2024.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $8,982,699,700 shall be made available for research and related activities;

(B) $1,205,450,000 shall be made available for education and human resources including—

(i) $99,000,000 for the Advanced Technical Education Program;

(ii) $370,500,000 for the Graduate Research Fellowship Program;

(iii) $113,750,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $110,000,000 for the CyberCorps Scholarship for Service Program; and

(v) $68,000,000 for the NSF Research Traineeship Program;

(C) $285,000,000 shall be made available for major research equipment and facilities construction, of which $105,000,000 shall be for mid-scale projects;

(D) $366,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $18,880,000 shall be made available for the Office of the Inspector General.

(d) FISCAL YEAR 2025.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $11,624,846,600 for fiscal year 2025.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $9,673,676,600 shall be made available for research and related activities;

(B) $1,269,400,000 shall be made available for education and human resources including—

(i) $105,600,000 for the Advanced Technical Education Program;

(ii) $399,000,000 for the Graduate Research Fellowship Program;

(iii) $130,000,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $112,200,000 for the CyberCorps Scholarship for Service Program; and

(v) $70,000,000 for the NSF Research Traineeship Program;

(C) $285,000,000 shall be made available for major research equipment and facilities con-

struction, of which $120,000,000 shall be for mid-scale projects;

(D) $373,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $19,270,000 shall be made available for the Office of the Inspector General.

(e) FISCAL YEAR 2026.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $12,403,503,500 for fiscal year 2026.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $10,364,653,500 shall be made available for research and related activities;

(B) $1,319,700,000 shall be made available for education and human resources including—

(i) $112,200,000 for the Advanced Technical Education Program;

(ii) $427,500,000 for the Graduate Research Fellowship Program;

(iii) $132,600,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $114,400,000 for the CyberCorps Scholarship for Service Program; and

(v) $72,000,000 for the NSF Research Traineeship Program;

(C) $315,000,000 shall be made available for major research equipment and facilities construction, of which $180,000,000 shall be for mid-scale projects;

(D) $380,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $19,650,000 shall be made available for the Office of the Inspector General.

(f) FISCAL YEAR 2027.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $13,152,330,400 for fiscal year 2027.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $11,055,630,400 shall be made available for research and related activities;

(B) $1,370,200,000 shall be made available for education and human resources including—

(i) $118,800,000 for the Advanced Technical Education Program;

(ii) $456,000,000 for the Graduate Research Fellowship Program;

(iii) $135,300,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $116,700,000 for the CyberCorps Scholarship for Service Program; and

(v) $74,000,000 for the NSF Research Traineeship Program;

(C) $315,000,000 shall be made available for major research equipment and facilities construction, of which $205,000,000 shall be for mid-scale projects;

(D) $382,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $20,000,000 shall be made available for the Office of the Inspector General.

(g) FISCAL YEAR 2028.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $13,931,257,300 for fiscal year 2028.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $11,746,607,300 shall be made available for research and related activities;

(B) $1,420,700,000 shall be made available for education and human resources including—

(i) $125,400,000 for the Advanced Technical Education Program;

(ii) $484,500,000 for the Graduate Research Fellowship Program;

(iii) $138,000,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $119,000,000 for the CyberCorps Scholarship for Service Program; and

(v) $76,000,000 for the NSF Research Traineeship Program;

(C) $345,000,000 shall be made available for major research equipment and facilities construction, of which $215,000,000 shall be for mid-scale projects;

(D) $394,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $20,450,000 shall be made available for the Office of the Inspector General.

(h) FISCAL YEAR 2029.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $14,680,234,200 for fiscal year 2029.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $12,437,584,200 shall be made available for research and related activities;

(B) $1,471,300,000 shall be made available for education and human resources including—

(i) $132,000,000 for the Advanced Technical Education Program;

(ii) $513,000,000 for the Graduate Research Fellowship Program;

(iii) $140,700,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $121,400,000 for the CyberCorps Scholarship for Service Program; and

(v) $78,000,000 for the NSF Research Traineeship Program;

(C) $345,000,000 shall be made available for major research equipment and facilities con-

struction, of which $225,000,000 shall be for mid-scale projects;

(D) $401,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $20,850,000 shall be made available for the Office of the Inspector General.

(i) FISCAL YEAR 2030.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $15,460,331,100 for fiscal year 2030.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $13,128,561,100 shall be made available for research and related activities;

(B) $1,523,000,000 shall be made available for education and human resources including—

(i) $139,600,000 for the Advanced Technical Education Program;

(ii) $541,500,000 for the Graduate Research Fellowship Program;

(iii) $143,500,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $123,800,000 for the CyberCorps Scholarship for Service Program; and

(v) $80,000,000 for the NSF Research Traineeship Program;

(C) $375,000,000 shall be made available for major research equipment and facilities construction, of which $225,000,000 shall be for mid-scale projects;

(D) $408,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $21,270,000 shall be made available for the Office of the Inspector General.

(j) FISCAL YEAR 2031.—

(1) IN GENERAL.—There are authorized to be appropriated to the Foundation $16,245,538,000 for fiscal year 2031.

(2) SPECIFIC ALLOCATION.—Of the amount authorized by paragraph (1)—

(A) $13,819,538,000 shall be made available for research and related activities;

(B) $1,609,800,000 shall be made available for education and human resources including—

(i) $146,200,000 for the Advanced Technical Education Program;

(ii) $570,000,000 for the Graduate Research Fellowship Program;

(iii) $146,400,000 for the Robert Noyce Teacher Scholarship Program;

(iv) $162,200,000 for the CyberCorps Scholarship for Service Program;

(v) $82,000,000 for the NSF Research Traineeship Program; and

(C) $375,000,000 shall be made available for major research equipment and facilities construction, of which $225,000,000 shall be for mid-scale projects;

(D) $415,000,000 shall be made available for agency operations and award management;

(E) $4,500,000 shall be made available for the Office of the National Science Board; and

(F) $21,700,000 shall be made available for the Office of the Inspector General.

SEC. 702. NSF ORGANIZATIONAL REVIEW.

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

(1) since its establishment in 1950, the National Science Foundation has been the gold stand-

ard for the world in funding basic science and engineering research;

(2) the National Science Foundation should continue to fund competitive, merit-reviewed basic research across all fields of science and engineering to achieve its statutory mission;

(3) scientific research has become increasingly interdisciplinary, crossing the boundaries of individual fields and the divisions and directorates of the National Science Foundation that support research grants; and

(4) as the nature of scientific research changes, it is important for the institutions that support science like the National Science Foundation, to periodically evaluate whether the organization needs to evolve to continue to fund the best science, the best scientists, and the most groundbreaking research.

(b) STUDY.—Not later than 60 days after the date of enactment of this Act, the Director shall contract with the National Academy of Public Administration (referred to in this section as the ''National Academy'') to conduct a study on the organizational and management structure of the Foundation, to—

(1) evaluate and make recommendations for the structure of the Foundation's directorates, divisions,

and offices of the Foundation to efficiently and effectively fund and oversee research grants and education and training programs;

(2) evaluate and make recommendations for any structural changes needed to improve the support for cross-disciplinary and trans-disciplinary research;

(3) evaluate and make recommendations for the long-term planning and development of research infrastructure projects; and

(4) make recommendations for the management of the Foundation's business practices, including personnel and financial management.

(c) REPORT TO CONGRESS.—Upon completion of the study under subsection (b), the Director shall transmit the study to Congress along with a summary of the Director's plans, if any, to implement the recommendations of the National Academy.

SEC. 703. ETHICS AND SECURITY PLANS.

(a) DEVELOPMENT OF ETHICS AND SECURITY POLICIES.—Not later than 6 months after the date of enactment of this Act, the Director shall develop and implement a policy requiring that all proposals for research funding from the Foundation include, if applicable, a plan for

managing the risk of any potential ethical or security implications resulting from such research.

