but encourages interdepartmental coordination on the creation or modification of these programs.

The Committee identifies the importance of student research participant programs in building a strong STEM workforce pipeline across DOE disciplines. The Department is directed to provide to the Committee not later than 90 days after enactment of this act a report on the resources required and opportunities to triple the number of student research participant placements within its current participant programs to support the cross-cutting, Department-wide initiatives, such as cybersecurity, artificial intelligence, and quantum information science, and basic and applied research programs. The report shall include information on how the Department's current programs and research investments can be further leveraged to support expanding undergraduate, graduate, doctoral, and post-doc research participant placements to build a strong STEM workforce pipeline.

DEPARTMENT OF ENERGY'S INSIDER THREAT PROGRAM

The Committee is alarmed by the findings of the Government Accountability Office's [GAO] recent report that identified significant problems with the Department's Insider Threat Program. The Committee recognizes that the Department and NNSA have many competing priorities; however, ensuring that the agency is guarding against insider threats is important. To better understand how DOE is planning to address these concerns, the Department is directed to provide the Committee with the Department's annual reports to the Secretary of Energy on the agency's Insider Threat Program-including any information on the resources needed to maintain and support the program within 30 days of issuance of each report. The Committee also directs the Department to provide a briefing to the Committee within 90 days of the issuance of each report. The briefings shall include information on actions the Department is taking to address recommendations from GAO and other entities to improve the program.

NATIONAL STUDIES

The Committee is concerned that the Department of Energy is not including Hawaii and Alaska in national needs studies or resource mapping and assessments. The Committee notes this results in an increasing data gap between Alaska and Hawaii and the rest of the United States. If the Department publishes a study that is national in scope but fails to include all 50 States, the Department is directed to provide an explanation of: (1) why certain States were not included; (2) what steps the Department is taking to ensure that all States are included in subsequent versions of the study; and (3) what resources or authorities the Department requires if the Department was unable to include all 50 States in the study.

CROSSCUTTING INITIATIVES

SBIR/STTR Programs.—The Department is directed to use the definition of research and development as provided by the Small Business Innovation Development Act of 1982 and Small Business Administration's ''SBIR and STTR Program Policy Directive'' for the purposes of the Department's SBIR and STTR programs. Addi-tionally, the Department is directed to establish and maintain for-mal coordination across relevant applied Departmental program of-fices regarding the proper implementation of the SBIR and STTR programs and to dedicate more resources to the administration of the SBIR and STTR programs. The Department is also encouraged to focus on solicitations that would advance commercialization and technological innovation aimed at decarbonization and emission reductions. Additionally, the Department is directed to develop program processes that are not burdensome to small businesses at the application stage and during grant management. Lastly, the Department is directed to develop metrics and processes for tracking private-sector commercialization of SBIR and STTR investments and for tracking the participation in SBIR and STTR programs, in accordance with the Small Business Innovation Development Act of 1982. The Department shall report to the Committee 30 days after enactment of this act how it plans to follow through on this direction.

Grid Modernization.—The Department shall brief the Committee not later than 90 days after enactment of this act on the revised Grid Modernization Initiative strategy, plans to reflect new decarbonization targets in strategy enhancements, the funding profiles, portfolio of funding opportunities, programmatic investments for the Initiative, and the roles and responsibilities of each participating program office. Further, the Committee recognizes the value of a diverse range of clean distributed energy resources, the Committee directs the Department to evaluate opportunities, in coordination with the Office of Clean Energy Demonstration, to deploy multi-resource microgrids that incorporate dispatchable, fuel-flexible, renewable-fuel-compatible, distributed generation technologies, including but not limited to linear generator technology, paired with variable output renewable resources and battery storage technology, in order to simultaneously achieve substantial carbon and criteria emissions reductions, ensure multi-day resilience, and improve energy security and independence.

Carbon Dioxide Removal.—The recommendation provides not less than $155,732,000 for research, development, and demonstration of carbon dioxide removal technologies, including not less than $22,000,000 from the Office of Energy Efficiency and Renewable Energy [EERE], not less than $66,000,000 from Office of Fossil Energy and Carbon Management [FECM], and not less than $67,000,000 from the Office of Science.

The Committee recommends $20,000,000 to continue a competitive purchasing pilot program that the Secretary was directed to establish in the fiscal year 2023 Energy and Water joint explanatory statement, consistent with Division D of Public Law 117–328, for the purchase of carbon dioxide removed from the atmosphere or upper hydrosphere. The Department is encouraged to make purchases through the pilot program that supports approaches such as those included in Section 5001, Division Z of Public Law 116–260, and to emphasize methods that minimize removal reversibility and maximize storage duration. Within 180 days of enactment of this act, the Department is directed to provide a report to the Committee on the progress of the competitive purchasing pilot program.

Equity and Justice.—The Committee notes the Department's continuing efforts and progress in implementing the Justice40 Initiative, the energy justice initiative, and Executive Order 14008.

Critical Minerals.—The Committee supports the Department's coordination of critical minerals activities across the Department through the Critical Minerals Initiative. The Committee encourages the Department to work with other relevant Federal departments and agencies to increase domestic critical mining, production, processing, recycling and manufacturing in order to secure supply chains for new energy development. The recommendation provides not less than $345,230,000 for research, development, demonstration, and commercialization activities on the development of alternatives to, recycling of, and efficient production and use of critical minerals, including not less than $150,000,000 from EERE, not less than $41,000,000 from FECM, not less than $129,000,000 from Nuclear Energy, and not less than $23,000,000 from the Office of Science. The Department is encouraged to carry out these activities pursuant to sections 7001 and 7002 of the Energy Act of 2020.

Industrial Decarbonization.—The recommendation provides not less than $956,000,000 for industrial decarbonization, including not less than $580,000,000 from EERE, not less than $245,000,000 from FECM, not less than $62,000,000 from Nuclear Energy [NE], and not less than $66,000,000 from the Office of Science.

Within available funds, the Committee directs the Department to establish the Low-Emissions Steel Manufacturing Research Program in accordance with Subtitle D of title IV of the Energy Independence and Security Act of 2007 (42 U.S.C. 17111a).

The Committee believes that innovative energy sources are necessary for manufacturers to transition from traditional carbon-emitting fuels to fuels with significantly lower greenhouse gases on a net basis. In support of that transition, more data is necessary for the long-term sustainability of combusting non-traditional fuels. The Department of Energy's Industrial Decarbonization Roadmap emphasizes that greater research, design, and deployment into alternative fuels usage is necessary to reduce carbon emissions in the industrial sector. The Committee encourages the Department to partner with an institution of higher learning to conduct research on greenhouse gas and other air emissions from the combustion and energy recovery of non-traditional fuels, such as biomass, wood, pulp & paper, agricultural waste, plastics, and municipal waste in cement manufacturing. The Committee expects the program to compare and analyze the calorific/heating value; greenhouse gas & other pollutants over any possible lifecycles of the fuel; fuel collection, processing & supply, and the regulatory barriers to utilizing potential fuels over traditional ones. The Committee also directs the Department to conduct this research in consultation with other agencies, as necessary. The Committee directs the Department to report its progress of data collection to Committee within a year of enactment of this act

Energy Storage.—The Committee supports the Department's Energy Storage Grand Challenge [ESGC] and Long-Duration Storage Shot initiatives, which includes cost-shared demonstrations of energy storage technologies. The ESGC builds on the Department's

prior research and development efforts in storage and will align Energy Storage research and development efforts to focus on technical, regulatory, and market issues necessary to achieve the technology goals. The Department is directed to continue to provide the Committee updates on the ESGC and make publically available a crosscutting research and development road-map through 2030 to illustrate the ESGC's goals. This road-map shall be focused on reducing costs and improving the performance of a diverse set of grid-scale storage technologies to meet industry needs, improve reliability and environmental performance of the electricity grid, and reduce greenhouse gas emissions. The Department is directed to carry out these activities in accordance with sections 3201 and 3202 of the Energy Act of 2020.

The Committee is aware of the Department's efforts to expand the capabilities of the United States in advanced battery manufacturing, including for long-duration grid-scale energy storage and electric vehicles. As the Department continues its efforts to scale up a domestic advanced battery supply chain, including battery manufacturing demonstration projects, the Committee encourages the Department to seek a broad spectrum of battery chemistries not wholly exclusive to lithium-ion based battery technology.

The recommendation provides not less than $570,000,000 for energy storage, including not less than $330,000,000 from EERE, not less than $84,000,000 from the Office of Electricity [OE], not less than $5,000,000 from FECM, not less than $21,000,000 from NE, and not less than $123,000,000 from the Office of Science.

Alternative Modes of Transportation.—The Committee notes the Department's ongoing efforts to develop technologies and low carbon fuels that will reduce emission in shipping, aviation, agricultural, and long distance transportation.

