TITLE I - DEPARTMENT OF ENERGY SCIENCE FOR THE FUTURE

Sec. 10101. Mission of the Office of Science.

This section amends the Department of Energy Organization Act (42 U.S.C. 7139) by authorizing the Director of the Office of Science to carry out the construction, operation, and maintenance of user facilities to support the mission 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 and other federal agencies—for the purpose of enabling development of mission-relevant technologies. This section also requires all Office of Science programs to complete a future planning roadmap consistent with this Act.

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 sciences and engineering, chemical sciences, physical biosciences, geosciences, and other disciplines to provide the foundations for new energy technologies. This subsection authorizes sustainable chemistry research, as well as upgrades and related improvements to multiple user facilities, including: the Advanced Photon Source; the Spallation Neutron Source; the Advanced Light Source; the Linac Coherent Light Source II; the Cryomodule Repair and Maintenance Facility; the Nanoscale Science Research Center; and the National Synchrotron Light Source II. This subsection also authorizes computational material and chemical sciences research and development, including up to six centers. It authorizes development of a materials research database. This subsection authorizes: $2,685,414,000 for fiscal year (FY) 2023; $2,866,890,840 for FY 2024; $2,987,727,170 for FY 2025; $3,062,732,781 for FY 2026; and $3,080,067,167 for FY 2027 for the Basic Energy Sciences Program.

Subsection (b) amends section 973 of the Energy Policy Act of 2005 (42 U.S.C. 16313) by authorizing $50,000,000 per year for FY 2023 through FY 2027 to support basic research in artificial photosynthesis and $50,000,000 per year for FY 2023 through FY 2027 to support basic research in biochemistry, replication of natural photosynthesis, and related processes. It removes the existing statutory prohibition on the use of funds for commercial application of energy technology.

Subsection (c) amends section 975 of the Energy Policy Act of 2005 (42 U.S.C. 16315) by authorizing basic research and development activities to ensure U.S. competitiveness in energy storage. This subsection authorizes $50,000,000 per year for FY 2023 through FY 2027 to support basic research in multivalent ion materials in electric energy storage systems, $50,000,000 per year for FY 2023 through FY 2027 to support electrochemistry modeling and simulation, and $20,000,000 per year for FY 2023 through FY 2027 to support mesoscale electrochemistry. It removes the existing statutory prohibition on the use of funds for commercial application of energy technology.

Subsection (d) authorizes the Director of the Office of Science to support a program of basic research and development to bridge scientific barriers to expand knowledge relevant to nuclear

matter for the benefit of commerce, medicine, and national security. This subsection authorizes $50,000,000 for each FY 2023 through FY 2027.

Subsection (e) establishes a "Carbon Materials Research Initiative" to expand fundamental knowledge of coal, coal-wastes, and carbon ore chemistry which includes a basic research program and the establishment of a research center in each of the two major coal-producing regions of the United States.

Subsection (f) establishes a "Carbon Sequestration Research and Geologic Computational Science Initiative" to expand fundamental knowledge, data collection, data analysis, and modeling of subsurface geology to advance understanding of carbon sequestration in geologic formations. This section includes a basic research program..

Subsection (g) establishes at least two carbon storage research and geologic computational science centers to improve data collection, analysis, and modeling of subsurface geology to advance carbon sequestration in geologic formations.

Subsection (h) authorizes $50,000,000 per year for FY 2023 through FY 2027 to carry out the carbon research provisions in subsections (e) through (g).

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 and climate and environment science relevant to the development of new energy technologies for the energy, environment, and national security missions of the Department. The subsection authorizes biological systems activities in genomic science, including fundamental research on plants and microbes, and biomolecular characterization and imaging science.

Subsection (b) amends section 306(e)(8) of the Department of Energy Research and Innovation Act (42 U.S.C. 18644(e)(8)) by authorizing $50,000,000 per year for FY 2026 and FY 2027 for the Low-Dose Radiation Research Program.