(b) REQUIREMENTS.—The policy shall—

(1) include clear guidance of what constitutes ethical and security risks;

(2) include field specific guidance as appropriate, which may include biology, artificial intelligence, or cybersecurity;

(3) include mechanisms to ensure appropriate evaluation of the submitted ethical and security plans required under this section;

(4) include mechanisms to ensure that researchers comply with approved ethical and security plans; and

(5) to the extent practical be harmonized with existing ethical and security policies or requirements, including the Common Rule (Federal Policy for the Protection of Human Subjects, 45 C.F.R. 690).

(c) LIMITATION.—The policy developed under subsection (a) shall not factor into award decisions unless deemed necessary by the merit review panel for each program.

SEC. 704. MAJOR RESEARCH INSTRUMENTATION UPDATE.

Section 7036(a) of the America COMPETES Act (42 U.S.C. 1862o–14(a)) is amended by striking ''The max-

imum amount of an award under the program shall be $4,000,000 except if the total amount appropriated for the program for a fiscal year exceeds $125,000,000, in which case the maximum amount of an award shall be $6,000,000'' and inserting ''The maximum amount of an award under the program shall be $6,000,000''.

SEC. 705. NSF RESEARCH SECURITY.

(a) OFFICE OF RESEARCH SECURITY AND POLICY.—The Director shall maintain a Research Security and Policy office within the Office of the Director. The functions of the Research Security and Policy office shall be to coordinate all research security policy issues across the Foundation and coordinate with the NSF Office of Inspector General, including by—

(1) serving as the Foundation's primary resource for all policy issues related to the security and integrity of the conduct of Foundation supported research;

(2) conducting outreach and education activities for awardees on research policies and potential security risks;

(3) educating NSF program managers and other directorate staff on evaluating NSF awards and awardees for potential security risks;

(4) communicating reporting and disclosure requirements to awardees and applicants for funding; and

(5) coordinating with other Federal science agencies as appropriate and through the National Science and Technology Council in accordance with the authority provided under section 1746 of the national Defense Authorization Act for Fiscal Year 2020 (Public Law 116–92; 42 U.S.C. 6601 note).

(b) CHIEF OF RESEARCH SECURITY.—The Director shall appoint a senior agency official within the Office of the Director as a Chief of Research Security, whose primary responsibility is to manage the office created in subsection (a).

(c) REPORT TO CONGRESS.—No later than 180 days after the date of enactment of this Act, the Director shall provide a report to the Science, Space, and Technology Committee of the House of Representatives, the Committee on Commerce, Science, and Transportation of the Senate, the Committee on Appropriations of the House of Representatives, and the Committee on Appropriations of the Senate on the resources and the number of full time employees needed to carry out the functions of the Office established in subsection (a).

SEC. 706. REPRODUCIBILITY IN SCIENCE.

(a) IN GENERAL.—The Director shall award grants, on a competitive basis, to institutions of higher education or nonprofit organizations (or a consortia thereof) to—

(1) support research and development of open source, usable tools and infrastructure that support reproducibility for a broad range of studies across different disciplines;

(2) support research on computational reproducibility, including the limits of reproducibility and the consistency of computational results in the development of new computation hardware, tools, and methods;

(3) support the education and training of students, faculty, and researchers on computational methods and tools to improve the quality of data and code to produce reproducible research; and

(4) support the education and training of students, faculty, and researchers on the knowledge, skills, and tools needed to conduct research that adheres to the highest scientific standard and to be able to clearly communicate methods and results accurately and appropriately to reflect the uncertainty involved in the research.

(b) DATA REPOSITORIES.—Not later than 12 months after the date of enactment of this Act, the Director of

the National Science Foundation shall coordinate with the heads of other Federal science agencies to develop a set of criteria for trusted open repositories to be used by the scientific community in order to facilitate the transparent sharing and availability of data and code for federally funded research studies.

(c) DEFINITION OF REPRODUCIBILITY.—For the purposes of this section, the term ''reproducibility'' means obtaining consistent results using the same input data, computational steps, methods and code, and conditions of analysis.

SEC. 707. PUBLIC-PRIVATE PARTNERSHIPS.

(a) IN GENERAL.—The Director shall pursue partnerships with private industry, private foundations, and/or other appropriate private entities to—

(1) enhance the impact of the Foundation's investments and contributions to American economic competitiveness and security; and

(2) make available infrastructure, expertise, and financial resources to the United States scientific and engineering research and education enterprise.

(b) MERIT-REVIEW.—Nothing in this section shall be construed as altering any intellectual or broader impacts criteria at the Foundation for evaluating grant applications.

SEC. 708. EPSCOR.

(a) SENSE OF CONGRESS.—

(1) IN GENERAL.—It is the sense of Congress that—

(A) since maintaining the Nation's scientific and economic leadership requires the participation of talented individuals nationwide, EPSCoR investments into State research and education capacities that are in the Federal interest and should be sustained; and

(B) EPSCoR should maintain its experimental component by supporting innovative methods for improving research capacity and competitiveness.

(2) DEFINITION OF EPSCOR.—In this subsection, the term ''EPSCoR'' has the meaning given the term in section 502 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p note).

(b) UPDATE OF EPSCOR.—Section 517(f)(2) of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 1862p–9(f)(2)) is amended—

(1) in subparagraph (A), by striking ''and'' at the end; and

(2) by adding at the end the following:

''(C) to increase the capacity of rural communities to provide quality STEM education and STEM workforce development programming to students, and teachers; and''.

SEC. 709. DEFINITIONS.

In this title, unless expressly provided otherwise:

(1) DIRECTOR.—The term ''Director'' means the Director of the National Science Foundation.

(2) FEDERAL SCIENCE AGENCY.—The term ''Federal science agency'' has the meaning given the term in section 103 of the America COMPETES Reauthorization Act of 2010 (42 U.S.C. 6623).

(3) FOUNDATION.—The term ''Foundation'' means the National Science Foundation.

(4) INSTITUTION OF HIGHER EDUCATION.—The term ''institution of higher education'' has the meaning given the term in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)).

TITLE VIII—STEM WORKFORCE FOR THE 21ST CENTURY

SEC. 801. FINDINGS; SENSE OF CONGRESS.

(a) FINDINGS.—Congress finds the following:

(1) Many reports over the past decade have found that it is critical to our Nation's economic leadership and global competitiveness that the

United States educates and trains more scientists and engineers.

(2) Worldwide demand for STEM-capable workers keeps growing, driven by international opportunities and competition, and by the rapid increases in the number of jobs that require STEM skills, including in lines of work that historically did not require STEM knowledge.

(3) By 2026 science and engineering jobs are predicted to grow by 13 percent compared with 7 percent growth in the overall United States workforce.

(4) A recent report by ACT, the scholastic testing service, found that only 20 percent of United States students in the 2016 ACT-tested high school graduating class were ready for first-year STEM college courses.

(5) Out of the 79 countries that participate in the Organisation for Economic Co-operation and Development's Programme for International Student Assessment, the United States ranks 18th in science and 37th in mathematics.

(6) The Federal Government spends over $3 billion annually on STEM education related research, programs and activities, but encouraging

STEM education activities beyond the scope of the Federal Government is crucial to the future technical and economic competitiveness of the United States.

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

(1) the Nation's future economic and national security relies on building a STEM-capable workforce in order to remain competitive in the global economy, foster greater innovation, and provide a foundation for shared prosperity;

(2) the Federal Government plays a key role in developing and sustaining a STEM-capable workforce by working with stakeholders at all levels, including researchers, practitioners, industry, and State and local governments to support and promote evidence-based approaches to modernize elementary, secondary, and post-secondary STEM education, and support the reskilling and upskilling that workers will need throughout their careers;

(3) applying a more holistic view of the STEM workforce that moves beyond academic degrees and occupations will highlight the contributions and opportunities for workers at all education levels;

(4) increasing the diversity and inclusion in the STEM workforce is needed to help address the STEM skills shortage;

(5) supporting an interdisciplinary approach to STEM learning, where academic concepts are coupled with real-world applications and students use STEM in contexts that make connections between school, community, work, and the wider world will improve outcomes for students in elementary, secondary and post-secondary education and for skilled technical workers in different career stages;

(6) leveraging private and nonprofit investments in STEM education will be essential to strengthening the Federal STEM portfolio;

(7) deepening partnerships between educational institutions and the business sector will be critical in preparing Americans for the industries of the future and support reskilling and upskilling of incumbent workers so that they can better navigate rapid changes in the world of work; and

(8) coordinating STEM programs and activities across the Federal Government in order to limit duplication and engage stakeholders in STEM programs and related activities for which objective outcomes can be measured will bolster results of Fed-

eral STEM education programs, improve the return on taxpayers' investments in STEM education programs, and in turn strengthen the United States economy.