The recommendation provides not less than $361,000,000 to further the research, development, testing, and demonstration of innovative technologies and solutions for low- or no-emission alternative fuels for ongoing efforts to develop technologies and low carbon fuels that will reduce emission in shipping, aviation, agricultural, and long distance transportation. This funding level includes not less than $285,000,000 from EERE, not less than $33,250,000 from FECM, not less than $33,250,000 from the OE, and not less than $9,500,000 from the Office of Science.

Hastening the availability of low- and no-carbon alternatives to diesel fuel for locomotives will be essential to achieving a net-zero emissions economy while also meeting our Nation's projected 50 percent growth in freight transportation demand by 2050. As part of the U.S. National Blueprint for Transportation Decarbonization, the Department states, "Freight rail research should be prioritized to determine the most promising paths to decarbonization, including a focus on sustainable fuels and the design and manufacture of new locomotive propulsion and fueling systems." The Committee notes there are ongoing efforts to further the use of technologies that will reduce emissions in existing locomotive fleets, such as different blends of renewable diesel and biodiesel, as well as to accelerate the commercial viability of alternative propulsion methods, including batteries and hydrogen fuel cells. The Committee directs the Department to regularly consult with railroads and rail manu-

facturers and suppliers to determine which research projects will best advance the commercial viability of these respective technologies and help to identify the pathway to decarbonization for the industry.

Further, the Committee encourages the Department to accelerate its work on sustainable aviation fuels, with a focus on getting feedstocks and biorefining processes for net-zero emission fuels into demonstration as it works to meet the goals of the Sustainable Aviation Fuel Grand Challenge. The Committee encourages the Department to develop a clear framework for evaluating the emissions reduction potential of different sustainable aviation fuel pathways and to prioritize research and development of fuels with the greatest potential to reduce GHG emissions while avoiding unintended consequences on forests and food supply chains. The Department is encouraged to work with other Federal agencies and the national labs to coordinate efforts to advance sustainable aviation fuels and work in coordination with aviation manufacturers. Additionally, the Committee directs the Department to factor growth in sustainable aviation fuel research, development, demonstration, and deployment into future year budget requests.

Hydrogen.—The Committee supports the Department's continued coordination on hydrogen energy and fuel cell technologies in order to maximize the effectiveness of investments in hydrogen-related activities. This coordination shall include EERE, FECM, NE, OE, the Office of Science, and the Advanced Research Projects Agency—Energy.

The recommendation provides not less than $390,000,000 for the Hydrogen crosscut, including not less than $205,000,000 from EERE, not less than $121,000,000 from FECM, not less than $21,000,000 from NE, and not less than $47,000,000 from the Office of Science.

The recommendation provides up to $65,000,000 for technologies to advance hydrogen use for heavy-duty transportation, industrial, and hard-to-electrify transportation applications including trains, maritime shipping, and aviation, and industrial applications.

Further, the Department is encouraged to engage on codes and standards for fast-developing fuel cell and hydrogen markets such as heavy-duty trucks, aviation, maritime, locomotives, transportation of hydrogen by rail, and other areas as needed.

The Committee instructs the Department to support updates to Argonne National Laboratory's Greenhouse gases, Regulated Emissions, and Energy use in Technologies, also known as the GREET model, including updating model defaults to match the best available science and data for consistency in modelling life-cycle greenhouse gas emissions; including innovative ways to produce hydrogen, such as geologic hydrogen and through the use of coal bed/coal mine methane, as well as other advanced pathways leveraging diverse domestic resources.

Transformers.—Currently, the power sector is experiencing long manufacturer lead-times to fulfill orders of distribution transformers. It has been reported that lead-times to fulfill orders for utilities are up to over 2 years compared to 2 to 4 months in 2019. This delay risks reliability, resilience, national security and defense

readiness, and affordability of the electric grid due to the critical role of this equipment.

The recommendation includes further funding to enhance the domestic supply chain for the manufacture of transformers and electric grid components derived from unobligated advanced emergency appropriations funding.

Further, the Committee is concerned about the Proposed Rulemaking (88 Federal Register 1722): Energy Conservation Program: Energy Conservation Standards for Distribution Transformers and its effect on materials that could go into the development of transformers and manufacturers ability to meet growing demand. The Department is directed to recognize the national security implications of changing the manufacturing process on critical grid components and to work with relevant stakeholders in developing future efficiency standards for distribution transformers. The Department is further directed to respond to Congressional and outside stakeholders regarding their comments on this proposed rule. The Department is further directed to report to the Committee within 30 days of passage of this act, regarding the status of this proposed rule and how it will address these concerns.

Battery Grants.—The Committee is concerned about reports that the Department of Energy is attempting to include additional requirements that were not mandated in the Infrastructure Investment and Jobs Act for projects that have been selected to negotiate a Battery Manufacturing and Recycling or a Battery Materials Processing award. The Committee encourages the Department to proceed expeditiously in negotiations to finalize awards without further delay due to requirements not mandated by law.

INDUSTRIAL EMISSIONS AND TECHNOLOGY COORDINATION

Appropriations, 2023	.....
Budget estimate, 2024	.....
Committee recommendation	$3,500,000

The recommendation provides a separate appropriation for Industrial Emissions Coordination. The Department is directed to coordinate and lead the clean industrial research, development, demonstrations, and deployment across the Department focusing on work that is both sector-specific and technology-inclusive for energy-intensive industries. Further, within 180 days of enactment of this act the Department is directed to develop a Department-wide Multi-Year Program Plan [MYPP] as an operational guide to implementing the Industrial Decarbonization Roadmap and ensure coordination across all participating offices. The MYPP shall be updated annually to reflect changes in the availability of funds, technology development, and reprioritization. The Department-wide MYPP will incorporate any plans or strategies as directed in previous congressional language.

The Committee continues to emphasize the importance of crosscutting initiatives that enable the Department to accelerate progress on specific goals through fully integrated science and applied energy research, development, demonstration, and deployment. These crosscutting initiatives require active coordination throughout the Department to ensure that the roles, responsibilities, programs, and funding are aligned across the various pro-

gram offices to achieve desired outcomes. This coordination ensures that the Department leverages funding sources across programs and avoids unnecessary duplication of efforts, resulting in the best stewardship of taxpayer funds. This coordination also helps align the considerable capabilities of the Department's stakeholders, including national laboratories, universities, industry, and other partners. However, the Committee has grown concerned with the proliferation of coordination mechanisms-such as crosscuts, Energy Earthshots, Joint Strategy Teams, Science and Energy Technology Teams, and Coordination Teams-that may actually result in confusion and redundancy instead of increased coordination. The Department is directed to align, simplify, and consolidate these coordination mechanisms into one function, so the resulting coordination mechanism includes clear leadership, articulates the roles and responsibilities of each participating program office, and plays a leading role in budget formulation and execution across program offices. The Department is directed to provide to the Committee not later than 90 days after enactment of this act a briefing on how these coordination mechanisms will achieve these goals and become institutionalized. Further, the Department is directed to include in future budget requests funding breakdowns by account and subprogram for each of the crosscutting initiatives. For this purpose, the crosscutting initiatives shall include: carbon dioxide removal, energy storage, hydrogen, critical minerals and materials, industrial decarbonization, agriculture, electricity sector, transportation sector, and buildings sector.

ENERGY EFFICIENCY AND RENEWABLE ENERGY

Appropriations, 2023	$3,460,000,000
Budget estimate, 2024	3,826,116,000
Committee recommendation	3,686,749,000

The Committee recommends $3,686,749,000 for Energy Efficiency and Renewable Energy [EERE]. Within available funds, the Committee recommends $243,000,000 for program direction.

Energy Transitions Initiative Partnership Project [ETIPP].—The Committee recommends not less than $15,000,000 for the Energy Transitions Initiative [ETI], including the Technology-to-Market and Communities subprogram, to support initiatives to address high energy costs, reliability, and inadequate infrastructure challenges faced by island and remote communities. Within available funds, the Committee recommends up to $10,000,000 to support stakeholder engagement and capacity building through the regional project partner organizations in the ETIPP Island, Remote Community Stakeholder Engagement Regional Project Partners, and the ETI Energy Transitions Playbook to support cross-region collaboration and the design, planning, and implementation of viable energy transition projects within their respective regions.

Additionally, the Committee encourages the Department to work with Regional Partners to support technical assistance recipient communities across cohorts, prior to and following the technical assistance engagements, to create continuity across Federal investments. To facilitate continued improvement of this initiative, the Department is directed to: (1) develop a plan to expedite the implementation of projects developed by communities under the guid-

ance and support of the ETIPP program; (2) develop a plan to provide support and technical assistance to communities and regional partners around the future of projects developed and finalized by ETIPP communities; and (3) develop written guidance for wrap-around support provided by the lab consortium and regional partner network to support projects through financing processes and potential final project implementation. The plans and guidance outlined above shall be briefed to the Committee no later than 180 days after enactment of this act.