Subsection (c) directs the Secretary to 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, in coordination with the Administrator of the National Aeronautics and Space Administration.

Subsection (d) amends section 306 of the Department of Energy Research and Innovation Act (42 U.S.C. 18644) by authorizing the Director of the Office of Science to carry out earth and environmental systems science research in consultation with the National Oceanic and Atmospheric Administration (NOAA) and other federal agencies carrying out earth and environmental systems science research. It also directs the development, construction, operation, and maintenance of user facilities to enhance the collection and analysis of observational data related to complex biological, climate, and environmental systems, including a microbial molecular phenotyping capability, and to carry out a research program, in consultation with NOAA and other federal agencies, to enhance the understanding of littoral ecosystems. The subsection also directs the Secretary to establish an initiative focused on the development of

engineered ecosystems within the Biological and Environmental Research program. The subsection authorizes: $885,420,000 for FY 2023; $946,745,200 for FY 2024; $1,001, 149,912 for FY 2025; $1,068,818,907 for FY 2026; and $1,129,948,041 for FY 2027 for the Biological and Environmental Research Program.

Subsection (e) authorizes up to six bioenergy research centers to conduct fundamental research in plant and microbial systems biology, biological imaging and analysis, and genomics, and to accelerate advanced research and development of advanced biofuels, bioenergy or biobased materials, chemicals, and products that are produced from a variety of regionally diverse feedstocks, and to facilitate the translation of research results to industry.

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. Within that program the subsection includes provisions for applied mathematics and software development for high-end computing systems and computer sciences research, an advanced computing program, guidance on mitigation of bias in high-performance computing capabilities, architectural research in heterogeneous computing systems, an energy efficient computing program, and upgrades to the energy science network user facility. Subsection (a) also authorizes a computational science graduate fellowship program. Subsection (a) authorizes: $1,126,950,000 for FY 2023; $1,194,109,500 for FY 2024; $1,265,275,695 for FY 2025; $1,340,687,843 for FY 2026; and $1,420,599,500 for FY 2027 for the Advanced Scientific Computing Research Program.

Subsection (b) authorizes a research, development, and demonstration program to accelerate innovation to support quantum network infrastructure and authorizes $100,000,000 per year for FY 2023 through FY 2027 for this program. It also directs the Secretary to establish a Quantum User Expansion for Science and Technology program (QUEST) to encourage and facilitate access to the United States quantum computing hardware and clouds for research purposes. The subsection authorizes: $30,000,000 for FY 2023; $31,500,000 for FY 2024; $33,075,000 for FY 2025; $34,728,750 for FY 2026; and $36,465,188 for FY 2027 for the QUEST program.

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 $50,000,000 per year for FY 2023 through FY 2027 for research and development of fusion materials. It extends the authorization for inertial fusion research and development, alternative and enabling concepts, and the milestone-based development program through FY 2027. It authorizes the establishment of at least two national teams to develop conceptual designs and technology roadmaps for a pilot fusion plant, and authorizes $35,000,000 for FY 2023; $50,000,000 for FY 2024; $65,000,000 for FY 2025; $80,000,000 for FY 2026; and $80,000,000 for FY 2027 for these activities. It directs the Secretary to establish a high-performance computation collaborative research program and an associated innovation center in high-performance computing for fusion. It directs the construction of the Material Plasma Exposure Experiment including $21,895,000 for FY 2023

and $3,800,000 for FY 2024 to carry out the project. The subsection also authorizes an upgrade to the Matter in Extreme Conditions endstation at the Linac Coherent Light Source. Subsection (a) authorizes a total of $1,025,500,400 for FY 2023; $1,043,489,724 for FY 2024; $1,053,266,107 for FY 2025; $1,047,962,074 for FY 2026; and $1,114,187,798 for FY 2027 for the Fusion Energy Sciences Program.