SEC. 802. ADVANCED TECHNICAL EDUCATION AND SKILLED TECHNICAL WORKFORCE.

(a) FINDINGS.—Congress finds the following:

(1) A National Academies of Science, Engineering, and Medicine report predicts a shortfall of nearly 3,400,000 skilled technical workers by 2022.

(2) The National Science Foundation's Advanced Technical Education program is critical to helping improve the training of the skilled technical workforce, with an emphasis on two-year Institutions of Higher Education (IHEs) and educating technicians for the high-technology fields that drive our nation's economy.

(3) The National Science Board's 2019 report on the skilled technical workforce called for strengthening partnerships between skilled technical workforce programs and business and industry.

(b) ADVANCED TECHNICAL EDUCATION PROGRAM UPDATE.—Section 3(b) of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862i(b)) is amended to read as follows:

''(b) NATIONAL COORDINATION NETWORK FOR SCIENCE AND TECHNICAL EDUCATION.—The Director shall award grants to institutions of higher education, nonprofit institutions, associate-degree granting colleges (or consortia thereof) to establish a network of centers for science and technical education. The centers shall—

''(1) coordinate research, training and education activities funded by awards under subsection (a) and share information and best practices across the network of awardees;

''(2) serve as national and regional clearinghouse and resource to communicate and coordinate research, training and educational activities across disciplinary, organizational, geographic and international boundaries and disseminate best practices; and

''(3) develop national and regional partnerships between K–12 schools, two-year colleges, institutions of higher education, workforce development programs, and industry to meet workforce needs.''.

(c) NSF PORTFOLIO REVIEW AND COORDINATION PLAN.—

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Director of the National Science Foundation shall conduct a full

portfolio analysis of the Foundation's skilled technical workforce investments and develop a plan to improve coordination and collaboration of research and education investments and the communication of those funding opportunities to the research and education community.

(2) SUBMISSION TO CONGRESS.—Not later than 180 days after the date of the review and development of the plan under paragraph (1) is complete, the Director of the National Science Foundation shall submit to Congress and make widely available to the public a summary of the portfolio review and plan.

SEC. 803. GRADUATE RESEARCH FELLOWSHIP PROGRAM UPDATE.

(a) FINDINGS.—Congress finds the following:

(1) The National Science Foundation Graduate Research Fellowship Program is the nation's oldest fellowship program that directly supports American graduate students in various STEM fields and is a model for training the best innovators in the United States.

(2) Since 1952, NSF has funded over 50,000 Graduate Research Fellowships out of more than 500,000 applicants, 42 Fellows have gone on to be-

come Nobel laureates, and more than 450 have become members of the National Academy of Sciences.

(3) Foreign nations are increasingly investing in foreign talent programs to compete with the United States.

(b) SENSE OF CONGRESS.—It is the sense of Congress that the National Science Foundation should grow the number of new graduate research fellows supported annually over the next 10 years to no less than 3,000 fellows.

(c) PROGRAM UPDATE.—Section 10 of the National Science Foundation Act of 1950 (42 U.S.C. 1869) is amended—

(1) in subsection (a), by inserting ''and as will address national workforce demand in critical STEM fields'' after ''throughout the United States'';

(2) in subsection (b), by striking ''of $12,000'' and inserting ''$16,000''; and

(3) by adding at the end the following:

''(c) OUTREACH.—The Director shall ensure program outreach to recruit fellowship applicants from fields of study that are in areas of critical national need, from all regions of the country, and from historically underrepresented populations in STEM.''.

SEC. 804. ROBERT NOYCE TEACHER SCHOLARSHIP PROGRAM SENSE OF CONGRESS.

It is the sense of Congress that—

(1) the Robert Noyce Teacher Scholarship Program plays an important role in supporting the development and dissemination of evidence-based teacher preparation models and the recruitment, preparation, and retention of STEM educators;

(2) the Robert Noyce Teacher Scholarship Program improves recruitment of underrepresented and STEM-trained students into teaching, encourages teachers to work in high-need areas, and can improve relationships between teacher preparation programs and industry; and

(3) the Robert Noyce Teacher Scholarship Program which currently supports between 1,000 to 1,500 new math and science teachers a year, including in high-need districts should be doubled over the next ten years to meet the growing demand for STEM capable educators.

SEC. 805. INNOVATIONS IN INFORMAL STEM LEARNING.

(a) PERMISSIBLE SUPPORT.—Section 3(b) of the STEM Education Act of 2015 (42 U.S.C. 1862q(b)) is amended—

(1) in paragraph (3), by striking ''; and'' at the end and inserting a semicolon;

(2) in paragraph (4), by striking the period at the end and inserting ''; and''; and

(3) by adding at the end the following:

''(5) supporting the participation of students in nonprofit competitions, out-of-school activities, and field experiences related to STEM subjects (such as robotics, science research, invention, mathematics, and technology competitions), which may include—

''(A) the purchase of parts and supplies needed to participate in such competitions;

''(B) incentives and stipends for teachers and instructional leaders who are involved in assisting students and preparing students for such competitions, if such activities fall outside the regular duties and responsibilities of such teachers and instructional leaders; or

''(C) incentivizes and stipends for professional training for teachers and instructional leaders of before-school, after-school, out-of-school or summer STEM programs; and

''(6) broadening secondary school students' access to, and interest in, careers that require academic preparation in STEM subjects.''.

(b) SUPPORTING PRE-K–8 INFORMAL STEM OPPORTUNITIES.—Section 3 of the STEM Education Act of

2015 (42 U.S.C. 1862q) is amended by adding at the end the following:

''(c) PRE-K-8 INFORMAL STEM PROGRAM.—

''(1) IN GENERAL.—The Director of the National Science Foundation shall provide grants on a merit-reviewed, competitive basis for research on programming that engages students in grades pre-kindergarten through 8, including underrepresented and rural students, in STEM in order to prepare such students to pursue degrees or careers in STEM.

''(2) USE OF FUNDS.—

''(A) IN GENERAL.—Grants awarded under this section shall be used toward research to advance the engagement of students in grades pre-kindergarten through 8 in STEM through providing before-school, after-school, out-of-school, or summer activities that are designed to encourage interest, engagement, and skills development for students in STEM.

''(B) PERMITTED ACTIVITIES.—The activities described in subparagraph (A) may include—

''(i) the provision of programming described in such subparagraph for the pur-

pose of research described in such subparagraph;

''(ii) the use of a variety of engagement methods, including cooperative and hands-on learning;

''(iii) exposure of students to role models in the fields of STEM and near-peer mentors;

''(iv) training of informal learning educators, youth-serving professionals, and volunteers who lead informal STEM programs in using evidence-based methods consistent with the target student population being served;

''(v) education of students on the relevance and significance of STEM careers, provision of academic advice and assistance, and activities designed to help students make real-world connections to STEM content;

''(vi) the attendance of students at events, competitions, and academic programs to provide content expertise and encourage career exposure in STEM;

''(vii) activities designed to engage parents and families of students in grades pre-kindergarten through 8 in STEM;

''(viii) innovative strategies to engage students, such as using leadership skills and outcome measures to impart youth with the confidence to pursue STEM coursework and academic study;

''(ix) coordination with STEM-rich environments, including other nonprofit, nongovernmental organizations, out-of-classroom settings, single-gender environments, institutions of higher education, vocational facilities, corporations, museums, or science centers; and

''(x) the acquisition of instructional materials or technology-based tools to conduct applicable grant activity.