The Committee recognizes the importance of EERE efforts to ensure that clean energy technologies provide jobs and benefits to a diverse range of communities across the Nation. The Committee encourages offices across EERE to more effectively coordinate approaches to ensure maximum impact for stakeholders, while reducing unnecessary burdens for historically disadvantaged communities.

Clean Energy to Communities (C2C) Program.—The Committee continues to support the budget request for the Department's Clean Energy to Communities program, which connects local stakeholders, community-based groups, and electric utilities with the Department's national laboratories.

SUSTAINABLE TRANSPORTATION

Within available funds, the Committee recommends up to $35,000,000 with a 50 percent industry cost-share to continue the SuperTruck III program and further address the energy efficiency, CO_2 reduction potential, and freight efficiency of heavy and medium duty long and regional haul vehicles, including Class-8 long haul trucks and associated charging infrastructure.

Vehicle Technologies.—The Committee recommends $455,000,000 for Vehicle Technologies.

The Committee recommends $250,000,000 for Battery and Electrification Technologies. The Committee recognizes the increasing domestic manufacturing opportunities for electric battery production for vehicles. The Committee also recognizes the challenges associated with domestically sourcing necessarily minerals for battery production. The Committee encourages the Department to work to expand domestic manufacturing opportunities for electric vehicle batteries and to further address consumer barriers to adoption, including work with academic institutions that have demonstrated strong connections and support for regional energy storage industries.

The Committee strongly encourages the Department's efforts in the development of advanced materials and technologies in support of next-generation lithium-ion batteries in direct support of the Vehicle Technologies Office's applied battery research.

The Committee provides up to $15,000,000 for the Battery Recycling Retail Initiative. Within available funds, the Committee provides up to $5,000,000 for store retrofits to meet new California fire standards for battery recycling, to be administered to recipients of the Battery Recycling Retail Initiative. The Department is directed to brief the Committee on the volume of battery material feedstock necessary to support the Department's investments in battery recy-

cling facilities and ways to offset the cost to consumers and retailers gathering feedstock at retail locations.

The Committee directs the Department to continue to support the Clean Cities program, which supports the Nation's Clean Cities Coalitions' work to deliver lower air emissions and meet customer needs with vehicles powered by biofuels, electricity, hydrogen, natural gas, renewable natural gas, propane, and renewable propane. Within available funds, the Committee recommends not less than $65,000,000 for deployment through the Clean Cities program, including not less than $20,000,000 with the Clean Cities Coalitions and not less than $40,000,000 for competitive grants to support alternative fuel, infrastructure, new mobility, and vehicle deployment activities. When issuing competitive grants in support of these activities, the Department is encouraged to include at least one Clean Cities coalition partner. The Committee encourages the Department to ensure balance in the award of funds to achieve varied aims in fostering broader adoption of clean vehicles and installation of supporting infrastructure. The Committee further encourages the Department to prioritize projects that can contribute the greatest reductions in greenhouse gases and other harmful air pollutants. The Department is encouraged to increase deployment and accessibility of electric vehicle charging infrastructure in underserved or disadvantaged communities through grants, technical assistance, and community engagement, and to address the full range of costs of installing EV charging infrastructure, such as permitting and interconnection, to accelerate deployment. The Committee encourages the Department to explore ways in which the Clean Cities Program can leverage funding to provide greater support for electrification efforts, including in underserved communities, recognizing the strong emissions reduction and public health benefits delivered by electrification.

The Committee provides not less than $5,000,000 for the Department to continue its partnership with the GridEd workforce training program to advance a national electric vehicle workforce.

The Committee recommends up to $20,000,000 to address technical barriers to the increased use of natural gas vehicles, with a focus on those utilizing non-fossil based, renewable natural gas. Technical barriers include demonstrations of advanced natural gas vehicles and fueling infrastructure, medium and heavy duty on-road natural gas engine research and development, energy efficiency improvements, emission reduction technologies, fueling infrastructure optimization, and renewable gas production research and development.

The Committee encourages continued research and development in advanced combustion and engine technology efficiency in propane engines used for medium- and heavy-duty on-road and non-road applications. This research shall include direct injection and engine technology, and the use of dimethyl ether. To carry out this research, the Committee includes up to $5,000,000 in the recommendation.

The Department is encouraged to support research and development for hydrogen combustion by two-stroke opposed piston engines.

With the increasing market penetration of Li-ion battery electric vehicles in the U.S., the Committee is concerned that malfunctioning EV batteries can create hard to extinguish fires in structures containing parking garages that could lead to fires spreading to other EV and gasoline powered vehicles. The Committee recommends up to $6,000,000 for a competitive solicitation for university-led teams to develop vehicle or structural level strategies to reduce the likelihood of the cascading effects of EV fires.

Assessing the Benefits of All-Electric Vehicle [EV] Efficiency.—The Committee recognizes the benefits of more efficient EVs that use less energy per mile traveled, including the ability to travel further distances on a single charge and to reduce battery size while achieving comparable range. The Committee notes that a select few EV models have recently achieved an unprecedented Environmental Protection Agency [EPA]-rated 140 combined MPGe fuel economy rating. Therefore, the Committee directs the Joint Office of Energy and Transportation [Joint Office], in coordination with EPA, to assess the environmental, climate, and consumer benefits of more efficient EVs across the market, including the impacts on upstream carbon emissions, public health, energy demand, consumer costs, critical mineral demand and conservation, grid reliability and integration, and energy security. In conducting the assessment, the Joint Office should seek input from industry and other relevant stakeholders, as appropriate. The Committee also encourages the Joint Office, in coordination with EPA, to advance greater levels of EV efficiency across the industry using existing policies and programs.

The Committee encourages the Department in its position in the Joint Office to increase deployment and accessibility of electric vehicle charging infrastructure in underserved or disadvantaged communities through grants, technical assistance, and community engagement and to address "soft costs" of installing EV charging infrastructure, such as permitting, interconnection and energization challenges, to accelerate deployment. The Department is encouraged to develop and submit a roadmap to the Committee on Appropriations of both Houses of Congress to provide voluntary technical assistance to municipalities and public utility commissions aimed at reducing the time and costs for permitting, inspecting, energizing, and interconnecting publicly available EV supply equipment through standardized requirements, online application systems, recognition programs, and technical assistance.

Bioenergy Technologies.—The Committee recommends $280,000,000 for Bioenergy Technologies [BETO].

Within available funds, the Committee supports research to develop the foundation for scalable techniques to use carbon dioxide produced in various plants, such as in biorefineries, to produce higher value fuels, chemicals, or materials.

Within available funds, the Committee recommends up to $5,000,000 for continued support of the development and testing of new domestic manufactured low-emission, high-efficiency, residential wood heaters that supply easily accessed and affordable renewable energy and have the potential to reduce the National costs associated with thermal energy.

The Committee recommends up to $6,000,000 to support research, at commercially relevant processing scales, into affordable preprocessing of forest residue technologies, forest residue fractionation technologies, and other processing improvements relevant to thermal deoxygenation biorefineries in order to enable economic production of sustainable aviation fuels and economic upgrading of hemicelluloses and lignin.

Within available funds, the Committee directs the Department to continue work with university consortia to develop combined chemical and biocataytic processes, including the use of thermophiles, to convert waste plastics to recyclable and biodegradable green plastics and value-added products. BETO shall collaborate with institutions of higher education on sustainable transformation of waste plastics to recyclable bioproducts and greener construction materials.

The Committee recommends up to $4,000,000 for research and development of the increased viability of renewable propane and other gaseous intermediates to pursue new production pathways to sustainable aviation fuel and other high impact products from municipal waste, agricultural residue, forest resources, and fats, oils, and grease.

Hydrogen and Fuel Cell Technologies.—The Committee recommends $163,075,000 for Hydrogen and Fuel Cell Technologies Office to maintain a diverse program which focuses on early, mid, and late stage research and development, and technology acceleration including market transformation. The program shall continue to emphasize hydrogen production and the development of hydrogen refueling infrastructure nationwide to accelerate the adoption of zero-emission fuel cell transportation. The Committee encourages regular consultation with industry to avoid duplication of private-sector activities and ensure retention of fuel cell technology and systems development in the U.S. The Committee recommends continued support for the broad range of H2@Scale activities to support the development of clean hydrogen as a clean energy resource for hard-to-electrify transportation applications and to help build out the infrastructure needed to transport and store hydrogen.

