



DIVISION B – RESEARCH & INNOVATION

TITLE I – DEPARTMENT OF ENERGY SCIENCE FOR THE FUTURE

Sec. 10101. Mission of the Office of Science.

Section 101 amends the Department of Energy Organization Act (42 U.S.C. 7139) by authorizing the Director of the Office of Science to steward scientific user facilities and coordinate programs and activities of the Office of Science. This section also authorizes the Secretary of Energy to coordinate the activities of the Office of Science with other offices of the Department of Energy and other Federal Agencies.

Sec. 10102. Basic energy sciences program.

Subsection (a) amends the Department of Energy Research and Innovation Act (42 U.S.C. 18641) by authorizing a research and development program in basic energy sciences, including materials science and engineering, chemical sciences, physical biosciences, geosciences, and other disciplines; prioritizing research and development in sustainable chemistry to enable clean, safe, and economic alternatives and methodologies to traditional chemical products and processes; and authorizing annual appropriations and providing other guidance for major construction projects.

Subsection (b) amends Section 973 of the Energy Policy Act of 2005 (42 U.S.C. 16313) by authorizing various research and development activities related to artificial photosynthesis and authorizing annual appropriations.

Subsection (c) amends Section 975 of the Energy Policy Act of 2005 (42 U.S.C. 16315) by authorizing various research and development activities related to electricity storage and authorizing annual appropriations.

Sec. 10103. Biological and environmental research.

Subsection (a) amends Section 306 of the Department of Energy Research and Innovation Act (42 U.S.C. 18644) by authorizing a research and development program in biological systems science, biomolecular characterization and imaging science, and climate and environment science relevant to the development of new energy technologies and to support the energy, environment, and national security missions of the Department.

Subsection (b) amends Section 977(f) of the Energy Policy Act of 2005 (42 U.S.C. 16317(f)) by authorizing up to six bioenergy research centers focused on fundamental research in plant and microbial systems biology, biological imaging and analysis, and genomics to accelerate the research, development, and commercial application of bioenergy sources and biobased products. It also provides guidance on the research thrusts, duration, selection, partnership efforts, and other activities and characteristics of these centers.

Subsection (c) amends Section 306(e)(8) of the Department of Energy Research and Innovation Act (42 U.S.C. 18644(e)(8)) by authorizing annual appropriations for a Low-Dose Radiation Research Program.



Subsection (d) amends Section 306(f) of the Department of Energy Research and Innovation Act (42 U.S.C. 18644(d)) by directing the Secretary of Energy, in consultation with the Administrator of the National Aeronautics and Space Administration, to carry out a basic research program on the similarities and differences between low-dose radiation exposure on Earth, in low-Earth orbit, and in the space environment.

Subsection (e) amends Section 306 of the Department of Energy Research and Innovation Act (42 U.S.C. 18644) by authorizing research in Earth and environmental systems science, including in clean water and watersheds and climate and Earth modeling, and through a new mid-scale funding mechanism; providing guidance on the stewardship of biological and environmental research user facilities; and establishing new initiatives in coastal zone research and engineered ecosystems, among other areas.

Sec. 10104. Advanced scientific computing research program.

Subsection (a) amends Section 304 of the Department of Energy Research and Innovation Act (42 U.S.C. 18642) by authorizing a program to steward applied mathematics, computational science, and computer science research relevant to the mission of the Department; support research to accelerate the development of advanced computing and networking technologies; and expansion of funding for the Computational Science Graduate Fellowship. Subsection (a) also: provides guidance on activities necessary for the long-term sustainment of the Exascale computing ecosystem; establishes new initiatives in next-generation computing, heterogeneous computing architectures, and energy efficient computing; and provides guidance on the future of the Energy Sciences Network.

Subsection (b) establishes programs to support quantum network infrastructure research and development and broaden access to quantum computing resources and directs the Secretary of Energy to ensure the equitable use of the Department's high-performance computing resources.

Sec. 10105. Fusion energy research.

Subsection (a) amends Section 307 of the Department of Energy Research and Innovation Act (42 U.S.C. 18645) by authorizing appropriations for research and development of fusion materials, the establishment of national teams to develop conceptual designs and technology roadmaps for a pilot fusion plant; the establishment of a high-performance computation collaborative research program and an associated innovation center in high-performance computing for fusion; and construction of the Material Plasma Exposure Experiment and the Matter in Extreme Conditions Instrument Upgrade project.

Subsection (b) amends Section 972 of the Energy Policy Act of 2005 (42 U.S.C. 16312) by authorizing annual appropriations for the construction of the ITER international fusion project.

Sec. 10106. High energy physics program.

Subsection (a) amends Section 305 of the Department of Energy Research and Innovation Act (42 U.S.C. 18643) by authorizing a research program in elementary particle physics and associated advanced technology research and development, including activities that leverage high energy accelerators and advanced detectors to create and study the interaction of elementary particles and to investigate the fundamental forces of physics.



Subsection (b) amends Section 305(d) of the Department of Energy Research and Innovation Act (42 U.S.C. 18634(d)) by authorizing the Director to ensure the participation of the United States in international efforts related to the Large Hadron Collider, encourage international participation in the Long-Baseline Neutrino Facility and Deep Underground Neutrino Experiment, and prioritize engagement in future international facilities.

Subsection (c) amends Section 305(f) of the Department of Energy Research and Innovation Act (42 U.S.C. 18645(f)) by authorizing research in fundamental cosmic phenomena and collaboration with other Federal Agencies and international partners on associated facilities and experiments.

Subsection (d) amends Section 305 of the Department of Energy Research and Innovation Act (42 U.S.C. 18645) by authorizing the construction of major facilities and items of equipment recommended by the 2014 Particle Physics Project Prioritization Panel report entitled “Building for Discovery”; upgrades to existing accelerators and detectors; accelerator and detector research and development; and a program in underground science.

Sec. 10107. Nuclear physics program.

Amends Section 308 of the Department of Energy Research and Innovation Act (42 U.S.C. 18646) by authorizing a research program in nuclear matter and providing guidance and authorization levels for the construction of the Facility for Rare Isotope Beams and the Electron-Ion Collider.

Sec. 10108. Accelerator research and development.

Amends the Department of Energy Research and Innovation Act (42 U.S.C. 18601 et seq.) by authorizing a program to advance accelerator science and technology of relevance to the mission of the Department; foster partnerships to develop, demonstrate, and enable the commercial application of such technologies; support associated workforce development activities; and provide access to accelerator design and engineering resources.

Sec. 10109. Isotope development and production for research applications.

Amends the Department of Energy Research and Innovation Act (42 U.S.C. 18601 et seq.) by authorizing a program to produce isotopes for use in research, medical, industrial, and related purposes and to advance isotope production methods and techniques. Section 109 also directs the Secretary to ensure that any activities carried out under this program do not compete with private industry unless such activities are warranted by national security concerns.

Sec. 10110. Science laboratories infrastructure program.

Amends Section 309 of the Department of Energy Research and Innovation Act (42 U.S.C. 18647) by authorizing the Director of the Office of Science to employ all available approaches and funding mechanisms to address science laboratory infrastructure needs, including alternative financing and expense funding. This section goes on to outline the limiting circumstances in which alternative financing arrangements can be implemented. This section also establishes a mid-scale instrumentation program to enable the acquisition and development of instruments ranging in cost between \$1 million and \$20 million.