''(3) APPLICATION.—An applicant seeking funding under the section shall submit an application at such time, in such manner, and containing such information as may be required. Applications that include or partner with a nonprofit, nongovernmental organization that has extensive experience and expertise in increasing the participation of stu-

dents in pre-kindergarten through grade 8 in STEM are encouraged. The application may include the following:

"(A) A description of the target audience to be served by the research activity or activities for which such funding is sought.

"(B) A description of the process for recruitment and selection of students to participate in such activities.

"(C) A description of how such activity or activities may inform programming that engages students in grades pre-kindergarten through 8 in STEM.

"(D) A description of how such activity or activities may inform programming that promotes student academic achievement in STEM.

"(E) An evaluation plan that includes, at a minimum, the use of outcome-oriented measures to determine the impact and efficacy of programming being researched.

"(4) EVALUATIONS.—Each recipient of a grant under this section shall provide, at the conclusion of every year during which the grant funds are received, an evaluation in a form prescribed by the Director.

''(5) ACCOUNTABILITY AND DISSEMINATION.—

''(A) EVALUATION REQUIRED.—The Director shall evaluate the activities established under this section. Such evaluation shall—

''(i) use a common set of benchmarks and tools to assess the results of research conducted under such grants; and

''(ii) to the extent practicable, integrate the findings of the research resulting from the activity or activities funded through the grant with the current research on serving students with respect to the pursuit of degrees or careers in STEM, including underrepresented and rural students, in grades pre-kindergarten through 8.

''(B) REPORT ON EVALUATIONS.—Not later than 180 days after the completion of the evaluation under subparagraph (A), the Director shall submit to Congress and make widely available to the public a report that includes—

''(i) the results of the evaluation; and

''(ii) any recommendations for administrative and legislative action that could

optimize the effectiveness of the program under this section.

''(6) COORDINATION.—In carrying out this section, the Director shall, for purposes of enhancing program effectiveness and avoiding duplication of activities, consult, cooperate, and coordinate with the programs and policies of other relevant Federal agencies.''.

SEC. 806. AI TRAINEESHIPS AND FELLOWSHIPS.

(a) ARTIFICIAL INTELLIGENCE TRAINEESHIPS.—

(1) IN GENERAL.—The Director of the National Science Foundation shall award grants to institutions of higher education to establish traineeship programs for graduate students who pursue artificial intelligence-related research leading to a masters or doctorate degree by providing funding and other assistance, and by providing graduate students opportunities for research experiences in government or industry related to the students' artificial intelligence studies.

(2) USE OF FUNDS.—An institution of higher education shall use grant funds provided under paragraph (1) for the purposes of—

(A) providing traineeships to students who are pursuing research in artificial intelligence leading to a masters or doctorate degree;

(B) paying tuition and fees for students receiving traineeships who are citizens, nationals, or lawfully admitted permanent resident aliens of the United States;

(C) creating and requiring courses or training programs in technology ethics for students receiving traineeships;

(D) creating opportunities for research in technology ethics for students receiving traineeships;

(E) establishing scientific internship programs for students receiving traineeships in artificial intelligence at for-profit institutions, nonprofit research institutions, or government laboratories; and

(F) other costs associated with the administration of the program.

(b) ARTIFICIAL INTELLIGENCE FELLOWSHIPS.—The Director of the National Science Foundation shall award fellowships to masters and doctoral students and postdoctoral researchers at institutions of higher education who are pursuing degrees or research in artificial

intelligence and related fields, including in the field of technology ethics. In making such awards, the Director shall—

(1) ensure recipients of artificial intelligence fellowships are citizens, nationals, or lawfully admitted permanent resident aliens of the United States; and

(2) conduct outreach, including through formal solicitations, to solicit proposals from students and postdoctoral researchers seeking to carry out research in aspects of technology ethics with relevance to artificial intelligence systems.

SEC. 807. CYBERSECURITY WORKFORCE DEVELOPMENT AT FEDERAL SCIENCE AGENCIES.

(a) CYBERSECURITY WORKFORCE DEVELOPMENT AT THE DEPARTMENT OF ENERGY.—

(1) IN GENERAL.—The Secretary of Energy shall support the development of a cybersecurity workforce through a program that—

(A) facilitates collaboration between undergraduate and graduate students, researchers at the National Laboratories (as defined in section 2 of the Energy Policy Act of 2005), and the private sector;

(B) prioritizes science and technology in areas relevant to the mission of the Department

of Energy through the design and application of cybersecurity technologies;

(C) develops, or facilitates private sector development of, voluntary cybersecurity training and retraining standards, lessons, and recommendations for the energy sector that minimize duplication of cybersecurity compliance training programs; and

(D) maintains a public database of cybersecurity education, training, and certification programs.

(2) COLLABORATION.—In carrying out the program authorized in paragraph (1), the Secretary of Energy shall leverage programs and activities carried out across the Department of Energy, other relevant Federal agencies, institutions of higher education, and other appropriate entities best suited to provide national leadership on cybersecurity related issues.

(b) CYBERSECURITY IN DEPARTMENT OF TRANSPORTATION PROGRAMS.—

(1) UNIVERSITY TRANSPORTATION CENTERS PROGRAM.—Section 5505 of title 49, United States Code, is amended—

(A) in subsection (a)(2)(C), by inserting ''in the matters described in subparagraphs (A) through (G) of section 6503(c)(1)'' after ''transportation leaders''; and

(B) in subsection (c)(3)(E)—

(i) by inserting '', including the cybersecurity implications of technologies relating to connected vehicles, connected infrastructure, and autonomous vehicles'' after ''autonomous vehicles''; and

(ii) by striking ''The Secretary'' and inserting the following:

''(1) IN GENERAL.—A regional university transportation center receiving a grant under this paragraph shall carry out research focusing on 1 or more of the matters described in subparagraphs (A) through (G) of section 6503(c)(1).

''(2) FOCUSED OBJECTIVES.—The Secretary''.

(2) TRANSPORTATION RESEARCH AND DEVELOPMENT 5-YEAR STRATEGIC PLAN.—Section 6503(c)(1) of title 49, United States Code, is amended—

(A) in subparagraph (E), by striking ''and'' at the end;

(B) in subparagraph (F), by inserting ''and'' after the semicolon at the end; and

(C) by adding at the end the following:

''(G) reducing transportation cybersecurity risks;''.

SEC. 808. BROADENING PARTICIPATION.

(a) PRESIDENTIAL AWARDS FOR EXCELLENCE IN MATHEMATICS AND SCIENCE TEACHING.—Section 117(a)(1) of the National Science Foundation Authorization Act of 1988 (42 U.S.C.1881b(a)(1)) is amended—

(1) in subparagraph (B)—

(A) by striking ''108'' and inserting ''110'';

(B) by striking clause (iv);

(C) in clause (v), by striking the period at the end and inserting ''; and'';

(D) by redesignating clauses (i), (ii), (iii), and (v) as subclauses (I), (II), (III), and (IV), respectively, and moving the margins of such subclauses (as so redesignated) two ems to the right; and

(E) by striking ''In selecting teachers'' and all that follows through ''two teachers—'' and inserting the following:

''(C) In selecting teachers for an award authorized by this subsection, the President shall select—

''(i) at least two teachers—;''; and

(2) in subparagraph (C), as designated by paragraph (1)(E), by adding at the end the following:

''(ii) at least one teacher—

''(I) from the Commonwealth of the Northern Mariana Islands;

''(II) from American Samoa;

''(III) from the Virgin Islands of the United States; and

''(IV) from Guam.''.

(b) EFFECTIVE DATE.—The amendments made by subsection (a) shall apply with respect to awards made on or after the date of the enactment of this Act.

TITLE I—TECHNOLOGY TRANSFER AND INNOVATION

SEC. 901. FEDERAL LABORATORY COMPUTER PROGRAMS UPDATE.

(a) UTILIZATION OF FEDERAL TECHNOLOGY UPDATE.—Section 11 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710) is amended by adding at the end the following:

''(j)(1) COPYRIGHT PROTECTION.—Pursuant to section 105(b)(1) of title 17, United States Code, and subject to the requirements therein, the director of any Government-operated Federal laboratory may seek copyright protection on behalf of the United States in a work described in that section.