The Committee recommends up to $50,000,000 for Hydrogen Research and Development. The Department is directed to continue efforts aimed at reducing the cost of hydrogen production, storage, and distribution including novel onboard hydrogen tank systems, trailer delivery systems, and development of systems and equipment for hydrogen pipelines.

The Committee recommends up to $30,000,000 for Safety, Codes, and Standards to maintain a robust program and engage with State and local agencies to support their technical needs relative to hydrogen infrastructure and safety.

RENEWABLE ENERGY

Solar Energy Technologies.—The Committee recommends $318,000,000 for Solar Energy Technologies.

Within available funds, the Committee recommends up to $60,000,000 for Concentrating Solar Power research, development, and demonstration to reduce overall system costs, better integrate

subsystem components, develop higher-temperature receivers, and improve the design of solar collection and thermal energy storage.

The Committee recommends not less than $20,000,000 for perovskites. The Department is directed to accelerate the development of pilot manufacturing plants for perovskite photovoltaics, support the development of perovskite technologies, and close the gap with international competitors. This support shall extend to a diverse array of manufacturing technologies and processes, and a broad range of integrated and stand-alone solar technologies across multiple industries, including residential and utility-scale solar photovoltaics as well as defense and other applications. The Department is encouraged to issue awards to private sector entities that are prepared to scale up perovskite solar technologies with an emphasis on building out the U.S. supply chain.

The Committee recommends not less than $45,000,000 for Balance of System Soft Costs efforts focused on reducing the time and costs for planning, siting, inspecting, and interconnecting solar energy and energy storage projects, including standardized requirements, online application systems, and process improvements, and grant awards to localities which voluntarily adopt the Solar Automated Permit Processing platform. Within available funds, $5,000,000 is for the National Community Solar Partnership program.

The Committee encourages the Department to continue supporting the regional demonstration sites under the Solar Energy Technologies Office.

The Committee is concerned with permitting and interconnection bottlenecks for solar and storage systems, delaying the activation of otherwise complete systems. The Department is encouraged to develop a standardized, automated interconnection process, in the model of the successful SolarAPP+ program, for utility adoption to allow for greater efficiency and predictability in establishing interconnections.

Wind Energy Technologies.—The Committee recognizes that the U.S. is uniquely positioned to establish global leadership in wind energy technologies and manufacturing, spurring innovation and creating domestic jobs. Accordingly, the Committee recommends $230,674,000 for Wind Energy Technologies.

The Department is directed to give priority to stewarding the assets and optimizing the operations of the Department-owned wind energy research and development facilities. The Committee recommends the Department continue to prioritize mission readiness and optimization of the operations of the National Wind Technology Center, and recommends not less than $5,000,000 for research and operations of the Integrated Energy System at Scale, a large-scale research platform using high-performance computing, modeling and simulation, including improved models that can be used to understand atmospheric and wind power plant flow physics, and reliability and grid integration efforts.

Within available funds, up to $5,000,000 is recommended to support university-led research projects related to resource characterization, site planning, aquaculture assessments, community outreach, and planning for long-term environmental monitoring for ap-

plications of floating offshore wind and marine energy technologies to support sustainable, scalable aquaculture production.

Within available funds, the Committee recommends up to $3,100,000 to expand a collaboration with the National Sea Grant College Program for regional capacity to provide science-based community engagement associated with floating offshore wind development.

The Committee encourages the Department to prioritize distributed wind technologies that reduce costs and improve performance and to collaborate with industry to invest in the development and demonstration of technologies and practices that advance distributed wind. Within available funds, the Committee recommends $16,000,000 for distributed wind.

The Committee recognizes the importance of the Floating Offshore Wind Shot initiative and the President's goal to deploy more than 15 GW of floating offshore wind by 2035. Near-term floating wind turbine technology demonstrations are critical to rapid risk and cost reduction and system level technology validation, which will enable large-scale commercial investment in offshore wind development to meet this goal. The Department is directed to support an at-scale floating wind turbine demonstrator to be deployed at the site of a prior Department offshore wind floating test project.

The Committee provides up to $30,000,000 to initiate the establishment of a university-based development and testing facility capable of supporting industrial prototyping and manufacturing of turbine systems capable of producing upwards of 30 megawatts of power per-unit. This program shall support the accompanying electric grid integration of these offshore wind turbine capabilities. In reviewing projects, the Department is encouraged to consider a university's ability to leverage existing infrastructure, partnerships, and expertise.

The Committee encourages the Department to continue to support research and development related to siting and environmental permitting issues, which if not properly addressed may lead to unnecessary delays in achieving the National goal to deploy 30 gigawatts of offshore wind generation by 2030. In considering research and development funding related to siting and environmental permitting issues, the Department shall prioritize the development of technologies and capabilities related to minimizing impacts to coastal communities, Federal radar missions, and living marine resources.

The Committee encourages the Department to continue focusing efforts with non-profit and academic partners to conduct coastal atmospheric boundary layer characterization that will help optimize and inform efforts of the Department of Interior's Bureau of Ocean Energy Management and assist the growing domestic coast wind energy industry.

Water Power.—The Committee recommends $200,000,000 for Water Power.

The Secretary is encouraged to utilize existing authorities to waive cost share for water power technologies research, development, demonstration, and deployment activities.

The Committee recognizes the importance of the Department's hydropower and marine energy workforce development programs,

including the hydropower and marine energy collegiate competitions and the marine energy graduate student research program and fellowships.

The Committee recommends $59,000,000 for hydropower and pumped storage activities. Within available funds for hydropower, the Committee recommends up to $5,000,000 to continue industry-led research, development, demonstration, and deployment efforts of innovative technologies for fish passage at hydropower facilities, as well as analysis of hydrologic climate science and water basin data to understand the impact of a changing climate on hydropower. The Committee recommends up to $5,000,000 for innovative analytics to optimize hydropower applications such as machine learning-based hydrologic forecasts and operations optimization technology advancement.

Tidal and river in-stream energy sources are becoming more viable as technology for hydrokinetic devices develop and matures and could be instrumental in providing cost-effective renewable energy production to certain areas. However, significant data gaps exist that could limit utilization of these resources. The Committee encourages the Department to coordinate with regulatory agencies and subject matter experts to prioritize and address key data and information gaps. The Committee also encourages the Department to support baseline environmental studies to enable regulatory agencies to rigorously and expeditiously evaluate near-future tidal energy development proposals.

Within available funds for hydropower, the Committee recommends up to $10,000,000 for small hydropower innovation testing, and initiatives, including industry-led competitive solicitations for advanced turbine demonstrations, improved environmental performance, and advanced manufacturing and supply chain innovations.

The Committee recommends up to $141,000,000 for Marine Energy. The Department is encouraged to utilize existing cost share waiver authorities under section 988 of the Energy Policy Act of 2005, when applicable and as appropriate, for marine energy research, development, demonstration, and deployment activities. The Committee recognizes the importance of more frequent, consistent, and less prescriptive funding opportunities to optimize the impacts of university-led foundational research and private sector-led technology development activities to accelerate commercialization of the marine energy sector.

Within available funds for Marine Energy, the Committee recommends not less than $43,300,000 to address infrastructure needs at marine energy technology sites, including $21,300,000 for the Department's Marine and Coastal Research Laboratory. The Committee encourages the Department to continue the advancement, improvement, and completion of ongoing projects, including the construction of the grid connected wave energy test facility.

The Committee recommends up to $20,000,000 for continuation of foundational research activities led by the National Marine Energy Centers and affiliated universities and research institutions. The Committee recommends up to $10,000,000 for operations at the National Marine Energy Centers to support market adoption and build a skilled workforce.

The Committee further recommends up to $35,000,000 for competitive solicitations to support private sector-led projects to rapidly design, fabricate, and test marine energy systems, subsystems, and components in order to increase power production and improve reliability at a variety of technology readiness levels. The Committee encourages the Department to give priority to more mature devices nearing market adoption, to advance or complete ongoing projects, or validate marine energy systems that provide reliability and resiliency for islanded communities with high-propensity for electrical outages.

The Committee recommends up to $8,000,000 for continuation of the Testing Expertise and Access for Marine Energy Research Community. The Committee continues to be supportive of the Atlantic Marine Energy Center.

The Committee recommends $24,000,000 for the Powering the Blue Economy initiative and directs the Department to continue leveraging existing core capabilities at national laboratories to execute this work, in partnership with universities and industry. The Committee is invested in the Department's Powering the Blue Economy efforts, and encourages the Department to continue focusing on cross-cutting initiatives within EERE and with other Federal partners that integrate marine energy harvesting, energy storage, and continuous, wide area monitoring.

The Committee directs the Department to coordinate with the U.S. Navy and other Federal agencies on marine energy technology development for national security and other applications.