Sec. 10111. Increased collaboration with teachers and scientists.

Amends the Department of Energy Research and Innovation Act (42 U.S.C. 18601 et seq.) by authorizing the Director of the Office of Science to support the development of a scientific workforce through programs that foster collaboration between K-12 students, university students, early-career researchers, faculty, and National Laboratories, including through proven mechanisms for engaging individuals from underrepresented groups.

Subsection (b) amends the Department of Energy Science Education Enhancement Act (42 U.S.C. 7381) by directing the Secretary of Energy to expand opportunities to increase the number and the diversity, equity, and inclusion of highly skilled STEM professionals working in the Department's mission-relevant disciplines and broaden the recruitment pool to increase diversity, including expanded partnerships with Historically Black Colleges, Tribal Colleges, Minority Serving Institutions, emerging research institutions, and scientific societies. Subsection (b) also directs the Office of Science to collaborate with the National Science Foundation to support and leverage the National Science Foundation Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (NSF INCLUDES) National Network to expand the number of students, early-career researchers, and faculty from underrepresented groups pursuing and attaining skills or undergraduate and graduate degrees in science, technology, engineering, and mathematics fields relevant to the Department's mission.

Sec. 10112. High intensity laser research initiative; Office of Science Emerging Infectious Disease Computing Research Initiative; helium conservation program; authorization of appropriations.

Subsection (a) amends the Department of Energy Research and Innovation Act (42 U.S.C. 18601 et seq.) by authorizing the establishment of a high intensity laser research initiative to advance laser technologies relevant to future facility needs in discovery science as well as to support a user network of academic and national laboratory high intensity laser facilities; and establishes a program to reduce the use of helium among the Department's grantees and facilities by encouraging recycling and reuse. This subsection also authorizes the Secretary of Energy, in coordination with the Administrator of the National Aeronautics and Space Administration and the Director of the National Science Foundation, to carry out a crosscutting initiative that leverages the Federal Government's relevant analytical resources and tools, user facilities, and advanced computational and networking capabilities to prevent, prepare for, and respond to emerging infectious diseases, including COVID-19. Finally, subsection (a) also authorizes annual appropriations for the Office of Science.

Subsection (b) amends Section 1(b) of the Department of Energy Research and Innovation Act to by inserting a Table of Contents that reflects the amendatory language.



Sec. 10113. State-owned enterprises prohibition.

Subsection (a) stipulates that none of the funds authorized in this section may be used in awarding a contract, subcontract, grant, or loan to any entity that is legally or financially related to a corporation based in a country that is identified as a nonmarket economy country pursuant to Section 771(18) of the Tariff Act of 1930 (19 U.S.C. 1677(18)); was identified by the U.S. Trade Representative as a priority foreign country pursuant to Section 182(a)(2) of the Trade Act of 1974 (19 U.S.C. 2242); or is subject to monitoring by the U.S. Trade Representative under Section 306 of the Trade Act of 1974 (19 U.S.C. 2416). This subsection also prohibits the use of authorized funds from being awarded to any entity that is legally or financially related to a corporation based in a country that is listed pursuant to Section 9(b)(3) of the Uyghur Human Rights Policy Act of 2020 (Public Law 116-145).

Subsection (b) authorizes the Secretary of Energy to grant a publicly available waiver to an entity that might qualify under Subsection (a) if such an entity possesses a minority relationship or investment.

Subsection (c) stipulates that the section shall be applied in a manner that is consistent with U.S. obligations under international agreements.

Sec. 10114. Determination of Budgetary Effects.

PAYGO Language.

Sec. 10115. National Virtual Biotechnology Laboratory.

Allows the Office of Science to allocate any funds authorized under this title to the National Virtual Biotechnology Laboratory so long as such allocation is in conformity with the purpose and any other requirements of such authorization.

Sec. 10116. Additional Research.

Directs the Secretary of Energy to support research to advance adoption of integrated rooftop solar, distributed solar, and microgrid technologies.

TITLE II – NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY FOR THE FUTURE ACT OF 2021

SUBTITLE A – APPROPRIATIONS

Sec. 10211. Authorization of appropriations.

SUBTITLE B – MEASUREMENT RESEARCH

Sec. 10221. Engineering biology and biometrology.

Authorizes and expands NIST's engineering biology, biomanufacturing, and biometrology research and development of tools and methodologies to measure the molecular components of the cell and engineered systems.



Sec. 10222. Greenhouse gas measurement research.

Authorizes and expands NIST's greenhouse gas measurement program, including support for testbeds and a center of excellence.

Sec. 10223. NIST authority for cybersecurity and privacy activities.

Amends Section 2 of the NIST Act (15 U.S.C. 272) cybersecurity and privacy program authorities, including with specific direction on software and cloud security and privacy enhancing technologies.

Sec. 10224. Software security and authentication.

Directs NIST to create guidance on the security of the full lifecycle of software and open-source software repositories, establishes a program for AI-enabled defense research, provides technical assistance to Federal inspectors general, and requires NIST to digitally authenticate all software tools developed by the agency.

Sec. 10225. Digital identity management research.

Amends Section 504 of the Cybersecurity Enhancement Act of 2014 (15 U.S.C. 7464) to authorize NIST's digital identity research and require NIST to develop voluntary guidance for digital identity management.

Sec. 10226. Biometrics research and testing.

Expands NIST's biometrics identification research and testing program for evaluating the accuracy and bias of biometric technologies and directs GAO to study the impact of biometric systems on historically marginalized communities.

Sec. 10227. Federal biometric performance standards.

Amends Section 20 of the National Institute of Standards and Technology Act (15 U.S.C. 278g-3) to direct NIST to develop performance standards and guidelines for high-risk Federal biometric identification systems.

Sec. 10228. Protecting research from cyber theft.

Amends Section 2 of the National Institute of Standards and Technology Act (15 U.S.C. 272(e)) to require NIST to consider the needs of institutions of higher education when creating cybersecurity guidance.

Sec. 10229. Dissemination of resources for research institutions.

Requires NIST to offer resources and technical assistance to research intensive universities to help them mitigate their cyber risks related to conducting research.

Sec. 10230. Advanced communications research.

Authorizes NIST's advanced communications research and test beds, including the existing National Advanced Spectrum Communications Test Network (NASCTN) spectrum test network.

Sec. 10231. Neutron scattering.

Requires NIST to develop a strategic plan for the future of the NIST Center for Neutron Research and to conduct the agency's neutron research in coordination with DOE.



Sec. 10232. Quantum information science.

Amends the National Quantum Initiative Act (15 U.S.C. 8801) to expand NIST work with post-quantum encryption and quantum networking and communications.

Sec. 10233. Artificial intelligence.

Provides support for NIST's role in the development of safe and trustworthy artificial intelligence (AI) and data science, including establishing test beds and an office to study bias in the use of AI.

Sec. 10234. Sustainable Chemistry Research and Education.

Requires NIST to conduct activities in support of sustainable chemistry.

Sec. 10235. Premise plumbing research.

Authorizes a research program to facilitate the development of metrology for premise plumbing.

SUBTITLE C – GENERAL ACTIVITIES

Sec. 10241. Educational outreach and support for underrepresented communities.

Expands NIST's educational activities and outreach focused on underrepresented communities.

Sec. 10242. Other transactions authority.

Gives NIST more flexibility to partner with the private sector on research and development.