''(2) GUIDELINES.—The Secretary is authorized to provide guidelines to implement paragraph (1) of this section and to provide guidance for the management of works in which copyright protection is obtained.''.

(b) GOVERNMENT WORKS COPYRIGHT UPDATE.—Section 105 of title 17, United States Code, is amended—

(1) by striking ''Copyright protection'' and inserting ''(a) Copyright protection''; and

(2) by adding at the end the following:

''(b) Notwithstanding subsection (a), copyright protection under this title is available for—

''(1) a computer program that is a work of the United States Government and is created at a Federal laboratory, as defined in section 4 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703), and which is a result of research, development, or engineering at the Federal laboratory, provided that the United States Government makes application for copyright registration under

section 409 pursuant to the authority granted under section 11(k) of such Act within 6 months from employee disclosure of the work to the Federal laboratory, and provided further that a certificate of registration is issued pursuant to section 410 of this title or following judicial review pursuant to chapter 7 of title 5; and

''(2) standard reference data prepared or made available by the Department of Commerce, provided the copyright is secured by the Secretary of Commerce in the manner set forth in section 6 of the Standard Reference Data Act (15 U.S.C. 290e).''.

SEC. 902. EXTEND CRADA INFORMATION PROTECTION PERIOD.

Section 12(c)(7)(B) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710a(c)(7)(B)) is amended by striking ''5'' and inserting ''12''.

SEC. 903. STEVENSON-WYDLER ACT AUTHORITY UPDATE.

Section 11 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710(g)) is amended to read as follows:

''(g) FUNCTIONS OF SECRETARY.—The Secretary shall convene an Interagency Working Group for Tech-

nology Transfer comprising those agencies with at least one Federal laboratory to—

''(1) share best practices for realizing the commercial potential of inventions and methods and options for commercialization which are available to the Federal laboratories, including research and development limited partnerships and cooperative research and development agreements; and

''(2) issue such guidelines as may be necessary to carry out this chapter, acting through the Director of the National Institute of Standards and Technology and with the concurrence of the Interagency Working Group for Technology Transfer.''.

SEC. 904. ROYALTY PAYMENTS TO FEDERAL EMPLOYEES UPDATE.

Section 14 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710c) is amended—

(1) by striking ''inventions'' each place the term appears and inserting ''inventions or works'';

(2) by striking ''invention'' each place the term appears and inserting ''invention or work'';

(3) by striking ''inventors'' each place the term appears and inserting ''inventors or contributors'';

(4) in subsection (a)(1) after ''shall be'' inserting ''non-appropriated funds and shall be'';

(5) in subsection (a)(1)(A)(i) inserting at the end ‘‘, or to the contributor or co-contributors if a certificate of copyright registration is issued to the United States’’;

(6) in subsection (a)(1)(A)(ii) after ‘‘inventor of’’ inserting ‘‘or contributor to’’;

(7) in subsection (a)(3) by striking ‘‘inventor’’ each place the term appears and inserting ‘‘inventor or contributor’’;

(8) in subsection (a)(3) by striking ‘‘$150,000’’ each place the term appears and inserting ‘‘500,000’’;

(9) at the end of subsection (a) by inserting the following new paragraph:

‘‘(5) Any royalties or other payments received by a Federal agency from the licensing and assignment of works under agreements entered into by Federal laboratories under section 12 of this Act, and from the licensing of works by Federal laboratories under any provision of law shall be retained by the agency licensing or assigning the work on behalf of the United States Government and shall be disposed of after payment of any copyright registration cots. The head of the agency is authorized to dispose of such royalties or other payments through transfer by the agency to its bureaus or laboratories, with the ma-

jority share of the royalties or other payments from any copyright going to the bureau or laboratory where or for which the copyrighted work was made.

''(A) The royalties or other payments so transferred to any bureau or laboratory may be used or obligated by that bureau or laboratory during the fiscal year in which they are received or during the 2 succeeding fiscal years—

''(i) to reward contributors of copyrighted computer programs;

''(ii) to further information exchange among bureaus and laboratories of the agency or with another agency;

''(iii) for education and training of employees consistent with the missions and objectives of the agency, bureau, or laboratory;

''(iv) for payment of expenses incidental to the administration and licensing of intellectual property by the agency or laboratory with respect to copyrighted computer programs made at that bureau or laboratory, including the fees or other costs for the services of other agencies, persons, or organizations for intellectual property management and licensing services; or

''(v) for scientific research and development consistent with the research and development missions and objectives of the bureau or laboratory.

''(B) All royalties or other payments retained by the agency, bureau, or laboratory after payments have been made pursuant to subparagraph (A) that is unobligated and unexpended at the end of the second fiscal year succeeding the fiscal year in which the royalties and other payments were received shall be paid into the Treasury.

''(C) As used in the section, the term 'contributor' means a laboratory employee who is a creator of an original expression in a copyrighted computer program.''; and

(10) in subsection (a)(1)(B)—

(A) by striking ''; or'' at the end of clause (iv) and inserting a semicolon;

(B) by striking the period at the end of clause (v) and inserting ''; or''; and

(C) by inserting at the end the following:

''(vi) for the acquisition, administration and licensing of intellectual property.''.

SEC. 905. GOVERNMENT INTELLECTUAL PROPERTY CLARIFICATION.

Section 15 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710d) is amended in subsection (a) to read as follows:

''(a) IN GENERAL.—

''(1) INVENTION RIGHTS.—The Government shall obtain the entire right, title and interest in and to all inventions made by any Federal employee—

''(A) during working hours;

''(B) with a contribution by the Government of facilities, equipment, materials, funds, or information, or of time or services of other Federal employees on official duty; or

''(C) within his or her field of research or within his or her official employment responsibility and activity.

''(2) DISCLOSURE.—Any invention made by a Federal employee as described in paragraph (1) shall be disclosed by the Federal employee to the agency that employs the Federal employee within 10 months of the earlier of the date of conception or actual reduction to practice of the invention. The Government shall obtain the entire right, title, and interest in and to any invention conceived or actually reduced to practice by a Federal employee that is not

disclosed to the Government within 10 months or shorter disclosure period required by agency regulation, from the earlier of the date of conception or actual reduction to practice of the invention.

''(3) PRESUMPTION.—Any invention made by a Federal employee as described in paragraph (1) shall be presumed to be owned by the Government, and the Federal employee shall assign the entire right, title, and interest in and to the invention to the Government. A Federal employee that disagrees with the presumption of ownership and obligation of assignment may request, from the agency employing the Federal employee, a determination of rights in and to the invention and shall do so within 30 days of the disclosure pursuant to paragraph (2), which may be extended by the head of an agency for good cause shown. The request shall provide all grounds and justification for leaving rights with the Federal employee. If the request is not made by the employee within the 30-day or extended period, the Government shall retain all right, title, and interest to the invention, and the Federal employee shall assign the entire right, title, and interest in and to the invention to the Government.

''(4) PATENT RIGHTS.—If a Federal agency which has ownership of or the right of ownership to an invention made by a Federal employee does not intend to file for a patent application or otherwise promote commercialization of such invention, the agency shall (upon request) allow the inventor, if the inventor is a Federal employee or former employee who made the invention during the course of employment with the Government, to obtain or retain title to the invention (subject to reservation by the Government of a nonexclusive, nontransferable, irrevocable, paid-up license to practice the invention or have the invention practiced throughout the world by or on behalf of the Government). In addition, the agency may condition the inventor's right to title on the timely filing of a patent application.

''(5) COMPUTER PROGRAM DISCLOSURE.—Any computer program that is a work of the United States Government and is created at a Federal laboratory within section 105(b)(1) of title 17, United States Code, shall be disclosed by the Federal employee who created such program to the Federal laboratory that employs the Federal employee.