Subsection (b) amends section 972 of the Energy Policy Act of 2005 (42 U.S.C. 16312) by authorizing $379,700,000 for FY 2023; $419,250,000 for FY 2024; $415,000,000 for FY 2025; $370,500,000 for FY 2026; and $411,078,000 for FY 2027 for 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 to improve the understanding of the fundamental properties of the universe, including constituents of matter and energy and the nature of space and time.

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 of the Office of Science 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 to understand the nature of the universe and authorizes collaboration with other federal agencies and international partners.

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, including: the Long-Baseline Neutrino Facility; the Proton Improvement Plan-II Accelerator Upgrade; and the Cosmic Microwave Background Stage 4 project. It also authorizes accelerator and detector upgrades and research and development, and a program to conduct scientific research in underground facilities. Subsection (d) authorizes: $1,159,520,000 for FY 2023; $1,289,891,200 for FY 2024; $1,428,284,672 for FY 2025; $1,499,881,752 for FY 2026; and $1,554,874,657 for FY 2027 for the High Energy Physics Program.

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 to discover and understand various forms of nuclear matter. It authorizes construction of the Electron-Ion Collider, including: $90,000,000 for FY 2023; $181,000,000 for FY 2024; $219,000,000 for FY 2025; $297,000,000 for FY 2026; and $301,000,000 for FY 2027. The subsection authorizes: $840,480,000 for FY 2023; $976,508,800 for FY 2024; $1,062,239,328 for FY 2025; $1,190,838,688 for FY 2026; and $1,248,463,709 for FY 2027 for the Nuclear Physics Program.

Sec. 10108. 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. It directs the Secretary to report annually on the list of projects for which the Secretary will provide funding under this section, including a description of each project and the funding profile for the project. The section authorizes $550,000,000 per year for FY 2023 through FY 2027 for the Science Laboratory Infrastructure Program.

Sec. 10109. 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 particle 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. The section authorizes: $19,080,000 for FY 2023; $20,224,800 for FY 2024; $21,438,288 for FY 2025; $22,724,585 for FY 2026; and $24,088,060 for FY 2027.

Sec. 10110. Isotope Research, Development, and Production.

Subsection (a) amends the Department of Energy Research and Innovation Act (42 U.S.C. 18601 et seq.) by authorizing a program to produce isotopes that are needed and of sufficient quality for research, medical, industrial, and related purposes. It also advances isotope production methods and techniques by maintaining and enhancing associated infrastructure and conducting research into new production and processing techniques. This subsection authorizes the Director of the Office of Science to carry out activities to reduce dependence on the foreign supply of critical radioactive and stable isotopes, and ensure that the program does not interfere with private sector efforts to produce isotopes. It authorizes the establishment of an Isotope Program Advisory Committee and requires reports for meeting the nation's isotope needs. The subsection authorizes: $175,708,000 for FY 2023; $196,056,480 for FY 2024; $215,759,869 for FY 2025; $200,633,461 for FY 2026; and $146,293,469 for FY 2027.

Subsection (b) amends section 952(a) of the Energy Policy Act of 2005 (42 U.S.C. 16272(a)) by requiring the Secretary to evaluate the technical and economic feasibility of establishing an isotope demonstration program to support the development and commercial demonstration of critical radioactive and stable isotope production in existing commercial nuclear power plants.

Subsection (c) authorizes the constructions of a radioisotope processing facility to provide for the growing radiochemical processing capability needs associated with the production of critical radioactive isotopes. The subsection authorizes $30,500,000 for FY 2023; $75,000,000 for FY 2024; $105,000,000 for FY 2025; $83,000,000 for FY 2026; and $43,000,000 for FY 2027.

Subsection (d) authorizes the establishment of a stable isotope production and research center to expand the ability of the United States to perform multiple stable isotope production campaigns at large-scale production, as authorized under section 311 of the Department of Energy Research

and Innovation Act. The subsection authorizes $74,400,000 for FY 2023; $46,000,000 for FY2024; $31,200,000 for FY 2025; $33,300,000 for FY 2026; and $13,900,000 for FY 2027.

Sec. 10111. Increased Collaboration with Teachers and Scientists.