Sec. 10243. Report to congress on collaborations with government agencies.

Requires report to relevant Committees, within six months of enactment of this Act, describing challenges with respect to collaboration with other Federal agencies.

Sec. 10244. Hiring critical technical experts.

Gives NIST the authority to directly hire 15 employees to enable the agency to better compete with the private sector for talent in critical technology areas.

Sec. 10245. International standards development.

Codifies NIST's role as a convener and Federal coordinator in international standard setting; expands NIST's support for standards capacity building, including through a pilot program for grants to small businesses, nonprofits, and universities to participate in international standards setting; and reaffirms the importance of voluntary, consensus-driven policies in international standards setting.

Sec. 10246. Standard technical update.

Provides several technical and administrative updates to the NIST Act.

Sec. 10247. GAO study on NIST research security policies and protocols.

Directs GAO to review the security practices of the Institute to guard against foreign interference.

Sec. 10248. Standards development organization grants.



Directs NIST to establish a competitive grants program for nongovernmental standards organizations to develop, approve, disseminate, maintain and review forensic science voluntary consensus standards.

SUBTITLE D – HOLLINGS MANUFACTURING EXTENSION PARTNERSHIP

Sec. 10251. Establishment of expansion awards pilot program as a part of the Hollings Manufacturing Extension Partnership.

Establishes a pilot program of expansion awards for Hollings Manufacturer Extension Partnership (MEP) centers to provide services for workforce development, resiliency of domestic supply chains, and expand support for advanced technology upgrades at small and medium manufacturers.

Sec. 10252. Update to manufacturing extension partnership.

Amends Section 25 of the National Institute of Standards and Technology Act (15 USC 278k) to require the Hollings Manufacturer Extension Partnership (MEP) to increase outreach to underserved communities, allows NIST to accept funding from other Federal departments and agencies for competitive MEP grants, and ensures the MEP Centers are specifically focused on supporting American manufacturing.

Sec. 10253. National supply chain database.

Establishes a national supply chain database at MEP to track disruptions in U.S. supply chains.

Sec. 10254. Hollings Manufacturing Extension Partnership activities.

Allows businesses that participate in MEP to automatically be enrolled in GSA Advantage.

SUBTITLE E – MANUFACTURING USA PROGRAM

Sec. 10261. Supporting geographic diversity.

Requires an Agency head, when planning or establishing a Manufacturing USA program, to consider geographic diversity, areas with low per capita income, and areas with a high proportion of socially disadvantaged residents.

SUBTITLE F – MANUFACTURING USA PROGRAM

SEC. 10271. Expanding Opportunities through the Manufacturing USA Program. Directs Federal agencies to increase participation of minority serving institutions or minority business enterprises in Manufacturing USA institutes.

TITLE III – NATIONAL SCIENCE FOUNDATION FOR THE FUTURE

Sec. 10301. Findings.

Sec. 10302. Definitions.

Sec. 10303. Authorizations of appropriation.



Sec. 10304. STEM education.

- (a) PreK-12 STEM Education - Supports a decadal survey to be carried out by the National Academies to identify research priorities in PreK-12 STEM education and an additional study on barriers to the widespread implementation of STEM education innovations. Establishes a program to fund multidisciplinary research and translation centers to scale STEM education innovations.
- (b) Undergraduate STEM Education - Supports research and development to improve the alignment of undergraduate STEM education and training with workforce needs. Updates the Advanced Technological Education program to establish a network of centers for science and technical education.
- (c) Advanced Technological Manufacturing Act – Amends and increases the authorized budget for the Advanced Technological Education program.
- (d) Graduate STEM Education - Expands requirement for funding proposals to include a mentoring plan to graduate students. Supports activities to facilitate career exploration for graduate students and postdoctoral researchers. Creates a requirement for funding proposals to include individual development plans for graduate students and postdoctoral researchers and provides supplemental funding to facilitate professional development activities. Supports research on the graduate education system. Updates the Graduate Research Fellowship Program to address workforce demand, increase the cost of education allowance, and recruit a more diverse pool of applicants. Requires an evaluation of mechanisms for supporting graduate student education and training.
- (e) STEM Workforce Data - Requires a portfolio analysis of Foundation investments in the skilled technical workforce. Requires an assessment of the feasibility and benefits of adding rotating questions/topic modules to existing National Center for Science and Engineering Statistics (NCSES) surveys. Requires an assessment of the feasibility and benefits of incorporating new questions to existing (NCSES) surveys on a range of topics related to the nature of the STEM workforce and the workforce environment. Requires a Government Accountability Office evaluation of the capacity of NCSES to meet current and future needs for data on the STEM workforce.
- (f) Cyber Workforce Development Research and Development - Supports research on the cyber workforce.
- (g) Federal Cyber Scholarship-for-Service Program – Clarifies that cybersecurity-related aspects of artificial intelligence, quantum computing, aerospace, and other fields are within the scope of the NSF CyberCorps Scholarship-for-Service program.
- (h) Cybersecurity Workforce Data Initiative – Establishes a data initiative to measure the cybersecurity workforce.
- (i) (Incorporation of Art and Design into Certain STEM Education – Supports research to develop STEM educational curriculums that incorporate art and design to promote creativity and innovation.
- (j) (Mandatory Cost-Sharing – Waives mandatory cost-sharing requirements for the Major Research Instrumentation and Robert Noyce Teacher Scholarship programs for 5 years.
- (k) (Integrating Art and Design into National Science Foundation Informal STEM Education Program - Supports the design and testing of informal STEAM education programs.



Sec. 10305. Broadening participation.

- (a) Presidential Awards for Excellence in Mathematics and Science Teaching - Updates the program to allow for the selection of at least one teacher each from the Commonwealth of the Northern Mariana Islands, American Samoa, the Virgin Islands of the United States, and Guam.
- (b) Robert Noyce Teacher Scholarship Program Update - Requires outreach to historically Black colleges and universities, minority institutions, higher education programs that serve veterans and rural communities, and emerging research institutions.
- (c) NSF INCLUDES Initiative - Codifies the NSF INCLUDES program.
- (d) Broadening Participation on Major Facilities Awards - Establishes a requirement for organizations seeking management awards to demonstrate experience and capabilities in employing best practices in broadening participation and directs the Foundation to consider implementation of such practices in oversight of the award.
- (e) Partnerships with Emerging Research Institutions - Establishes a pilot program to require multi-institution proposals seeking funding in excess of \$1 million be submitted in partnership with emerging research institutions and requires annual reporting on such grants to include feedback directly from participating emerging research institutions.
- (f) Tribal Colleges and Universities Program Update - Expands the scope of the Tribal Colleges and Universities program to include support for activities to build graduate programs.
- (g) Diversity in Tech Research - Supports organizational research, including research on diversity, equity, and inclusion in the technology sector.
- (h) Continuing Support for EPSCoR – Expresses the sense of Congress that the Foundation should continue to support research and education capacity building through the EPSCoR program.
- (i) Fostering STEM Research Diversity and Capacity Program – Supports research capacity building for research institutions not in the top 100 of Federal research funding, including support for developing and expanding research programs, faculty professional development, stipends for students, acquisition of research instrumentation, and administrative research support.
- (j) Capacity Building Program for Developing Universities – Supports administrative capacity building activities to increase the capacity of minority serving institutions to compete for and manage Foundation research and development awards.
- (k) Chief Diversity Officer of the NSF – Establishes a Chief Diversity Officer position charged with providing guidance and leading the Foundation’s strategic planning to broaden participation of individuals and institutions in NSF-funded activities.
- (l) Grant Program to Increase the Participation of Women and Underrepresented Minorities in Stem Fields – Supports activities to increase the participation of women and underrepresented minorities in STEM fields.