''(6) AUTHOR RIGHTS.—Any program described in paragraph (5) prepared by a Federal employee

within the scope of his or her employment shall be considered a work made for hire and the Government shall be the author. A Federal employee who discloses as required under paragraph (5) but who contests that the Government is the author may request, from the agency employing the Federal employee, a determination of rights in and to the program and shall do so within 30 days of the disclosure pursuant to paragraph (5), which may be extended by the head of an agency for good cause shown. The request shall provide all grounds and justification for leaving rights with the Federal employee. If the request is not made by the Federal employee within the 30-day period, the Government shall remain and shall be the author of such program.

''(7) REPORTING EXEMPTION.—Such reporting requirements shall not apply to Federal employees who are otherwise prohibited from applying for or obtaining a patent. The Secretary may issue guidelines to implement this section.''.

SEC. 906. CLARIFYING CRADA AUTHORITY.

Section 12 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710a) is amended—

(1) by inserting at the end of the section the following new subsection:

''(h) PATENT OBLIGATION.—Under an agreement entered into pursuant to this section, there is an obligation on the part of the collaborating party, in the event a United States patent application is filed by or on behalf of the collaborating party or by any assignee of the collaborating party, to include within the specification of such application and any patent issuing thereon, a statement specifying that the invention was made with Government support and that the Government has certain rights in the invention.''; and

(2) by striking subsection (d).

SEC. 907. EXPANSION OF AGREEMENTS FOR COMMERCIALIZING TECHNOLOGY AUTHORITY.

The Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3701 et seq.) is amended by inserting after section 14 the following:

''SEC. 14A. AGREEMENTS FOR COMMERCIALIZING TECHNOLOGY.

''(a) AGREEMENTS WITH NON-FEDERAL ENTITIES.—The head of each Federal agency may permit the director of any of its Government-owned, contractor-operated laboratories to perform work for non-Federal entities (sponsors) on a fully reimbursable basis and to execute

agreements with a non-Federal entity, including a non-Federal entity already receiving Federal funding that will be used to support activities under the agreements, provided that such funding is solely used to carry out the purposes of the Federal award.

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

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

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

''(c) SUBMISSION TO AGENCY.—Each affected director of a Government-owned, contractor-operated laboratory shall submit to the head of the Federal agency, with respect to each agreement entered into under this section—

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

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

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

''(4) other documentation determined to be appropriate by the head of the Federal agency.

''(d) CERTIFICATION.—The head of the Federal agency shall require the contractor of the affected Government-owned, contractor-operated laboratory to certify that each activity carried out under a project for which an agreement is entered into under this section—

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

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

''(e) LIMITATION.—This authority only pertains to Federal agencies that do not have agency-specific authorities for Agreements for Commercializing Technology elsewhere in statute.''.

SEC. 908. OTHER TRANSACTION AUTHORITY.

The Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3701 et seq.) is amended by inserting after section 15 the following:

''SEC. 15A. OTHER TRANSACTIONS.

''(a) GENERAL AUTHORITY.—

''(1) PERMISSION.—Each Federal agency may permit the director of any of its Government-oper-

ated Federal laboratories to enter into such other transactions as may be necessary in the conduct of the work of the Federal laboratory and on such terms as the director of the Federal laboratory considers appropriate, in furtherance of the purposes of this Act.

''(2) DISCLOSURE.—The Federal agency may protect from disclosure, for up to 12 years after the date on which the information is developed, any information developed pursuant to a transaction under this section that would be protected from disclosure under section 552(b)(4) of title 5, United States Code, if obtained from a person other than a Federal agency.

''(3) AUTHORITY LIMITATION.—This authority only pertains to Federal agencies that do not have agency-specific authorities for other transactions elsewhere in statute.

''(b) LIMITATIONS.—A Federal laboratory using the authorities granted in subsection (a) may only enter into such other transactions when—

''(1) a warranted contracting officer determines that use of other authority of the Federal agency would be insufficient to achieve the purposes of this Act; and

''(2) use of such other transaction is approved by the Federal agency.''.

SEC. 909. NONPROFIT FOUNDATIONS.

The Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3701 et seq.) is amended by adding after section 28 the following:

''SEC. 29. FOUNDATIONS.

''(a) IN GENERAL.—A Government-owned Federal laboratory may establish or enter into an agreement with a nonprofit organization to establish a Federal laboratory Foundation in support of its mission. Such a Foundation shall not be an agency or instrumentality of the United States Government, and the United States shall not be liable for any debts, defaults, acts, or omissions of the Foundation.

''(b) PURPOSE.—The purpose of a Foundation established under this section shall be to support the Government-owned Federal laboratory in its mission.

''(c) ACTIVITIES.—Activities of the Foundation may include the following:

''(1) The receipt, administration, solicitation, acceptance and use of funds, gifts, devises, or bequests, either absolutely or in trust of real or personal property or any income therefrom or other interest or equity therein for the benefit of, or in con-

nection with, the mission of the Government-owned Federal laboratory. A gift, devise, or bequest may be accepted by the Foundation even though it is encumbered, restricted, or subject to beneficial interests of private persons if any current or future interest therein is for the benefit of the Federal laboratory in its research and development activities. Contributions, gifts, and other transfers made to or for the use of a Foundation established under this section shall be regarded as contributions, gifts, or transfers to or for the use of the United States.

''(2) The conduct of support studies, competitions, projects, research and other activities that further the purposes of the Foundation.

''(3) Programs for fostering collaboration and partnerships with researches from the Federal and State governments, institutions of higher education, federally funded research and development centers, industry and nonprofit organizations for the research, development or commercialization of federally supported technologies.

''(4) Programs for leveraging technologies to support new product development that supports regional economic development.

''(5) Administering prize competitions to accelerate private sector competition and investment.

''(6) Provision of fellowships and grants to research and development personnel at, or affiliated with, federally funded centers. Such fellowships and grants may include stipends, travel, health insurance benefits and other appropriate expenses. The recipients of fellowships shall be selected by the donors and the Foundation upon the recommendation of the employees in the Federal laboratory where the fellow would serve, and shall be subject to agreement of the head of the agency whose mission is supported by the Foundation.

''(7) Supplementary programs to provide for—

''(A) scientists of other countries to serve in research capacities in the United States in association with the Federal laboratory whose mission the Foundation supports, or elsewhere, or opportunities for employees of the Federal laboratory whose mission the Foundation supports to serve in such capacities in other countries, or both;

''(B) the conduct and support of studies, projects, and research, that may include stipends, travel and other support for personnel in

collaboration with national and international nonprofit and for-profit organizations;

''(C) the conduct and support of forums, meetings, conferences, courses, and training workshops that may include undergraduate, graduate, post-graduate, and post-doctoral accredited courses and the maintenance of accreditation of such courses by the Foundation at the State and national level for college or continuing education credits or for degrees;

''(D) programs to support and encourage teachers and students of science at all levels of education and programs for the general public which promote the understanding of science;

''(E) programs for writing, editing, printing, publishing, and vending of books and other materials; and

''(F) the conduct of other activities to carry out and support the purpose described in subsection (b).

''(d) TRANSFER OF FUNDS.—Notwithstanding any other provision of law, a Foundation established under this section may transfer funds to the Government-owned Federal laboratory and the Government-owned Federal

laboratory may accept transfers of funds from the Foundation.''.

SEC. 910. IMPROVING REPORTING AND METRICS.

Section 11 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710) is amended by striking subsections (f) and (g) and inserting the following:

''(f) AGENCY REPORTS ON UTILIZATION.—

''(1) IN GENERAL.—Each Federal agency which operates or directs one or more Federal laboratories or which conducts activities under subsection (k) of this section or sections 207 and 209 of title 35, United States Code, shall report annually to the Office of Management and Budget, on the activities performed by that agency and its Federal laboratories under the provisions of this section and of sections 207 and 209 of such title 35.

''(2) CONTENTS.—The report shall include—

''(A) an explanation of the agency's technology transfer activities for the preceding fiscal year and the agency's plans to manage innovations with commercial promise consistent with the agency's mission and benefitting the competitiveness of United States industry; and

''(B) information on technology transfer activities for the preceding fiscal year, including—

''(i) the number of patent applications filed;

''(ii) the number of patents received;

''(iii) the number of works registered for copyright protection in the United States on behalf of the United States, pursuant to section 105(b) of title 17, United States Code;

''(iv) the number of fully-executed licenses which received income from licensing in the preceding fiscal year;

''(v) the total income from licensing;

''(vi) the number of licenses terminated for cause;

''(vii) the number of collaborative research and development relationships; and

''(viii) any other parameters or discussion that the agency deems relevant or unique to its practice of technology transfer.