Geothermal Technologies.—The Committee recommends $118,000,000 for Geothermal Technologies for research, development, and demonstration, including implementation of the recommendations outlined in the GeoVision study and authorized in the Energy Act of 2020 (Public Law 116–206).

The Committee recommends up to $100,000,000 for enhanced geothermal system demonstrations and next-generation geothermal demonstration projects in diverse geographic areas, including at least one demonstration project in an area with no obvious surface expression, to develop deep, direct use of geothermal technologies to distribute geothermal heat through an integrated energy system or district heating system. Awards for geothermal exploration activities, including test drilling, shall recognize the diversity of geologic terrains, resource depths, and exploration costs across the United States.

Renewable Energy Grid Integration.—The Committee recommends $45,000,000 for activities to facilitate the integration of grid activities among renewable energy technologies and to include integrated system analysis, technical assistance, and innovative municipal or community-driven initiatives to increase the use and integration of renewable energy in the United States.

ENERGY EFFICIENCY

Advanced Manufacturing [IEDO and AMMTO].—Within Advanced Manufacturing, the Committee recommends $275,000,000 for the Industrial Efficiency and Decarbonization Office [IEDO] and $220,000,000 for the Advanced Materials and Manufacturing Technologies Office [AMMTO].

Within available funds for AMMTO, the Committee recommends $25,000,000 for the Manufacturing Demonstration Facility [MDF] and the Carbon Fiber Technology Facility. Within available funds for the MDF, the Committee recommends $5,000,000 for the development of processes for materials solutions.

The Committee recommends up to $20,000,000 to continue development of additive manufacturing involving nanocellulose feedstock materials made from forest products. This work shall be conducted in partnership with the MDF in order to leverage expertise and capabilities for large scale additive manufacturing.

Within available funds, the Committee recommends up to $15,000,000 to provide ongoing support for the Combined Heat and Power [CHP] Technical Assistance Partnerships and related CHP Technical Partnership activities. The Department is directed to collaborate with industry on the potential energy efficiency and energy security gains to be realized with district energy systems.

The Committee notes that drying processes consume approximately 10 percent of the process energy used in the manufacturing sector. Within available funds, up to $10,000,000 is recommended for the issuance of a competitive solicitation for university and industry-led teams to improve the efficiency of industrial drying processes.

The Committee recommends up to $35,000,000 for the lab-embedded entrepreneurship program to support entrepreneurial fellows with access to national laboratory research facilities, expertise, and mentorship to assist with the commercialization of clean energy technologies. The Committee directs EERE to coordinate with other applied energy offices, including FECM, NE, and OCED, to explore opportunities for additional entrepreneurial support for the Department's broad clean energy portfolio. The Committee also encourages the Department to consider expanding their support of entrepreneurship beyond national laboratories to include support for communities of clean tech entrepreneurs in pursuit of commercialization at research universities and Department funded organizations in the form of stipends, training, mentorship, and access to critical equipment.

The Committee recommends up to $5,000,000 for the Department to partner with industry experienced in the industrialization of additive manufacturing of structural components to develop a framework to guide process improvement that will enhance the competitiveness of additive manufacturing technologies for rapidly and sustainably manufacturing large-scale structures.

The Committee notes the important role large-area additive manufacturing can play in helping to advance the deployment of building, transportation, and clean energy technologies. The Department is directed to further foster the partnership between the national laboratories, universities, and industry to use bio-based thermoplastics composites, such as micro- and nanocellulosic materials, and large 3–D printing to overcome challenges to the cost and deployment of building, transportation, and energy technologies.

The Department is encouraged to dedicate funding towards demonstrations of viable technologies that are ready for deployment at scale, such as industrial heat pumps. The Department is also encouraged to coordinate industrial heat decarbonization efforts with

Industrial Coordination to maximize the effectiveness of investments.

The Committee is aware of the Department's efforts to establish a domestic advanced battery supply chain. The Committee notes the Department's previous awards focused on lithium-ion based battery chemistries. The Committee encourages the Department to accelerate the deployment of domestic alternative battery manufacturing for grid-scale battery energy storage. The Department is also encouraged to craft programmatic advanced battery solicitations focused on a broad spectrum of non-lithium battery chemistries for long-duration energy storage.

BUILDING TECHNOLOGIES

The Committee recommends $332,000,000 for Building Technologies.

Across all of these efforts, where appropriate, the Buildings Technologies Office is encouraged to collaborate with OE and CESER, especially including efforts pertaining to improved building-to-grid interactions and integration of energy storage and renewable energy. Within available funds for Emerging Technologies, the Committee encourages the Department to make funding available for Heating, Ventilation, and Air Conditioning [HVAC] and Refrigeration Research, Development and deployment, including heat pumps, heat pump water heaters and boilers. The Department shall focus its efforts to address whole building energy performance and cost issues to inform efforts to advance beneficial electrification and greenhouse gas mitigation without compromising building energy performance. The Committee encourages the Department to develop strategies and activities to increase adoption of energy-saving and emissions-saving technologies for low-income households, multi-family buildings, and minority communities.

The Committee recommends not less than $75,000,000 for Equipment and Buildings Standards.

The Committee recommends up to $30,000,000 for the Building Energy Codes Program to increase training, including certifications, and provide technical assistance to States, local Governments, regional collaboratives, workforce development providers, homebuilders, office builders, architects and engineers, and other organizations that develop, adopt, or assist with the adoption or compliance with model building energy codes and standards to improve energy efficiency and resilience.

The Committee supports continued research to quantify the resilience impacts of energy codes for buildings, occupants, and communities. Recognizing that the pandemic has presented challenges to permit processing for building departments reliant on paper-based systems, the Committee encourages the development of cloud-based software that can facilitate permit processing for projects that conserve energy or promote resilience as well as efforts to help departments modernize systems.

The Committee directs EERE to carry out the Grid-interactive Efficient Buildings [GEB] program to ensure that a high level of energy efficiency is a core element of the program and a baseline characteristic for GEBs, which are also connected, smart, and flexible. EERE shall engage with the public and private sectors, includ-

the purposes of the Department's SBIR and STTR programs. Additionally, the Department is directed to establish and maintain formal coordination across relevant applied Departmental program offices regarding the proper implementation of the SBIR and STTR programs and to dedicate more resources to the administration of the SBIR and STTR programs. The Department is also encouraged to focus on solicitations that would advance commercialization and technological innovation aimed at decarbonization and emission reductions. Additionally, the Department is directed to develop program processes that are not burdensome to small businesses at the application stage and during grant management. Lastly, the Department is directed to develop metrics and processes for tracking private-sector commercialization of SBIR and STTR investments and for tracking the participation in SBIR and STTR programs, in accordance with the Small Business Innovation Development Act of 1982. The Department shall report to the Committee 30 days after enactment of this act how it plans to follow through on this direction.

Grid Modernization.—The Department shall brief the Committee not later than 90 days after enactment of this act on the revised Grid Modernization Initiative strategy, plans to reflect new decarbonization targets in strategy enhancements, the funding profiles, portfolio of funding opportunities, programmatic investments for the Initiative, and the roles and responsibilities of each participating program office. Further, the Committee recognizes the value of a diverse range of clean distributed energy resources, the Committee directs the Department to evaluate opportunities, in coordination with the Office of Clean Energy Demonstration, to deploy multi-resource microgrids that incorporate dispatchable, fuel-flexible, renewable-fuel-compatible, distributed generation technologies, including but not limited to linear generator technology, paired with variable output renewable resources and battery storage technology, in order to simultaneously achieve substantial carbon and criteria emissions reductions, ensure multi-day resilience, and improve energy security and independence.

Carbon Dioxide Removal.—The recommendation provides not less than $155,732,000 for research, development, and demonstration of carbon dioxide removal technologies, including not less than $22,000,000 from the Office of Energy Efficiency and Renewable Energy [EERE], not less than $66,000,000 from Office of Fossil Energy and Carbon Management [FECM], and not less than $67,000,000 from the Office of Science.

The Committee recommends $20,000,000 to continue a competitive purchasing pilot program that the Secretary was directed to establish in the fiscal year 2023 Energy and Water joint explanatory statement, consistent with Division D of Public Law 117–328, for the purchase of carbon dioxide removed from the atmosphere or upper hydrosphere. The Department is encouraged to make purchases through the pilot program that supports approaches such as those included in Section 5001, Division Z of Public Law 116–260, and to emphasize methods that minimize removal reversibility and maximize storage duration. Within 180 days of enactment of this act, the Department is directed to provide a report to the Committee on the progress of the competitive purchasing pilot program.

Equity and Justice.—The Committee notes the Department's continuing efforts and progress in implementing the Justice40 Initiative, the energy justice initiative, and Executive Order 14008.