Sec. 10306. Fundamental research.

- (a) Definitions
- (b) Broader Impacts - Directs an assessment of the application of the Broader Impacts review criterion across the Foundation and provides support for activities to improve its implementation.



- (c) Sense of Congress - Expresses the sense of Congress that the Foundation should continue to identify opportunities to reduce administrative burden on researchers.
- (d) Research Integrity and Security - Directs the Foundation to take steps to address security risks to Foundation-supported research, including through the Office of Research Security and Policy, the appointment of a Chief of Research Security, the development of an online resources to inform institutions and researchers of security risks, support for the establishment of a risk assessment center, and support for research on misconduct in the research environment. Authorizes NSF to request proposal supporting documentation, including talent recruitment program contracts and directs NSF to require and support the development of research security training. Supports an update to the National Academies Guide to Responsible Conduct in Research. Establishes a prohibition on participation by NSF-funded researchers in malign foreign talent recruitment programs sponsored by foreign countries of concern.
- (e) Research Ethics - Expresses the sense of Congress with respect to potential ethical, social, safety, and security implications of research in emerging technologies. Establishes a requirement for the inclusion of an ethics statement in award proposals. Supports research on the ethical and social implications of Foundation-supported research and the development of approaches for risk mitigation.
- (f) Research Reproducibility and Replicability - Establishes a requirement for the inclusion of a machine-readable data management plan in award proposals. Requires the development of a set of criteria for trusted open repositories and provides support for the development of open data repositories to address any gaps. Requires the establishment of a single web-based point of access for data, software, and code resulting from Foundation funded projects. Directs the Foundation to ensure that data resulting from Foundation-funded projects is made available in trusted open repositories. Supports research and development of tools and infrastructure to support research reproducibility.
- (g) Climate Change Research - Supports research to improve understanding and predictability of the climate system and climate-change risk, resilience, and mitigation and to educate and train climate researchers.
- (h) Violence Research - Supports research related to violence.
- (i) Social, Behavioral, and Economic Sciences - Directs the Foundation to take steps to ensure the participation of social, behavioral, and economic science researchers in cross-cutting agency programs.
- (j) Measuring Impacts of Federally Funded R&D - Supports research related to the impacts of Federally funded research and development on society, the economy, and the workforce.
- (k) Food-Energy-Water Research - Supports research related to the food-energy-water system.
- (l) Biological Field Stations and Marine Laboratories – Supports research instrumentation and other infrastructure at biological field stations and marine laboratories.
- (m) Sustainable Chemistry Research and Education - Establishes a program to support research related to sustainable chemistry.
- (n) Risk and Resilience Research - Supports research related to risk assessment and predictability and development of tools and technologies for increased resilience.
- (o) UAV Technologies – Supports research and development related to unmanned aerial vehicle technologies.
- (p) Leverage International Expertise in Research - Directs NSF to explore opportunities to support international research collaboration.



- (q) Biological Research Collections - Supports databases and tools to secure and improve biological research collections. Establishes a requirement for the inclusion of a specimen management plan in award proposals. Supports the establishment of a center to facilitate coordination and data sharing.
- (r) Clean Water Research and Technology Acceleration - Supports water system research and technology development.
- (s) Technology and Behavioral Science Research - Supports social and behavioral science research on consumer technology and mental health.
- (t) Manufacturing Research Amendment - Updates the list of technology areas eligible for funding through the NSF's advanced manufacturing research program to include additive and continuous manufacturing.
- (u) Critical Minerals Mining Research and Development – Supports research to advance critical minerals mining strategies and technologies.
- (v) Study of AI Research Capacity – Directs the Foundation to conduct or support a study on artificial intelligence research capacity at U.S. universities.
- (w) Advancing IoT for Precision Agriculture – Supports research to improve the use of advanced sensing systems in rural and agricultural areas, highlights improving productivity in agriculture as a goal for activities funded under the Advanced Technological Education program and supports a Government Accountability Office technology assessment of precision agriculture technologies.
- (x) Astronomy and Satellite Constellations – Supports research on the impact of satellite constellations on ground-based astronomy and the development of mitigation strategies.
- (y) GAO Technology Assessment to Address the Opioid Epidemic – Provides for a technology assessment by the Government Accountability Office on predictive analytic technologies applications to address the opioid epidemic.
- (z) National Science Foundation Study on Inflation – Directs NSF to commission a study to assess the effects of inflation on the American workforce and competitiveness.

Sec. 10307. Research infrastructure.

- (a) Facility Operations and Maintenance - Requires the continuation of the Facility Operation Transition pilot program in the Facilities Construction (MREFC) account to provide cost sharing with the managing directorate during the first five years of operation.
- (b) Reviews - Directs periodic assessment of the cost and benefits of extending the operation of research facilities beyond their planned operational lifespan.
- (c) Helium Conservation - Expands eligibility for the Major Research Instrumentation program to include the purchase, installation, operation, and maintenance of equipment and instrumentation to conserve helium.
- (d) Advanced Computing - Directs the Foundation to collect information and regularly publish a report on the computational needs for Foundation-funded projects. Directs the Foundation to develop and regularly update an advanced computing roadmap.
- (e) National Secure Data Service – Establishes a National Secure Data Service demonstration project.



Sec. 10308. Directorate for science and engineering solutions.

- (a) Establishment - Establishes a new directorate to accelerate use-inspired and translational research and development to advance solutions to pressing societal challenges.
- (b) Purpose – Describes the purposes of the directorate.
- (c) Activities - Describes activities to be supported by the directorate, including support for use-inspired research and translation, the development of innovative approaches to connect research with societal outcomes, the development of partnerships and collaborations that include traditional and nontraditional players, support for translational research infrastructure and capacity building, and support for education and training of students.
- (d) Assistant Director - Establishes an Assistant Director position to head the directorate.
- (e) Advisory Committee - Establishes an advisory committee to assess the activities carried out by the directorate and propose new strategies for fulfilling the purpose of the directorate.
- (f) Existing Programs - Authorizes the Foundation to place existing programs under the management of the directorate.
- (g) Focus Areas - Directs the Foundation to identify focus areas to guide directorate activities and to consider focus areas that contribute to a list of societal challenge –climate change and environmental sustainability, global competitiveness, cybersecurity, national security, STEM education and workforce, and social and economic inequality.
- (h) Eligibility – Expands awardee eligibility to include private sector entities.
- (i) Technology Research Institutes – Supports Technology Research Institutes to advance transdisciplinary research, development, and commercialization in key technology areas, including through support for multi-user testbeds and instrumentation, accessible repositories for research data and computational models, workshops, and graduate student traineeships.
- (j) Planning and Capacity Building Grants – Supports technology transfer capacity building for smaller research institutions, including support for technology transfer expert staff, private sector partnerships, and education and training of students and researchers.
- (k) Entrepreneurial Fellowships – Establishes a fellowship program to provide scientists with entrepreneurial training.
- (l) Low-Income Scholarship Program – Authorizes appropriations for the Scholarships in STEM program.
- (m) Authorities - Provides flexible funding and hiring authorities.
- (n) Ethical, Legal, and Societal Considerations - Directs the Foundation to take steps to ensure that ethical, legal, and societal considerations are integrated into the activities of the directorate.
- (o) Reports and Roadmaps - Directs the Foundation to provide an annual report describing the activities of the directorate and a roadmap describing the strategic vision that will guide future investment decisions.
- (p) Evaluation - Directs an evaluation of the success of the directorate in achieving its purpose to advance solutions to pressing societal challenges through use-inspired and translational research.