''(3) COPY TO SECRETARY.—The agency shall transmit a copy of the report to the Secretary of

Commerce for inclusion in the annual summary required by subsection (g)(2).

''(4) PUBLIC AVAILABILITY.—Each Federal agency reporting under this subsection shall make available to the public through internet sites, updated at least annually—

''(A) the information contained in such report;

''(B) information on intellectual property which is available for licensing from the Federal agency; and

''(C) information on Federal research and development programs, facilities, equipment and tools, expertise, services, and other relevant assets which are made available to the public by the Federal agency.

''(5) PUBLICATION BY NIST.—The Director of the National Institute of Standards and Technology is authorized to provide the summary required by subsection (g)(2) to the public through internet sites.''.

SEC. 911. INNOVATIVE APPROACHES TO TECHNOLOGY TRANSFER.

Section 9(jj) of the Small Business Act (15 U.S.C. 638(jj)) is amended to read as follows:

''(jj) INNOVATIVE APPROACHES TO TECHNOLOGY TRANSFER.—

''(1) GRANT PROGRAM.—

''(A) IN GENERAL.—Each Federal agency required by subsection (n) to establish an STTR program shall carry out a grant program to support innovative approaches to technology transfer at institutions of higher education (as defined in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a))), nonprofit research institutions and Federal laboratories in order to accelerate the commercialization of federally funded research and technology by small business concerns, including new businesses.

''(B) AWARDING OF GRANTS AND AWARDS.—

''(i) IN GENERAL.—Each Federal agency required by subparagraph (A) to participate in this program, shall award, through a competitive, merit-based process, grants, in the amounts listed in subparagraph (C) to institutions of higher education, technology transfer organizations that facilitate the commercialization of

technologies developed by one or more such institutions of higher education, Federal laboratories, other public and private nonprofit entities, and consortia thereof, for initiatives that help identify high-quality, commercially viable federally funded research and technologies and to facilitate and accelerate their transfer into the marketplace.

''(ii) USE OF FUNDS.—Activities supported by grants under this subsection may include—

''(I) providing early-stage proof of concept funding for translational research;

''(II) identifying research and technologies at recipient institutions that have the potential for accelerated commercialization;

''(III) technology maturation funding to support activities such as prototype construction, experiment analysis, product comparison, and collecting performance data;

''(IV) technical validations, market research, clarifying intellectual property rights position and strategy, and investigating commercial and business opportunities; and

''(V) programs to provide advice, mentoring, entrepreneurial education, project management, and technology and business development expertise to innovators and recipients of technology transfer licenses to maximize commercialization potential.

''(iii) SELECTION PROCESS AND APPLICATIONS.—Qualifying institutions seeking a grant under this subsection shall submit an application to a Federal agency required by subparagraph (A) to participate in this program at such time, in such manner, and containing such information as the agency may require. The application shall include, at a minimum—

''(I) a description of innovative approaches to technology transfer, technology development, and commercial readiness that have the potential

to increase or accelerate technology transfer outcomes and can be adopted by other qualifying institutions, or a demonstration of proven technology transfer and commercialization strategies, or a plan to implement proven technology transfer and commercialization strategies, that can achieve greater commercialization of federally funded research and technologies with program funding;

''(II) a description of how the qualifying institution will contribute to local and regional economic development efforts; and

''(III) a plan for sustainability beyond the duration of the funding award.

''(iv) PROGRAM OVERSIGHT BOARDS.—

''(I) IN GENERAL.—Successful proposals shall include a plan to assemble a Program Oversight Board, the members of which shall have technical, scientific, or business expertise

and shall be drawn from industry, start-up companies, venture capital, technical enterprises, financial institutions, and business development organizations.

''(II) PROGRAM OVERSIGHT BOARDS RESPONSIBILITIES.—Program Oversight Boards shall—

''(aa) establish award programs for individual projects;

''(bb) provide rigorous evaluation of project applications;

''(cc) determine which projects should receive awards, in accordance with guidelines established under subparagraph (C)(ii);

''(dd) establish milestones and associated award amounts for projects that reach milestones;

''(ee) determine whether awarded projects are reaching milestones; and

''(ff) develop a process to reallocate outstanding award amounts from projects that are not reaching milestones to other projects with more potential.

''(C) GRANT AND AWARD AMOUNTS.—

''(i) GRANT AMOUNTS.—Each Federal agency required by subparagraph (A) to carry out a grant program may make grants to a qualifying institution for up to $1,000,000 per year for up to 3 years.

''(ii) AWARD AMOUNTS.—Each qualifying institution that receives a grant under subparagraph (B) shall provide awards for individual projects of not more than $150,000, to be provided in phased amounts, based on reaching the milestones established by the qualifying institution's Program Oversight Board.

''(D) AUTHORIZED EXPENDITURES FOR INNOVATIVE APPROACHES TO TECHNOLOGY TRANSFER GRANT PROGRAM.—

''(i) PERCENTAGE.—The percentage of the extramural budget each Federal agency required by subsection (n) to estab-

lish an STTR program shall expend on the Innovative Approaches to Technology Transfer Grant Program shall be—

"(I) 0.05 percent for each of fiscal years 2012 and 2013; and

"(II) 0.1 percent for each of fiscal years 2014 and 2015.

"(ii) TREATMENT OF EXPENDITURES.—Any portion of the extramural budget expended by a Federal agency on the Innovative Approaches to Technology Transfer Grant Program shall apply towards the agency's expenditure requirements under subsection (n).

"(2) PROGRAM EVALUATION AND DATA COLLECTION AND DISSEMINATION.—

"(A) EVALUATION PLAN AND DATA COLLECTION.—Each Federal agency required by paragraph (1)(A) to establish an Innovative Approaches to Technology Transfer Grant Program shall develop a program evaluation plan and collect annually such information from grantees as is necessary to assess the Program. Program evaluation plans shall require the collection of data aimed at identifying outcomes

resulting from the transfer of technology with assistance from the Innovative Approaches to Technology Transfer Grant Program, such as—

''(i) specific follow-on funding identified or obtained, including follow-on funding sources, such as Federal sources or private sources;

''(ii) number of projects which result in a license to a start-up company or an established company with sufficient resources for effective commercialization within 5 years of receiving an award under paragraph (1);

''(iii) invention disclosures and patents;

''(iv) number of projects supported by qualifying institutions receiving a grant under paragraph (1) that secure Phase I or Phase II SBIR or STTR awards;

''(v) available information on revenue, sales or other measures of products that have been commercialized as a result of projects awarded under paragraph (1);

''(vi) number and location of jobs created resulting from projects awarded under paragraph (1); and

''(vii) other data as deemed appropriate by a Federal agency required by this subparagraph to develop a program evaluation plan.

''(B) EVALUATIVE REPORT TO CONGRESS.—The head of each Federal agency that participates in the Innovative Approaches to Technology Transfer Grant Program shall submit to the Committee on Science, Space, and Technology and the Committee on Small Business of the House of Representatives and the Committee on Small Business and Entrepreneurship of the Senate an evaluative report regarding the activities of the program. The report shall include—

''(i) a detailed description of the implementation of the program;

''(ii) a detailed description of the grantee selection process;

''(iii) an accounting of the funds used in the program; and

''(iv) a summary of the data collected under subparagraph (A).

''(C) DATA DISSEMINATION.—For the purposes of program transparency and dissemination of best practices, the Administrator shall include on the public database under subsection (k)(1) information on the Innovative Approaches to Technology Transfer Grant Program, including—

''(i) the program evaluation plan required under subparagraph (A);

''(ii) a list of recipients of awards under paragraph (1); and

''(iii) information on the use of grants under paragraph (1) by recipient institutions.''.