Subsection (a) 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. It authorizes programs that foster collaboration between teachers at elementary schools and secondary schools, students and faculty at institutions of higher education, early-career researchers, and the National Laboratories. This section authorizes the use of proven techniques to expand the number of individuals from underrepresented groups pursuing and attaining skills or undergraduate and graduate degrees relevant to the mission of the Office of Science.

Subsection (b) authorizes $40,000,000 per year for FY 2023 through FY 2027 to support the activities of this section.

Subsection (c) amends the Department of Energy Science Education Enhancement Act by authorizing the Secretary to expand opportunities to increase the number of highly skilled science, technology, engineering, and mathematics (STEM) professionals working in disciplines relevant to the mission of the Department, including by broadening the recruitment pool to increase participation of underrepresented groups. The Secretary is further directed to report to Congress on the Department's plan associated with this authorization. Of the funds authorized under this section, not less than $2,000,000 per year is authorized to carry out these activities.

Sec. 10112. High intensity laser research initiative; Helium conservation program; Office of Science Emerging Biological Threat Preparedness Research Initiative; Midscale Instrumentation and Research Equipment Program; Authorization of Appropriations.

This section amends the Department of Energy Research and Innovation Act (42 U.S.C. 18601 et seq.) (as amended by section 12(a) of the bill) by adding the following sections:

Sec. 313 authorizes the Director of the Office of Science to establish a high intensity laser research initiative. The subsection authorizes $50,000,000 for FY 2023; $100,000,000 for FY 2024; $150,000,000 for FY 2025; $200,000,000 for FY 2026; and $250,000,000 for FY 2027.

Sec. 314 authorizes the Secretary to establish a program to reduce the consumption of helium for Department grant recipients and facilities and encourage helium recycling and reuse.

Sec. 315 authorizes the Secretary to establish a cross-cutting research initiative, to be known as the 'Biological Threat Preparedness Research Initiative', to aid efforts to prevent, prepare for, predict, and respond to natural and anthropogenic biological threats to national security. It authorizes the Secretary to leverage the innovative analytical resources and tools, user facilities, and advanced computational and networking capabilities of the Department as necessary for the purposes of this initiative. This section authorizes $50,000,000 per year for FY 2023 through FY 2027

Sec. 316 authorizes the Director of the Office of Science to establish a midscale instrumentation and research equipment program to develop, acquire, and commercialize research instrumentation and equipment in the $1,000,000 to $20,000,000 range needed to meet the Department's mission and to provide platform technologies for the broader scientific community. This section authorizes $150,000,000 per year for FY 2023 through FY 2027.

Sec. 317 authorizes $8,902,392,400 for FY 2023; $9,541,895,744 for FY 2024; $10,068,198,994 for FY 2025; $10,468,916,520 for FY 2026; and $10,831,342,317 for FY 2027 for the Office of Science.

Sec. 10113. Established Program to Stimulate Competitive Research (EPSCoR).

This section amends section 2203(b)(3) of the Energy Policy Act of 1992 (42 U.S.C. 3503(b)(3)) to expand DOE's EPSCoR program and improve its integration with Office of Science programs. It expands activities to improve the research capacity and capabilities at universities in EPSCoR states, including with scholarships and fellowships, grants for early career faculty, and funding to institutions to support collaboration and expertise-building. The section authorizes: $50,000,000 for FY 2023; $50,000,000 for FY 2024; $75,000,000 for FY 2025; $100,000,000 for FY 2026; and $100,000,000 for FY 2027 to support the activities authorized under this section. Additionally, this section authorizes $25,000,000 per year for FY 2023 through FY 2027 for research instrumentation and equipment that range in cost from $500,000 to $20,000,000.

This section requires that not less than 10 percent of the university research and developments funds awarded by the Office of Science be awarded to institutions in EPSCoR states to further enhance their participation in and contributions to Office of Science programs. To further improve coordination, the Undersecretary for Science is directed to ensure robust participation of representatives from EPSCoR universities on Office of Science Advisory Committees. The Department is required to submit to the appropriate committees of Congress its plan for implementing the activities authorized in this section and to provide an annual evaluation report.