Sec. 10309. Administrative amendments.

- (a) Supporting Veterans in STEM Careers - Provides a technical fix.
- (b) Sunshine Act Compliance - Relaxes the requirement for an annual review and report related to Sunshine Act Compliance of the National Science Board and authorizes a risk-based approach to scheduling compliance reviews.
- (c) Science and Engineering Indicators Report Submission - Changes the deadline for a biennial report on science and engineering indicators from January 15 to March 15.
- (d) Other requirements – Ensures that construction activities funded under this title meet prevailing wage requirements.

Sec. 10310. Microgravity utilization policy.

Requires National Science Foundation facilitate access to the microgravity environment for awardees.

Sec. 10311. Recognition of Arecibo Observatory.

Sec. 10312. Hands-on learning opportunities in STEM education.

Requires NSF Director make awards to eligible nonprofit programs for supporting hands-on learning opportunities in STEM education, including via after-school activities and innovative learning opportunities.

TITLE IV – BIOECONOMY RESEARCH AND DEVELOPMENT

Sec. 10401. Findings.

Sec. 10402. Definitions.

Sec. 10403. National Engineering Biology Research and Development Initiative.

Subsection (a) establishes a National Engineering Biology Research and Development Initiative to advance engineering biology research; support risk research to address ethical, safety, security and other societal implications of engineering biology; support the development of tools to accelerate engineering biology research; expand the number of engineering biology researchers; accelerate the translation and commercialization of engineering biology research; and improve interagency planning and coordination of federal engineering biology research initiatives.

Subsection (b) describes the specific activities of the Initiative, including support for research grants, research centers, "omics" databases, novel tools and technologies to accelerate research, testbeds for technology scale-up, education and training of students, metrics to understand and assess the bioeconomy, and technology transfer activities.

Subsection (c) requires outreach to minority-serving institutions and predominantly undergraduate institutions and encourages research collaborations among different types of institutions.

Subsection (d) describes how the Initiative should take into account the ethical, legal, environmental, safety, security, and other appropriate societal concerns.



Sec. 10404. Initiative coordination.

Requires OSTP to designate an Interagency Committee that would oversee the planning, management, and coordination of the Initiative, in addition to developing and regularly updating a strategic plan for the Initiative, developing a national genomic sequencing strategy; and submitting to Congress an annual coordinated interagency budget proposal for the Initiative.

Sec. 10405. Advisory committee.

Designates an Advisory Committee of non-Federal members to provide advice on the Initiative (in practice the intent would be for PCAST to fill this role); charges the Committee with specific duties; and requires the Committee to report on their findings and recommendations at least every 3 years.

Sec. 10406. External review of ethical, legal, environmental, safety, security, and societal issues.

Requires a National Academy of Sciences workshop to review the ethical, environmental, societal, and health concerns related to engineering biology research and development.

Sec. 10407. Agency activities.

Describes specific Initiative activities and responsibilities for the National Science Foundation, the National Institute of Standards and Technology, the National Oceanic and Atmospheric Administration, the Department of Energy, the National Aeronautics and Space Administration, the Department of Agriculture, the Environmental Protection Agency, and the Department of Health and Human Services.

Sec. 10408. Rule of construction.

Stating that nothing in the title will be construed to require public disclosure of information that is exempt from mandatory disclosure.

TITLE V – BROADENING PARTICIPATION IN SCIENCE

SUBTITLE A – STEM OPPORTUNITIES

Sec. 10501. Findings.

Sec. 10502. Purposes.

The purposes of this Act are to: (1) ensure Federal science agencies and institutions of higher education are fully engaging their entire talent pool; (2) to provide for research and data collection on the participation and trajectories of groups historically underrepresented in STEM studies and careers; (3) to raise awareness within Federal science agencies and institutions of higher education about the barriers faced by these groups; (4) to identify, disseminate, and implement best practices for lowering these barriers at Federal science agencies and institutions of higher education; (5) to provide grants to institutions of higher education to implement or expand evidence-based reforms to increase the number of individuals from underrepresented groups in STEM studies and careers.

Sec. 10503. Federal science agency policies for caregivers.

Requires OSTP to develop guidance to Federal science agencies regarding establishment of policies to provide no-cost extensions and flexibility in award start time to grantees with caregiving responsibilities.



Sec. 10504. Collection and reporting of data on Federal research grants.

Requires each Federal science agency to collect comprehensive demographic data on recipients of Federal grants and to report this data to NSF for summarization and publication.

Sec. 10505. Policies for review of Federal research grants.

Requires Federal science agencies to implement recommendations from the 2016 OSTP Report "Reducing the Impact of Bias in the STEM Workforce" in reviewing grant applications, hiring policies, and workforce policies. Also requires agencies to carry out pilot programs and develop evidence-based policies to minimize the effect of implicit bias in the grant review process.

Sec. 10506. Collection of data on demographics of faculty.

Requires NSF to carry out a survey of STEM faculty demographics at institutions of higher education and to summarize and publish data collected under this section. Authorizes \$3 million for each of fiscal years 2022 through 2024 for this purpose.

Sec. 10507. Cultural and institutional barriers to expanding the academic and Federal STEM workforce.

Requires OSTP to develop and disseminate guidance to universities and Federal laboratories on best practices to help identify any cultural or institutional barriers limiting the recruitment, retention, and advancement of women and minorities in STEM research careers. Directs NSF to develop policies to requiring institutions to report on steps taken based on OSTP guidance. Requires OSTP to develop uniform policy guidance on agency support for workshops for researchers and STEM departments on methods that minimize the effects of implicit bias. Authorizes \$1 million for each of fiscal years 2022 through 2026 for NSF to carry out this section.

Sec. 10508. Research and dissemination at the National Science Foundation.

Requires NSF to award research grants and carry out dissemination activities using data from Sections 4 and 6. Authorizes \$5 million for each of fiscal years 2022 through 2026 for this purpose.

Sec. 10509. Research and related activities to expand STEM opportunities.

Requires NSF to award grants to universities to implement or expand research-based practices aimed at increasing the recruitment, retention, and advancement of minority faculty. Authorizes \$8 million for each of fiscal years 2022 through 2026 for this purpose. Further, authorizes NSF to award grants to research, develop and assess scalable reforms in undergraduate STEM education, with a focus on increasing the recruitment and retention of minority students. Authorizes \$15 million for each of fiscal years 2022 through 2026 for this purpose.

Sec. 10510. Tribal Colleges and Universities Program.

Requires NSF to award grants through the Tribal Colleges and Universities Program to increase participation in computer science and computational thinking education programs. Authorizes \$2 million for each of fiscal years 2022 through 2026 for this purpose.



Sec. 10511. Report to Congress.

Requires OSTP submit a report to Congress with a description and evaluation of the status and usage of policies, and progress on efforts to minimize effects of implicit bias in the review of Federal research grants.