SEC. 912. DOE PUBLIC-PRIVATE PARTNERSHIPS FOR COMMERCIALIZATION.

(a) IN GENERAL.—Subject to subsections (b) and (c), the Secretary of Energy shall delegate to directors of the National Laboratories signature authority with respect to any agreement described in subsection (b) the total cost of which (including the National Laboratory contributions and project recipient cost share) is less than $1,000,000, if such an agreement falls within the scope of—

(1) a strategic plan for the National Laboratory that has been approved by the Department of Energy; or

(2) the most recent congressionally approved budget for Department of Energy activities to be carried out by the National Laboratory.

(b) AGREEMENTS.—Subsection (a) applies to—

(1) a cooperative research and development agreement;

(2) a non-Federal work-for-others agreement; and

(3) any other agreement determined to be appropriate by the Secretary of Energy, in collaboration with the directors of the National Laboratories.

(c) ADMINISTRATION.—

(1) ACCOUNTABILITY.—The director of the affected National Laboratory and the affected contractor shall carry out an agreement under this section in accordance with applicable policies of the Department of Energy, including by ensuring that the agreement does not compromise any national security, economic, or environmental interest of the United States.

(2) CERTIFICATION.—The director of the affected National Laboratory and the affected con-

tractor shall certify that each activity carried out under a project for which an agreement is entered into under this section does not present, or minimizes, any apparent conflict of interest, and avoids or neutralizes any actual conflict of interest, as a result of the agreement under this section.

(3) AVAILABILITY OF RECORDS.—Within 30 days of entering an agreement under this section, the director of a National Laboratory shall submit to the Secretary of Energy for monitoring and review all records of the National Laboratory relating to the agreement.

(4) RATES.—The director of a National Laboratory may charge higher rates for services performed under a partnership agreement entered into pursuant to this section, regardless of the full cost of recovery, if such funds are used exclusively to support further research and development activities at the respective National Laboratory.

(d) EXCEPTION.—This section does not apply to any agreement with a majority foreign-owned company.

(e) CONFORMING AMENDMENT.—Section 12 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710a) is amended—

(1) in subsection (a)—

(A) by redesignating paragraphs (1) and (2) as subparagraphs (A) and (B), respectively;

(B) by striking ''Each Federal agency'' and inserting the following:

''(1) IN GENERAL.—Except as provided in paragraph (2), each Federal agency''; and

(C) by adding at the end the following:

''(2) EXCEPTION.—Notwithstanding paragraph (1), in accordance with section 813(a) of the Securing American Leadership in Science and Technology Act of 2021, approval by the Secretary of Energy shall not be required for any technology transfer agreement proposed to be entered into by a National Laboratory of the Department of Energy, the total cost of which (including the National Laboratory contributions and project recipient cost share) is less than $1,000,000.''; and

(2) in subsection (b), by striking ''subsection (a)(1)'' each place it appears and inserting ''subsection (a)(1)(A)''.

(f) SAVINGS CLAUSE.—Nothing in this section or an amendment made by this section abrogates or otherwise affects the primary responsibilities of any National Laboratory to the Department of Energy.

SEC. 913. DEPARTMENT OF ENERGY FOUNDATION.

(a) DEFINITIONS.—In this section:

(1) BOARD.—The term ''Board'' means the Board of Directors for the Foundation described in section 3(c).

(2) CHAIR.—The term ''Chair'' means the Chair of the Board described in section 3(c)(2).

(3) EXECUTIVE DIRECTOR.—The term ''Executive Director'' means the Executive Director of the Board described in section 3(f)(2).

(4) FOUNDATION.—The term ''Foundation'' means the Energy Foundation established under section 3(a).

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

(b) ESTABLISHMENT OF ENERGY FOUNDATION.—

(1) IN GENERAL.—Not later than December 31, 2021, the Secretary shall establish a nonprofit corporation to be known as the Energy Foundation referred to in this section as ''the Foundation''.

(2) LIMITATION.—The Foundation shall not be an agency or instrumentality of the Federal Government.

(3) NONAPPLICABILITY OF FACA.—The Federal Advisory Committee Act (5 U.S.C. App.) shall not apply to the Foundation.

(4) NONPROFIT STATUS.—The Foundation shall be an organization described in section 501(c) of the Internal Revenue Code of 1986 and exempt from taxation under section 501(a) of that Code.

(5) BOARD OF DIRECTORS.—

(A) IN GENERAL.—The Foundation shall operate under a board of directors.

(B) INITIAL APPOINTMENT.—The initial appointment of the board of directors shall be facilitated by the Secretary.

(C) COMPOSITION.—To the maximum extent practicable, the board of directors shall include representatives from a diverse range of communities, including—

(i) the academic community;

(ii) the business community;

(iii) nonprofit organizations;

(iv) the communities surrounding the laboratories and facilities of the Department; and

(v) the technology transfer and commercialization community.

(D) RESTRICTION ON MEMBERSHIP.—No employee of the Department shall be appointed as a member of the board of directors.

(6) PURPOSE AND ACTIVITIES OF FOUNDATION.—the purpose of the Foundation is to channel private sector investments that support efforts to create, develop, and commercialize innovative technologies that address diverse energy challenges, by methods that may include—

(A) fostering collaboration and partnerships between the Federal Government, State governments, institutions of higher education, federally funded research and development centers, industry, and nonprofit organizations for the research, development, or commercialization of next-generation energy technologies;

(B) leveraging technologies to support new product development that supports regional innovation and economic development; and

(C) administering prize competitions to accelerate private sector competition and investment.

(7) ACTIVITIES.—

(A) IN GENERAL.—The Foundation may solicit and accept gifts, grants, and other donations, establish accounts, and invest and expend funds in support of the programs and activities described in subparagraphs (B) through (D).

(B) STUDIES, COMPETITIONS, AND PROJECTS.—The Foundation may conduct and support studies, competitions, projects, research, development, commercialization, and other activities that further the purpose of the Foundation described in paragraph (1).

(C) FELLOWSHIPS AND GRANTS.—the Foundation may award fellowships and grants to recipients selected under clause (iii) for activities relating to research, development, prototyping, maturing, or commercializing of energy technologies.

(i) USES OF FELLOWSHIPS AND GRANTS.—A fellowship or grant under clause (i) may include stipends, travel, health insurance benefits, and other appropriate expenses.

(ii) SELECTION.—

(I) IN GENERAL.—The Foundation shall award a fellowship or grant under clause (i) based on the technical and commercialization merits of the proposed project.

(II) INPUT.—In selecting recipients of a fellowship or grant under

clause (i), the Foundation may consult with potential recipients regarding the ability to carry out various projects that would further the purpose of the Foundation described in paragraph (1).

(ii) FEDERAL LABORATORIES.—

(I) IN GENERAL.—Federal Laboratories, including laboratories of the Department of Energy, may apply for and accept grants under clause (i).

(II) EFFECT.—A Federal laboratory that applies for or accepts a grant under subclause (I) shall not be considered to be engaging in a competitive procedure.

(D) SUPPLEMENTARY PROGRAMS.—The Foundation may carry out supplementary programs—

(i) to conduct and support forums, meetings, conferences, courses, and training workshops consistent with the purpose of the Foundation described in paragraph (1);

(ii) to support and encourage the understanding and development of—

(I) data reporting models that promote the translation of technologies from the research stage, through development and maturation, and to the market; and

(II) policies that make regulation more effective and efficient by leveraging the technology translation data described in subclause (I) for the regulation of relevant technology sectors;

(iii) for writing, editing, printing, publishing, and vending books and other materials relating to research carried out under the Foundation; and

(iv) to conduct other activities to carry out and support the purpose described in paragraph (1).

(E) AUTHORITY OF FOUNDATION.—The Foundation shall be the sole entity responsible for carrying out the activities described in this paragraph.

(F) ADMINISTRATIVE CONTROL.—No participant in a program under this paragraph or employee of the Foundation shall exercise any administrative control over any Federal employee.

(G) SUPPORT SERVICES.—The Secretary may provide facilities, utilities, and support services to the Foundation if it is determined by the Secretary to be advantageous to the research programs of the Department.