Sec. 10114. Research Security.

This section directs the Secretary to develop and maintain tools and processes to manage and mitigate research security risks associated with any research, development, demonstration, or deployment activities authorized under this Act, such as a science and technology risk matrix, informed by threats identified by the Director of the Office of Intelligence and Counterintelligence, to facilitate determinations of the risk of loss of United States intellectual property or threat to the national security of the United States. It also imposes penalties on funding recipients which knowingly violate the protocols established to mitigate research security risks. This provision is limited to the Office of Science.

TITLE VI - MISCELLANEOUS SCIENCE AND TECHNOLOGY PROVISIONS

SUBTITLE C - REGIONAL INNOVATION

Sec. 10622. 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 set up a regional clean energy innovation partnership.

SUBTITLE I - FOUNDATION FOR ENERGY SECURITY AND INNOVATION

The Partnerships for Energy Security and Innovation Act promotes fostering partnerships between government, industry, startups, and outside funding organizations. Foundations at the National Institutes of Health, the Centers for Disease Control and Prevention, and the U.S. Department of Agriculture have all demonstrated that they can raise tens of millions of private sector dollars towards cutting-edge research and innovation. These foundations complement and enhance the agency's mission and enable new functions and services.

This bill establishes a Foundation for Energy Security and Innovation (FESI) for the DOE to engage with the private sector to raise funds that support the creation, development, and commercialization of innovative technologies that address tomorrow's energy challenges. Functions of the foundation will include–

- Increasing access to private sector funding. As a 501(c)(3), FESI will have the flexibility to engage with various private sector sources for funds and attract new non-traditional partners.
- Accelerating commercialization. FESI will facilitate public-private partnerships to commercialize research and technology as well as administer prize competitions that engage the private sector to invest in commercial solutions to big problems.
- Convening thought-leaders. FESI will organize events, briefings, and symposia to create a neutral space for partners to share ideas and engage the public.
- Training tomorrow's workforce. FESI will support education and training of new researchers in energy through awards, grants, and fellowships.

It includes an authorization of $40.5 million total over fiscal year 2023 and 2027.

SUBTITLE J - ENERGIZING TECHNOLOGY TRANSFER

Sec. 10701. Definitions.

Part 1 – National Clean Energy Technology Transfer Programs

Sec. 10713. 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. It authorizes $15,000,000 for each of fiscal years 2023 through 2027.

Sec. 10714. 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. It authorizes $1,000,000 for each of fiscal years 2023 through 2027.

Sec. 10715. 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. It authorizes $3,000,000 for each of fiscal years 2023 through 2027.

Part 2 – Supporting Technology Development at the National Laboratories

Sec. 10716. 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). It authorizes $3,700,000 for each of fiscal years 2023-2025.

Sec. 10717. 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. It authorizes $25,000,000 for each of fiscal years 2023 through 2027.

Sec. 10718. 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. It authorizes $25,000,000 for each of fiscal years 2023 through 2027.

Sec. 10719. 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. 10720. 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.

Part 3 – Department of Energy Modernization

Sec. 10722. 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). It authorizes $20,000,000 for each of fiscal years 2023 through 2027.

Sec. 10723. 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 solicit, select, and manage covered projects directly through the program, and direction for project termination.

Sec. 10724. 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. 10725. 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. 10726. 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. 10727. 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).

SUBTITLE K - MICRO ACT

Section 10731. Microelectronics research for energy innovation.