Sec. 10512. Merit review.

Nothing in this Act shall be construed as altering any intellectual or broader impacts criteria at Federal science agencies for evaluating grant applications.

Sec. 10513. Determination of budgetary effects.

PAYGO language.

Sec. 10514. Definitions.

SUBTITLE B – RURAL STEM EDUCATION RESEARCH

Sec. 10521. Findings.

Sec. 10522. NIST engagement with rural communities.

Expands the scope of the National Institute of Standards and Technology (NIST) Hollings Manufacturing Extension Partnership (MEP) program to include engagement with secondary schools. Directs the Secretary of Commerce to establish a prize competition to stimulate innovation in technologies to deploy broadband connectivity to rural communities.

Sec. 10523 NITR-D broadband working group.

Directs the Office of Science and Technology Policy (OSTP) to establish a working group to address the challenges and opportunities for improving access to broadband connectivity across the U.S. Sunsets the Working Group 5 years after enactment of the Act.

Sec. 10524. National Academy of Sciences evaluation.

Directs NSF to enter into an agreement with the National Academies of Sciences, Engineering, and Medicine for a study that includes an evaluation of Federal investments in rural STEM education, an assessment of research and data needs, and recommendations for improving STEM education in rural communities. Authorizes \$1 million in appropriations for fiscal year 2022 to carry out this section.

Sec. 10525. GAO review.

Directs GAO to study the engagement of rural populations in Federal STEM programs and submit report to Congress.

Sec. 10526. Capacity building through EPSCOR.

Amends the America COMPETES Reauthorization Act of 2010 to direct Federal agencies administering an EPSCoR program to consider modifications to EPSCoR award structures to build the STEM education and workforce development capacity of rural communities.



Sec. 10527. National Science Foundation rural STEM Research activities.

Authorizes the National Science Foundation (NSF) to support research to improve STEM teaching in rural schools and improve participation and advancement of rural students in STEM studies. Directs the NSF Committee on Equal Opportunities in Science and Engineering (CEOSE) to report to Congress an assessment of NSF activities that support participation of rural students in STEM studies. Authorizes \$20 million in appropriations for each of fiscal years 2022-2027 to carry out this section.

Sec. 10528. Researching opportunities for online education.

Authorizes NSF to support research on online STEM education and mentoring in rural communities.

Sec. 10529. Definitions.

SUBTITLE C – MSI STEM ACHIEVEMENT

Sec. 10531. Findings.

Sec. 10532. Government Accountability Office review.

GAO is directed to report to Congress an inventory of Federal science agency competitive funding programs targeted to MSIs. GAO is also directed to assess Federal science agency outreach to MSIs and make recommendations for steps agencies can take to increase the participation and competitiveness of MSIs in such programs.

Sec. 10533. Research and capacity building.

NSF is authorized to support research on the challenges and successes MSIs have had in contributing to the STEM workforce. NSF is also directed to support research focused on building the research capacity of MSIs, encouraging mutually beneficial partnerships, and scaling up successful model programs for use by other universities.

Sec. 10534. Agency responsibilities.

OSTP is directed to issue uniform policy guidance for Federal science agencies to improve outreach to MSIs with the goal of increasing awareness among MSIs of funding opportunities and building MSI capacity to submit competitive proposals and manage awarded grants. OSTP is also directed to work with Federal science agencies to develop a strategic plan for how to modify existing or develop new programs or processes to make Federal STEM education and research funding more accessible to MSIs.

Sec. 10535. Definitions.

SUBTITLE D – COMBATING SEXUAL HARASSMENT IN SCIENCE

Sec. 10541. Findings.

Sec. 10542. Definitions.



Sec. 10543. Research grants.

Requires NSF to establish a program to award research grants to further understanding of sexual harassment in the STEM workforce and effective interventions to reduce the incidence and negative consequences of such harassment.

Sec. 10544. Data collection.

Requires NSF to convene a working group of Federal statistical agencies to develop survey questions on sexual harassment in STEM in order to gather national data on the prevalence, nature, and implications of sexual harassment in institutions of higher education.

Sec. 10545. Responsible conduct guide.

Requires NSF to enter into agreement with the National Academies to update the report *On Being a Scientist: A Guide to Responsible Conduct in Research* to include updated professional conduct standards, including methods for identifying and addressing incidents of sexual harassment.

Sec. 10546. Interagency working group.

Requires OSTP to establish an interagency working group to coordinate Federal science agency efforts to reduce the prevalence of sexual harassment involving federally funded researchers and to develop and implement uniform policy guidelines for Federal Science agencies.

Sec. 10547. National academies assessment.

Requires NSF to enter into agreement with the National Academies to undertake a follow-on study to examine the influence of sexual harassment in institutions of higher education on the career advancement of individuals in the STEM workforce.

Sec. 10548. Authorization of appropriations.

Authorizes to be appropriated \$17.5 million to NSF to carry out this Act.

TITLE VI – MISCELLANEOUS SCIENCE AND TECHNOLOGY PROVISIONS

SUBTITLE A – SUPPORTING EARLY-CAREER RESEARCHERS

Sec. 10601. Findings.

Sec. 10602. Early-career research fellowship program.

Directs the National Science Foundation to establish a 2-year pilot program to support early career scientists to conduct research for up to 2 years at the institution of their choice.

Sec. 10603. Authorization of appropriations.

Authorizes \$250 million in each of fiscal years 2021 and 2022 for the program.

SUBTITLE B – NATIONAL SCIENCE AND TECHNOLOGY STRATEGY

Sec. 10611. National science and technology strategy.

Requires the Director of OSTP to develop and submit to Congress a 4-year comprehensive national S&T strategy. Requires that the S&T strategy be consistent with other relevant Federal strategies, such as the national defense strategy, and describes the required elements of the report.



Sec. 10612. Quadrennial science and technology review.

Requires the Director of OSTP to conduct a quadrennial review of the S&T enterprise and describes specific requirements for the scope and contents of each review.

Sec. 10613. National Circular Economy Roadmap.

Requires Director of the Office of Science and Technology develop a national circular economy roadmap no later than two years after enactment.

SUBTITLE C – ENERGIZING TECHNOLOGY TRANSFER

Sec. 10621. Definitions.

Part 1 – National Clean Energy Technology Transfer Programs

Sec. 10623. National clean energy incubator program.

Authorizes a program to support incubators that accelerate the commercial application of clean energy technologies by providing a physical workspace or support, such as business education and mentorship to clean energy technology startups or companies. Awards authorized under this section are limited to \$4 million per state for one or more incubators, for a period of no longer than 5 years, with the option for a renewal of not more than 3 years.

Sec. 10624. Clean energy technology university prize competition.

Authorizes a prize competition for university students to develop a business model for furthering the commercial application of an innovative clean energy technology to encourage student interest in clean energy technology development in diverse regions of the U.S. This prioritizes funding entities that work with students at minority-serving institutions.

Sec. 10625. Clean energy technology transfer coordination.

Authorizes the Secretary of Energy to support the coordination of relevant technology transfer programs within the Department of Energy. Coordination activities described in this Section include information sharing, connecting entrepreneurs and startup companies to the variety of programs related to clean energy technology transfer under the Department of Energy, and the development of metrics to measure the impact of clean energy technology transfer programs.

Part 2 – Supporting Technology Development at the National Laboratories

Sec. 10626. Lab partnering service pilot program.