Critical Minerals.—The Committee supports the Department's coordination of critical minerals activities across the Department through the Critical Minerals Initiative. The Committee encourages the Department to work with other relevant Federal departments and agencies to increase domestic critical mining, production, processing, recycling and manufacturing in order to secure supply chains for new energy development. The recommendation provides not less than $345,230,000 for research, development, demonstration, and commercialization activities on the development of alternatives to, recycling of, and efficient production and use of critical minerals, including not less than $150,000,000 from EERE, not less than $41,000,000 from FECM, not less than $129,000,000 from Nuclear Energy, and not less than $23,000,000 from the Office of Science. The Department is encouraged to carry out these activities pursuant to sections 7001 and 7002 of the Energy Act of 2020.

Industrial Decarbonization.—The recommendation provides not less than $956,000,000 for industrial decarbonization, including not less than $580,000,000 from EERE, not less than $245,000,000 from FECM, not less than $62,000,000 from Nuclear Energy [NE], and not less than $66,000,000 from the Office of Science.

Within available funds, the Committee directs the Department to establish the Low-Emissions Steel Manufacturing Research Program in accordance with Subtitle D of title IV of the Energy Independence and Security Act of 2007 (42 U.S.C. 17111a).

The Committee believes that innovative energy sources are necessary for manufacturers to transition from traditional carbon-emitting fuels to fuels with significantly lower greenhouse gases on a net basis. In support of that transition, more data is necessary for the long-term sustainability of combusting non-traditional fuels. The Department of Energy's Industrial Decarbonization Roadmap emphasizes that greater research, design, and deployment into alternative fuels usage is necessary to reduce carbon emissions in the industrial sector. The Committee encourages the Department to partner with an institution of higher learning to conduct research on greenhouse gas and other air emissions from the combustion and energy recovery of non-traditional fuels, such as biomass, wood, pulp & paper, agricultural waste, plastics, and municipal waste in cement manufacturing. The Committee expects the program to compare and analyze the calorific/heating value; greenhouse gas & other pollutants over any possible lifecycles of the fuel; fuel collection, processing & supply, and the regulatory barriers to utilizing potential fuels over traditional ones. The Committee also directs the Department to conduct this research in consultation with other agencies, as necessary. The Committee directs the Department to report its progress of data collection to Committee within a year of enactment of this act

Energy Storage.—The Committee supports the Department's Energy Storage Grand Challenge [ESGC] and Long-Duration Storage Shot initiatives, which includes cost-shared demonstrations of energy storage technologies. The ESGC builds on the Department's

prior research and development efforts in storage and will align Energy Storage research and development efforts to focus on technical, regulatory, and market issues necessary to achieve the technology goals. The Department is directed to continue to provide the Committee updates on the ESGC and make publically available a crosscutting research and development road-map through 2030 to illustrate the ESGC's goals. This road-map shall be focused on reducing costs and improving the performance of a diverse set of grid-scale storage technologies to meet industry needs, improve reliability and environmental performance of the electricity grid, and reduce greenhouse gas emissions. The Department is directed to carry out these activities in accordance with sections 3201 and 3202 of the Energy Act of 2020.

The Committee is aware of the Department's efforts to expand the capabilities of the United States in advanced battery manufacturing, including for long-duration grid-scale energy storage and electric vehicles. As the Department continues its efforts to scale up a domestic advanced battery supply chain, including battery manufacturing demonstration projects, the Committee encourages the Department to seek a broad spectrum of battery chemistries not wholly exclusive to lithium-ion based battery technology.

The recommendation provides not less than $570,000,000 for energy storage, including not less than $330,000,000 from EERE, not less than $84,000,000 from the Office of Electricity [OE], not less than $5,000,000 from FECM, not less than $21,000,000 from NE, and not less than $123,000,000 from the Office of Science.

Alternative Modes of Transportation.—The Committee notes the Department's ongoing efforts to develop technologies and low carbon fuels that will reduce emission in shipping, aviation, agricultural, and long distance transportation.

The recommendation provides not less than $361,000,000 to further the research, development, testing, and demonstration of innovative technologies and solutions for low- or no-emission alternative fuels for ongoing efforts to develop technologies and low carbon fuels that will reduce emission in shipping, aviation, agricultural, and long distance transportation. This funding level includes not less than $285,000,000 from EERE, not less than $33,250,000 from FECM, not less than $33,250,000 from the OE, and not less than $9,500,000 from the Office of Science.

Hastening the availability of low- and no-carbon alternatives to diesel fuel for locomotives will be essential to achieving a net-zero emissions economy while also meeting our Nation's projected 50 percent growth in freight transportation demand by 2050. As part of the U.S. National Blueprint for Transportation Decarbonization, the Department states, "Freight rail research should be prioritized to determine the most promising paths to decarbonization, including a focus on sustainable fuels and the design and manufacture of new locomotive propulsion and fueling systems." The Committee notes there are ongoing efforts to further the use of technologies that will reduce emissions in existing locomotive fleets, such as different blends of renewable diesel and biodiesel, as well as to accelerate the commercial viability of alternative propulsion methods, including batteries and hydrogen fuel cells. The Committee directs the Department to regularly consult with railroads and rail manu-

facturers and suppliers to determine which research projects will best advance the commercial viability of these respective technologies and help to identify the pathway to decarbonization for the industry.

Further, the Committee encourages the Department to accelerate its work on sustainable aviation fuels, with a focus on getting feedstocks and biorefining processes for net-zero emission fuels into demonstration as it works to meet the goals of the Sustainable Aviation Fuel Grand Challenge. The Committee encourages the Department to develop a clear framework for evaluating the emissions reduction potential of different sustainable aviation fuel pathways and to prioritize research and development of fuels with the greatest potential to reduce GHG emissions while avoiding unintended consequences on forests and food supply chains. The Department is encouraged to work with other Federal agencies and the national labs to coordinate efforts to advance sustainable aviation fuels and work in coordination with aviation manufacturers. Additionally, the Committee directs the Department to factor growth in sustainable aviation fuel research, development, demonstration, and deployment into future year budget requests.

Hydrogen.—The Committee supports the Department's continued coordination on hydrogen energy and fuel cell technologies in order to maximize the effectiveness of investments in hydrogen-related activities. This coordination shall include EERE, FECM, NE, OE, the Office of Science, and the Advanced Research Projects Agency—Energy.

The recommendation provides not less than $390,000,000 for the Hydrogen crosscut, including not less than $205,000,000 from EERE, not less than $121,000,000 from FECM, not less than $21,000,000 from NE, and not less than $47,000,000 from the Office of Science.

The recommendation provides up to $65,000,000 for technologies to advance hydrogen use for heavy-duty transportation, industrial, and hard-to-electrify transportation applications including trains, maritime shipping, and aviation, and industrial applications.

Further, the Department is encouraged to engage on codes and standards for fast-developing fuel cell and hydrogen markets such as heavy-duty trucks, aviation, maritime, locomotives, transportation of hydrogen by rail, and other areas as needed.

The Committee instructs the Department to support updates to Argonne National Laboratory's Greenhouse gases, Regulated Emissions, and Energy use in Technologies, also known as the GREET model, including updating model defaults to match the best available science and data for consistency in modelling life-cycle greenhouse gas emissions; including innovative ways to produce hydrogen, such as geologic hydrogen and through the use of coal bed/coal mine methane, as well as other advanced pathways leveraging diverse domestic resources.

Transformers.—Currently, the power sector is experiencing long manufacturer lead-times to fulfill orders of distribution transformers. It has been reported that lead-times to fulfill orders for utilities are up to over 2 years compared to 2 to 4 months in 2019. This delay risks reliability, resilience, national security and defense

readiness, and affordability of the electric grid due to the critical role of this equipment.

The recommendation includes further funding to enhance the domestic supply chain for the manufacture of transformers and electric grid components derived from unobligated advanced emergency appropriations funding.

Further, the Committee is concerned about the Proposed Rulemaking (88 Federal Register 1722): Energy Conservation Program: Energy Conservation Standards for Distribution Transformers and its effect on materials that could go into the development of transformers and manufacturers ability to meet growing demand. The Department is directed to recognize the national security implications of changing the manufacturing process on critical grid components and to work with relevant stakeholders in developing future efficiency standards for distribution transformers. The Department is further directed to respond to Congressional and outside stakeholders regarding their comments on this proposed rule. The Department is further directed to report to the Committee within 30 days of passage of this act, regarding the status of this proposed rule and how it will address these concerns.

Battery Grants.—The Committee is concerned about reports that the Department of Energy is attempting to include additional requirements that were not mandated in the Infrastructure Investment and Jobs Act for projects that have been selected to negotiate a Battery Manufacturing and Recycling or a Battery Materials Processing award. The Committee encourages the Department to proceed expeditiously in negotiations to finalize awards without further delay due to requirements not mandated by law.