To further accelerate U.S. leadership in the development of next-generation microchips, the Microelectronics Research for Energy Innovation Act would establish two new programs at the Department of Energy:

- Microelectronics Research Program: this provision requires DOE to establish a dedicated research program focused on research, development, and demonstration of next-generation microelectronics. Eligible research areas within this program include materials and chemical sciences, novel microchip designs and diverse computing architectures, integrated sensing, photonic integration and packaging, cybersecurity through design, and advancements in next-generation microelectronics manufacturing, among others. The Secretary should ensure that all research activities support commercial technology transfers, and identify opportunities to enhance workforce development. It includes authorizations of $75,000,000 for fiscal year 2023 and $100,000,000 for each of fiscal years 2024 through 2027.
- Microelectronics Science Research Centers: this provision requires DOE to, subject to appropriations, develop four Microelectronics Science Research Centers, to be located at National Laboratories, Universities, non-profit or commercial research entities, or consortiums to carry out research activities focused on addressing the foundational challenges in design, development, characterization, prototyping, demonstration, and fabrication of microelectronics. These research centers are required to coordinate with other federal programs focused on microelectronics R&D, and would be required to support technology transfer and workforce development initiatives to support the private sector. It includes authorizations of $25,000,000 per year for each of fiscal years 2023 through 2027.

SUBTITLE L - NATIONAL NUCLEAR UNIVERSITY RESEARCH INFRASTRUCTURE REINVESTMENT

Sec. 10741. Short title.

Sec. 10742. 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. 10743. 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 2023 through 2027 for these activities.

Sec. 10744. 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 $390M over fiscal years 2023 through 2027 for these activities.

Sec. 10745. 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 for this program by $15M for fiscal years 2023 through 2025.

SUBTITLE M - STEEL UPGRADING PARTNERSHIPS AND EMISSIONS REDUCTION (SUPER Act)

Sec. 10751. 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 N - APPLIED LABORATORIES INFRASTRUCTURE RESTORATION AND MODERNIZATION

Sec. 10761. Applied laboratories infrastructure restoration and modernization.

This section authorizes $800 million in total funding for deferred maintenance, critical infrastructure needs, and modernization activities across National Laboratories for each of fiscal years 2023 through 2027, including National Renewable Energy Laboratory, National Energy Technology Laboratory, Idaho National Laboratory, Savannah River National Laboratory, Sandia National Laboratories, Los Alamos National Laboratory, Lawrence Livermore National Laboratory.

SUBTITLE O - DEPARTMENT OF ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACTIVITIES

Sec. 10771. Department of Energy research, development, and demonstration activities.

This section authorizes $11,200,852,898 for research, development, and demonstration aligned with the 10 technology areas in the applied energy offices. This section authorizes appropriations for building technologies, sustainable transportation, advanced manufacturing, industrial emissions reduction technology, advanced materials, and renewable power research, development, and demonstration within the Office of Energy Efficiency and Renewable Energy. It also authorizes appropriations for grid modernization research, development and demonstration within the Office of Electricity. This section authorizes appropriations for advanced materials research, development, and demonstration within the Office of Nuclear Energy. It also authorizes appropriations for artificial intelligence and information technologies within the Office of Environmental Management. This section also authorizes appropriations for clean industrial technologies, alternative fuels, and carbon removal research, development, and demonstration within the Office of Fossil Energy and Carbon Management. It also authorizes appropriations for the Advanced Research Projects Agency—Energy.

SUBTITLE P - FISSION FOR THE FUTURE

Sec. 10781. Advanced Nuclear Technologies Federal Research, Development, and Demonstration Program.

Subsection (a) defines relevant terms.

Subsection (b) directs the Secretary to establish a program to provide Federal financial assistance to eligible entities to support the research, development, and demonstration of advanced nuclear reactors. It also directs the Secretary to use a competitive, merit-based review process.

Subsection (c) establishes that eligible entities seeking Federal financial assistance shall submit an application containing the information required by the Secretary.

Subsection (d) specifies the types of projects the Secretary shall prioritize when selecting eligible entities.

Subsection (e) specifies that section 988 of the Energy Policy Act of 2005 (42 U.S.C. 16352) shall apply to the Federal financial assistance provided under this program.

Subsection (f) authorizes $800,000,000 to be appropriated to the Secretary to carry out the program for the fiscal years 2023-2027.