Authorizes funds for the Lab Partnering Service Pilot Program as authorized in Section 9002 of division Z of the Consolidated Appropriations Act, 2021 (Public Law 116-260).

Sec. 10627. Lab-embedded entrepreneurship program.

Authorizes a program to provide entrepreneurial fellows with access to national laboratory research facilities, expertise, and mentorship to assist with the commercial application of research ideas.



Sec. 10628. Small business voucher program.

This section makes technical changes to Section 1003 of the Energy Policy Act of 2005 (42 U.S.C. 16393), which authorizes a program for the Secretary of Energy, in consultation with the Directors of the National Laboratories, to provide small businesses with vouchers to perform research, development, demonstration, technology transfer, skills training and workforce development, or commercial application activities at the national laboratories.

Sec. 10629. Entrepreneurial leave program.

Authorizes the Secretary of Energy to delegate to the Directors of the National Laboratories the authority to carry out an entrepreneurial leave program, allowing national laboratory employees to take a leave of absence from their employment for up to 3 years to advance the commercial application of energy and related technologies relevant to the mission of the Department of Energy. This section requires the establishment of streamlined mechanisms for facilitating the licensing of technology that is the focus of an employee who participates in this program.

Sec. 10630. National laboratory non-Federal employee outside employment authority.

Authorizes the Secretary of Energy to delegate to the Directors of the National Laboratories the authority to allow their non-Federal employees to engage in outside employment and consulting activities.

Sec. 10631. National laboratories restoration and modernization

Subsection (a) provides definitions for terms used in Section 10631.

Subsection (b) directs the Secretary of Energy to address maintenance, critical infrastructure needs, and modernization projects at the National Laboratories.

Subsection (c) provides direction regarding the prioritization of projects that are eligible for support under the effort authorized in subsection (b). These include priority deferred maintenance projects, including facilities sustainment for, upgrade of, and construction of research laboratories as well as other general-purpose projects; and laboratory modernization projects related to core infrastructure needs.

Subsection (d) directs the Secretary of Energy to provide an annual report to Congress including a description and funding profile of each project supported under subsection (b).

Subsection (e) authorizes \$6.1 billion annually for fiscal years 2022 through 2026 to carry out projects authorized under subsection (b). This subsection further stipulates that not less than one-third of the funding made available would be managed by the Department of Energy's Office of Science.



Part 3 – Department of Energy Modernization

Sec. 10632. Office of technology transitions.

Amends Section 1001(a) of the Energy Policy Act of 2005 (42 U.S.C. 16391) to give the Under Secretary for Science the authority to appoint personnel using the authorities in section 305 of the Energizing Technology Transfer Act and authorizes funds for this section and the Office of Technology Transitions as authorized in Section 9001 of division Z of the Consolidated Appropriations Act, 2021 (Public Law 116-260).

Sec. 10633. Management of demonstration projects.

Amends section 41201 of the Infrastructure Investment and Jobs Act (42 U.S.C. 18861) to ensure the Office of Clean Energy Demonstration (OCED) coordinates with the Office of Technology Transitions, the Loan Program Office, and all applied program offices within the Department of Energy. Provides additional direction for hiring for the OCED, additional authority to allow the OCED to carry out and manage covered projects directly through the program, and direction for project termination.

Sec. 10634. Streamlining prize competitions.

Amends Section 1008 of the Energy Policy Act of 2005 (42 U.S.C. 16396) to add reporting requirements for prize competitions.

Sec. 10635. Cost-share waiver extension.

Extends the cost-share waiver pilot program for non-profit institutions and institutions of higher education granted in Section 108 of the Department of Energy Research and Innovation Act by 2 years.

Sec. 10636. Special hiring authority for scientific, engineering, and project management personnel.

Authorizes the Under Secretary for Science to make appointments for scientific, engineering, and professional personnel for a term of not more than 3 years.

Sec. 10637. Technology transfer reports and evaluation.

Updates reporting requirements as authorized in Section 9007 of division Z of the Consolidated Appropriations Act, 2021 (Public Law 116-260).

Sec. 10638. ARPA-E authorization of appropriations.

Adds an authorization of appropriation of \$1 billion for ARPA-E for fiscal year 2026.



SUBTITLE D – REGIONAL INNOVATION

Sec. 10641. Regional Innovation Capacity.

This section amends the Stevenson-Wydler Technology Innovation Act of 1980 to include a regional technology and innovation hub program at the Department of Commerce.

- (a) Definitions
- (b) Regional Technology and Innovation Hub Program – Requires the Secretary of Commerce to establish a regional technology and innovation hubs program consisting of strategy development and strategy implementation grants or cooperative agreements and describes the purposes of the program.
- (c) Eligible Consortia – Provides direction regarding the makeup of eligible regional consortium. Eligible consortia are composed of required and allowed organization including those focused on education, industry, community development, local government, and workforce.
- (d) Designation of Regional Technology and Innovation Hubs – Requires the Secretary to use a competitive process to designate not fewer than 10 eligible consortia as regional hubs, and provides direction regarding geographic distribution and inclusion of underserved communities.
- (e) Strategy Development Grants and Cooperative Agreements – provides direction for strategy development grants to develop a comprehensive regional technology strategy. Direction is provided for requirements for geographic distribution, use of funds, and cost-share.
- (f) Strategy Implementation Grants and Cooperative Agreements – provides direction for strategy implementation grants; describes allowable uses of funds, including workforce development, business development activities, technology development, and infrastructure; establishes two tiers of awards and a maximum allowable grant size of \$150 million for tier 1 and 15% of the total program for tier 2; establishes cost-share requirements based on tier and type of consortium.
- (g) Applications – Requires the Secretary to establish specific application requirements.
- (h) Considerations for Designation and Award of Strategy Implementation Grants and Cooperative Agreements – Provides guidance to the Secretary regarding selection criteria.
- (i) Coordination and Collaboration – Requires the Secretary to ensure coordination among Hubs and between the program and other relevant Federal programs, including MEP and Manufacturing USA.
- (j) Performance Measurement, Transparency, and Accountability – Requires the Secretary to develop performance, transparency and accountability criteria for recipients and reporting requirements for the program.
- (k) Authorization of Appropriations – Authorizes nearly \$7 billion for the program from fiscal years 2022 through 2026.
- (l) Administration – Allows the Secretary to use funds for program administration.



Sec. 10642. Regional Clean Energy Innovation Program.

This section amends the Energy Independence and Security Act of 2007 to authorize a Regional Clean Energy Innovation Program at the Department of Energy to establish regional partnerships that promote the economic development of diverse geographic areas of the United States by supporting clean energy innovation. Awards are capped at \$10 million over 5 years and requires a cost-share of 50% in years 3, 4, and 5, of the grant, with an optional renewal for an additional 5 years. This section also authorizes grants in the amount of \$2 million for government entities, in partnership with other entities, to conduct planning activities to setup a regional clean energy innovation partnership.

Sec. 10643. Critical technology and innovation analytics program.

This section directs the Secretary of Commerce to create a program of data collection and analysis of technology and innovation sectors critical to realizing national objects, such as national security, economic prosperity, and social welfare. The section authorizes the Secretary of Commerce to access data across the Federal government and to coordinate these activities with Federal statistical agencies, as appropriate. This section authorizes \$100 million for the program from fiscal years 2022 through 2026.

Sec. 10644. Support for commercial deployment.