INDUSTRIAL EMISSIONS AND TECHNOLOGY COORDINATION

Appropriations, 2023	.....
Budget estimate, 2024	.....
Committee recommendation	$3,500,000

The recommendation provides a separate appropriation for Industrial Emissions Coordination. The Department is directed to coordinate and lead the clean industrial research, development, demonstrations, and deployment across the Department focusing on work that is both sector-specific and technology-inclusive for energy-intensive industries. Further, within 180 days of enactment of this act the Department is directed to develop a Department-wide Multi-Year Program Plan [MYPP] as an operational guide to implementing the Industrial Decarbonization Roadmap and ensure coordination across all participating offices. The MYPP shall be updated annually to reflect changes in the availability of funds, technology development, and reprioritization. The Department-wide MYPP will incorporate any plans or strategies as directed in previous congressional language.

The Committee continues to emphasize the importance of crosscutting initiatives that enable the Department to accelerate progress on specific goals through fully integrated science and applied energy research, development, demonstration, and deployment. These crosscutting initiatives require active coordination throughout the Department to ensure that the roles, responsibilities, programs, and funding are aligned across the various pro-

gram offices to achieve desired outcomes. This coordination ensures that the Department leverages funding sources across programs and avoids unnecessary duplication of efforts, resulting in the best stewardship of taxpayer funds. This coordination also helps align the considerable capabilities of the Department's stakeholders, including national laboratories, universities, industry, and other partners. However, the Committee has grown concerned with the proliferation of coordination mechanisms-such as crosscuts, Energy Earthshots, Joint Strategy Teams, Science and Energy Technology Teams, and Coordination Teams-that may actually result in confusion and redundancy instead of increased coordination. The Department is directed to align, simplify, and consolidate these coordination mechanisms into one function, so the resulting coordination mechanism includes clear leadership, articulates the roles and responsibilities of each participating program office, and plays a leading role in budget formulation and execution across program offices. The Department is directed to provide to the Committee not later than 90 days after enactment of this act a briefing on how these coordination mechanisms will achieve these goals and become institutionalized. Further, the Department is directed to include in future budget requests funding breakdowns by account and subprogram for each of the crosscutting initiatives. For this purpose, the crosscutting initiatives shall include: carbon dioxide removal, energy storage, hydrogen, critical minerals and materials, industrial decarbonization, agriculture, electricity sector, transportation sector, and buildings sector.

ENERGY EFFICIENCY AND RENEWABLE ENERGY

Appropriations, 2023	$3,460,000,000
Budget estimate, 2024	3,826,116,000
Committee recommendation	3,686,749,000

The Committee recommends $3,686,749,000 for Energy Efficiency and Renewable Energy [EERE]. Within available funds, the Committee recommends $243,000,000 for program direction.

Energy Transitions Initiative Partnership Project [ETIPP].—The Committee recommends not less than $15,000,000 for the Energy Transitions Initiative [ETI], including the Technology-to-Market and Communities subprogram, to support initiatives to address high energy costs, reliability, and inadequate infrastructure challenges faced by island and remote communities. Within available funds, the Committee recommends up to $10,000,000 to support stakeholder engagement and capacity building through the regional project partner organizations in the ETIPP Island, Remote Community Stakeholder Engagement Regional Project Partners, and the ETI Energy Transitions Playbook to support cross-region collaboration and the design, planning, and implementation of viable energy transition projects within their respective regions.

Additionally, the Committee encourages the Department to work with Regional Partners to support technical assistance recipient communities across cohorts, prior to and following the technical assistance engagements, to create continuity across Federal investments. To facilitate continued improvement of this initiative, the Department is directed to: (1) develop a plan to expedite the implementation of projects developed by communities under the guid-

ance and support of the ETIPP program; (2) develop a plan to provide support and technical assistance to communities and regional partners around the future of projects developed and finalized by ETIPP communities; and (3) develop written guidance for wrap-around support provided by the lab consortium and regional partner network to support projects through financing processes and potential final project implementation. The plans and guidance outlined above shall be briefed to the Committee no later than 180 days after enactment of this act.

The Committee recognizes the importance of EERE efforts to ensure that clean energy technologies provide jobs and benefits to a diverse range of communities across the Nation. The Committee encourages offices across EERE to more effectively coordinate approaches to ensure maximum impact for stakeholders, while reducing unnecessary burdens for historically disadvantaged communities.

Clean Energy to Communities (C2C) Program.—The Committee continues to support the budget request for the Department's Clean Energy to Communities program, which connects local stakeholders, community-based groups, and electric utilities with the Department's national laboratories.

SUSTAINABLE TRANSPORTATION

Within available funds, the Committee recommends up to $35,000,000 with a 50 percent industry cost-share to continue the SuperTruck III program and further address the energy efficiency, CO_2 reduction potential, and freight efficiency of heavy and medium duty long and regional haul vehicles, including Class-8 long haul trucks and associated charging infrastructure.

Vehicle Technologies.—The Committee recommends $455,000,000 for Vehicle Technologies.

The Committee recommends $250,000,000 for Battery and Electrification Technologies. The Committee recognizes the increasing domestic manufacturing opportunities for electric battery production for vehicles. The Committee also recognizes the challenges associated with domestically sourcing necessarily minerals for battery production. The Committee encourages the Department to work to expand domestic manufacturing opportunities for electric vehicle batteries and to further address consumer barriers to adoption, including work with academic institutions that have demonstrated strong connections and support for regional energy storage industries.

The Committee strongly encourages the Department's efforts in the development of advanced materials and technologies in support of next-generation lithium-ion batteries in direct support of the Vehicle Technologies Office's applied battery research.

The Committee provides up to $15,000,000 for the Battery Recycling Retail Initiative. Within available funds, the Committee provides up to $5,000,000 for store retrofits to meet new California fire standards for battery recycling, to be administered to recipients of the Battery Recycling Retail Initiative. The Department is directed to brief the Committee on the volume of battery material feedstock necessary to support the Department's investments in battery recy-

cling facilities and ways to offset the cost to consumers and retailers gathering feedstock at retail locations.

The Committee directs the Department to continue to support the Clean Cities program, which supports the Nation's Clean Cities Coalitions' work to deliver lower air emissions and meet customer needs with vehicles powered by biofuels, electricity, hydrogen, natural gas, renewable natural gas, propane, and renewable propane. Within available funds, the Committee recommends not less than $65,000,000 for deployment through the Clean Cities program, including not less than $20,000,000 with the Clean Cities Coalitions and not less than $40,000,000 for competitive grants to support alternative fuel, infrastructure, new mobility, and vehicle deployment activities. When issuing competitive grants in support of these activities, the Department is encouraged to include at least one Clean Cities coalition partner. The Committee encourages the Department to ensure balance in the award of funds to achieve varied aims in fostering broader adoption of clean vehicles and installation of supporting infrastructure. The Committee further encourages the Department to prioritize projects that can contribute the greatest reductions in greenhouse gases and other harmful air pollutants. The Department is encouraged to increase deployment and accessibility of electric vehicle charging infrastructure in underserved or disadvantaged communities through grants, technical assistance, and community engagement, and to address the full range of costs of installing EV charging infrastructure, such as permitting and interconnection, to accelerate deployment. The Committee encourages the Department to explore ways in which the Clean Cities Program can leverage funding to provide greater support for electrification efforts, including in underserved communities, recognizing the strong emissions reduction and public health benefits delivered by electrification.

The Committee provides not less than $5,000,000 for the Department to continue its partnership with the GridEd workforce training program to advance a national electric vehicle workforce.

The Committee recommends up to $20,000,000 to address technical barriers to the increased use of natural gas vehicles, with a focus on those utilizing non-fossil based, renewable natural gas. Technical barriers include demonstrations of advanced natural gas vehicles and fueling infrastructure, medium and heavy duty on-road natural gas engine research and development, energy efficiency improvements, emission reduction technologies, fueling infrastructure optimization, and renewable gas production research and development.

The Committee encourages continued research and development in advanced combustion and engine technology efficiency in propane engines used for medium- and heavy-duty on-road and non-road applications. This research shall include direct injection and engine technology, and the use of dimethyl ether. To carry out this research, the Committee includes up to $5,000,000 in the recommendation.

The Department is encouraged to support research and development for hydrogen combustion by two-stroke opposed piston engines.

With the increasing market penetration of Li-ion battery electric vehicles in the U.S., the Committee is concerned that malfunctioning EV batteries can create hard to extinguish fires in structures containing parking garages that could lead to fires spreading to other EV and gasoline powered vehicles. The Committee recommends up to $6,000,000 for a competitive solicitation for university-led teams to develop vehicle or structural level strategies to reduce the likelihood of the cascading effects of EV fires.