Authorization of appropriation of \$1 billion for each of fiscal years 2022 through 2026 to fund the commercial deployment of technologies to achieve emissions reduction at high emitting non-power industrial facilities.

SUBTITLE E – MALIGN FOREIGN TALENT RECRUITMENT PROGRAM PROHIBITION

Sec. 10651. Malign foreign talent recruitment program prohibition.

This section requires Federal research agencies to establish policies to prohibit awards to individuals party to a malign foreign talent recruitment program, subject to certain existing laws.

SUBTITLE F – MICROELECTRONICS RESEARCH FOR ENERGY INNOVATION

Sec. 10661. Definitions.

Definitions.

Sec. 10662. Findings.

Findings relevant to the subtitle.

Sec. 10663. Microelectronics research program.

This section directs the Secretary of Energy to carry out a crosscutting program in microelectronics research, development, and demonstration and authorizes appropriations for those purposes. The section also authorizes activities in workforce development and outreach pursuant to the program, and authorizes the Secretary to consult with the National Science Foundation on these activities.



Sec. 10664. Microelectronics science research centers.

This section directs the Secretary of Energy to establish up to four Microelectronics Science Research Centers to conduct mission-driven research to address foundational challenges in the design, development characterization, prototyping, demonstration, and fabrication of microelectronics and to facilitate the translation of research results to industry and authorizes appropriations for this purpose.

Sec. 10665. Miscellaneous other requirements.

This section ensures that any construction authorized in Sec. 10663 meets prevailing wage requirements.

SUBTITLE G – REPORTS

Sec. 10671. Report on methane removal technology.

Requires Secretary of Energy submit to Congress a report on the potential for, and technical and economic viability of, direct methane removal to significantly mitigate climate change, with special consideration given to natural methane sources, such as melting permafrost, and non-energy sector methane sources.

SUBTITLE H – BETTER ENERGY STORAGE TECHNOLOGY

Sec. 10681. Long-duration demonstration initiative and joint program.

Amends the Energy Act of 2020 to increase the authorization of appropriations for the long-duration demonstration initiative and joint program between the Department of Energy and the Department of Defense to \$45 million for each of fiscal years 2022 through 2026.

SUBTITLE I -- SBIR, STTR, AND PILOT EXTENSIONS

Sec. 10691. Small business innovation programs and pilot extensions.

Extends programs through fiscal year 2027.

SUBTITLE J—COASTAL AND OCEAN ACIDIFICATION STRESSORS AND THREATS RESEARCH

Sec. 10701. Short title.

Sec. 10702. Purposes.

Sec. 10703. Definitions.

Sec. 10704. Interagency working group.

Specifically adds coastal acidification to subject matter covered interagency working group on ocean acidification. Creates Ocean Acidification Advisory Board.



Sec. 10705. Strategic research plan.

Technical changes to the Strategic research plan issued by Subcommittee.

Sec. 10706. NOAA ocean acidification activities.

Adds additional duties to NOAA's ocean acidification activities, including data archiving; standards, protocols and procedures; and requirements for dissemination of ocean acidification and coastal acidification data.

Sec. 10707. NSF ocean acidification activities.

Technical changes to NSF ocean acidification activities.

Sec. 10708. NASA ocean acidification activities.

Technical changes to NASA ocean acidification activities.

Sec. 10709. Authorization of appropriations

**SUBTITLE K—NATIONAL NUCLEAR UNIVERSITY RESEARCH
INFRASTRUCTURE REINVESTMENT**

Sec. 10711. Short title.

Sec. 10712. Purposes.

States purposes of the bill as: 1) to upgrade nuclear research capabilities of U.S. universities; 2) to ensure the continued operation of university research reactors; 3) to coordinate available resources to enable the establishment of new nuclear science and engineering facilities; and 4) to support nuclear energy workforce development and the establishment or enhancement of nuclear science and engineering capabilities at historically Black colleges and universities, Tribal colleges or universities, minority-serving institutions, EPSCoR universities, junior or community colleges, and associate-degree-granting colleges.

Sec. 10713. University infrastructure collaboration.

Amends the Energy Policy Act of 2005 to improve collaboration between relevant nuclear energy university stakeholders and to maintain and upgrade existing university research reactor infrastructure. Authorizes \$55 million for each of fiscal years 2022 through 2026 for these activities.

Sec. 10714. Advanced nuclear research infrastructure enhancement subprogram.

Amends the Energy Policy Act of 2005 to establish a new university infrastructure subprogram that will further the development of advanced nuclear technologies including by establishing not more than four new research reactors and new nuclear science and engineering facilities. Authorizes a total of \$600M over fiscal years 2022 through 2029 for these activities.



Sec. 10715. Science education and human resources scholarships, fellowships, and research and development projects.

Adds nontechnical nuclear research to the scope for the University Nuclear Leadership Program; increases authorization of appropriations.

SUBTITLE L—STEEL UPGRADING PARTNERSHIPS AND EMISSIONS REDUCTION

Sec. 10721. Low-emissions steel manufacturing research program.

This section authorizes a DOE research, development, demonstration, and commercial application program of advanced tools, technologies, and methods for low-emissions steel manufacturing, focusing on several key technology areas, including heat generation, carbon capture, smart manufacturing, resource efficiency, alternative materials, and high-performance computing.

This section also directs the Secretary to support an initiative for the demonstration of low-emissions steel manufacturing in collaboration with industry partners, institutions of higher education, and the National Laboratories, and to consider leveraging the resources of the Manufacturing USA Institutes.

SUBTITLE M—NATIONAL ACADEMIES SCIENCE, TECHNOLOGY, AND SECURITY ROUNDTABLE

Sec. 10731. Ad-hoc committee on research security.

Establishes an ad-hoc committee to complete a fast-track consensus study on the feasibility of establishing an independent, non-profit entity to further protect the United States research enterprise against foreign interference, theft, and espionage.

SUBTITLE N—ADDITIONAL PROVISIONS

Sec. 10741. Establishment of blockchain and cryptocurrency specialist position within OSTP.

Requires the Director of the Office of Science and Technology Policy establish a blockchain and cryptocurrencies advisory specialist position within the Office to advise the President on matters relating to blockchain and cryptocurrencies.



SUBTITLE O—PARTNERSHIPS FOR ENERGY SECURITY AND INNOVATION

Sec. 10751. Foundation for Energy Security and Innovation.

Subsection (a) includes definitions of terms used in Section 10751.

Subsection (b) directs the Secretary of Energy to establish the Foundation for Energy Security and Innovation. The Foundation will support the mission of the Department of Energy and advance collaboration with energy researchers, institutions of higher education, industry, and nonprofit and philanthropic organizations to enable the commercialization of energy technologies. Subsection (b) also provides specific direction on: the Foundation's activities; the composition and purview of its Board of Directors; administrative structure and authorities; collaboration with the Department of Energy and its National Laboratories; and compliance with national security policies. Finally, this subsection authorizes annual appropriations between fiscal years 2022 and 2026, subject to restrictions on construction activities and cost share requirements.

Subsection (c) authorizes the National Energy Technology Laboratory to establish a Federal Laboratory-Associated Foundation to support its mission. This subsection provides specific direction on the new entity's governance structure, activities, and liabilities. Subsection (c) also stipulates that none of its provisions will supersede existing law governing the authority, scope, establishment, or use of nonprofit organizations by a Federal agency.