Assessing the Benefits of All-Electric Vehicle [EV] Efficiency.—The Committee recognizes the benefits of more efficient EVs that use less energy per mile traveled, including the ability to travel further distances on a single charge and to reduce battery size while achieving comparable range. The Committee notes that a select few EV models have recently achieved an unprecedented Environmental Protection Agency [EPA]-rated 140 combined MPGe fuel economy rating. Therefore, the Committee directs the Joint Office of Energy and Transportation [Joint Office], in coordination with EPA, to assess the environmental, climate, and consumer benefits of more efficient EVs across the market, including the impacts on upstream carbon emissions, public health, energy demand, consumer costs, critical mineral demand and conservation, grid reliability and integration, and energy security. In conducting the assessment, the Joint Office should seek input from industry and other relevant stakeholders, as appropriate. The Committee also encourages the Joint Office, in coordination with EPA, to advance greater levels of EV efficiency across the industry using existing policies and programs.

The Committee encourages the Department in its position in the Joint Office to increase deployment and accessibility of electric vehicle charging infrastructure in underserved or disadvantaged communities through grants, technical assistance, and community engagement and to address "soft costs" of installing EV charging infrastructure, such as permitting, interconnection and energization challenges, to accelerate deployment. The Department is encouraged to develop and submit a roadmap to the Committee on Appropriations of both Houses of Congress to provide voluntary technical assistance to municipalities and public utility commissions aimed at reducing the time and costs for permitting, inspecting, energizing, and interconnecting publicly available EV supply equipment through standardized requirements, online application systems, recognition programs, and technical assistance.

Bioenergy Technologies.—The Committee recommends $280,000,000 for Bioenergy Technologies [BETO].

Within available funds, the Committee supports research to develop the foundation for scalable techniques to use carbon dioxide produced in various plants, such as in biorefineries, to produce higher value fuels, chemicals, or materials.

Within available funds, the Committee recommends up to $5,000,000 for continued support of the development and testing of new domestic manufactured low-emission, high-efficiency, residential wood heaters that supply easily accessed and affordable renewable energy and have the potential to reduce the National costs associated with thermal energy.

The Committee recommends up to $6,000,000 to support research, at commercially relevant processing scales, into affordable preprocessing of forest residue technologies, forest residue fractionation technologies, and other processing improvements relevant to thermal deoxygenation biorefineries in order to enable economic production of sustainable aviation fuels and economic upgrading of hemicelluloses and lignin.

Within available funds, the Committee directs the Department to continue work with university consortia to develop combined chemical and biocataytic processes, including the use of thermophiles, to convert waste plastics to recyclable and biodegradable green plastics and value-added products. BETO shall collaborate with institutions of higher education on sustainable transformation of waste plastics to recyclable bioproducts and greener construction materials.

The Committee recommends up to $4,000,000 for research and development of the increased viability of renewable propane and other gaseous intermediates to pursue new production pathways to sustainable aviation fuel and other high impact products from municipal waste, agricultural residue, forest resources, and fats, oils, and grease.

Hydrogen and Fuel Cell Technologies.—The Committee recommends $163,075,000 for Hydrogen and Fuel Cell Technologies Office to maintain a diverse program which focuses on early, mid, and late stage research and development, and technology acceleration including market transformation. The program shall continue to emphasize hydrogen production and the development of hydrogen refueling infrastructure nationwide to accelerate the adoption of zero-emission fuel cell transportation. The Committee encourages regular consultation with industry to avoid duplication of private-sector activities and ensure retention of fuel cell technology and systems development in the U.S. The Committee recommends continued support for the broad range of H2@Scale activities to support the development of clean hydrogen as a clean energy resource for hard-to-electrify transportation applications and to help build out the infrastructure needed to transport and store hydrogen.

The Committee recommends up to $50,000,000 for Hydrogen Research and Development. The Department is directed to continue efforts aimed at reducing the cost of hydrogen production, storage, and distribution including novel onboard hydrogen tank systems, trailer delivery systems, and development of systems and equipment for hydrogen pipelines.

The Committee recommends up to $30,000,000 for Safety, Codes, and Standards to maintain a robust program and engage with State and local agencies to support their technical needs relative to hydrogen infrastructure and safety.

RENEWABLE ENERGY

Solar Energy Technologies.—The Committee recommends $318,000,000 for Solar Energy Technologies.

Within available funds, the Committee recommends up to $60,000,000 for Concentrating Solar Power research, development, and demonstration to reduce overall system costs, better integrate

subsystem components, develop higher-temperature receivers, and improve the design of solar collection and thermal energy storage.

The Committee recommends not less than $20,000,000 for perovskites. The Department is directed to accelerate the development of pilot manufacturing plants for perovskite photovoltaics, support the development of perovskite technologies, and close the gap with international competitors. This support shall extend to a diverse array of manufacturing technologies and processes, and a broad range of integrated and stand-alone solar technologies across multiple industries, including residential and utility-scale solar photovoltaics as well as defense and other applications. The Department is encouraged to issue awards to private sector entities that are prepared to scale up perovskite solar technologies with an emphasis on building out the U.S. supply chain.

The Committee recommends not less than $45,000,000 for Balance of System Soft Costs efforts focused on reducing the time and costs for planning, siting, inspecting, and interconnecting solar energy and energy storage projects, including standardized requirements, online application systems, and process improvements, and grant awards to localities which voluntarily adopt the Solar Automated Permit Processing platform. Within available funds, $5,000,000 is for the National Community Solar Partnership program.

The Committee encourages the Department to continue supporting the regional demonstration sites under the Solar Energy Technologies Office.

The Committee is concerned with permitting and interconnection bottlenecks for solar and storage systems, delaying the activation of otherwise complete systems. The Department is encouraged to develop a standardized, automated interconnection process, in the model of the successful SolarAPP+ program, for utility adoption to allow for greater efficiency and predictability in establishing interconnections.

Wind Energy Technologies.—The Committee recognizes that the U.S. is uniquely positioned to establish global leadership in wind energy technologies and manufacturing, spurring innovation and creating domestic jobs. Accordingly, the Committee recommends $230,674,000 for Wind Energy Technologies.

The Department is directed to give priority to stewarding the assets and optimizing the operations of the Department-owned wind energy research and development facilities. The Committee recommends the Department continue to prioritize mission readiness and optimization of the operations of the National Wind Technology Center, and recommends not less than $5,000,000 for research and operations of the Integrated Energy System at Scale, a large-scale research platform using high-performance computing, modeling and simulation, including improved models that can be used to understand atmospheric and wind power plant flow physics, and reliability and grid integration efforts.

Within available funds, up to $5,000,000 is recommended to support university-led research projects related to resource characterization, site planning, aquaculture assessments, community outreach, and planning for long-term environmental monitoring for ap-

plications of floating offshore wind and marine energy technologies to support sustainable, scalable aquaculture production.

Within available funds, the Committee recommends up to $3,100,000 to expand a collaboration with the National Sea Grant College Program for regional capacity to provide science-based community engagement associated with floating offshore wind development.

The Committee encourages the Department to prioritize distributed wind technologies that reduce costs and improve performance and to collaborate with industry to invest in the development and demonstration of technologies and practices that advance distributed wind. Within available funds, the Committee recommends $16,000,000 for distributed wind.

The Committee recognizes the importance of the Floating Offshore Wind Shot initiative and the President's goal to deploy more than 15 GW of floating offshore wind by 2035. Near-term floating wind turbine technology demonstrations are critical to rapid risk and cost reduction and system level technology validation, which will enable large-scale commercial investment in offshore wind development to meet this goal. The Department is directed to support an at-scale floating wind turbine demonstrator to be deployed at the site of a prior Department offshore wind floating test project.

The Committee provides up to $30,000,000 to initiate the establishment of a university-based development and testing facility capable of supporting industrial prototyping and manufacturing of turbine systems capable of producing upwards of 30 megawatts of power per-unit. This program shall support the accompanying electric grid integration of these offshore wind turbine capabilities. In reviewing projects, the Department is encouraged to consider a university's ability to leverage existing infrastructure, partnerships, and expertise.

The Committee encourages the Department to continue to support research and development related to siting and environmental permitting issues, which if not properly addressed may lead to unnecessary delays in achieving the National goal to deploy 30 gigawatts of offshore wind generation by 2030. In considering research and development funding related to siting and environmental permitting issues, the Department shall prioritize the development of technologies and capabilities related to minimizing impacts to coastal communities, Federal radar missions, and living marine resources.

The Committee encourages the Department to continue focusing efforts with non-profit and academic partners to conduct coastal atmospheric boundary layer characterization that will help optimize and inform efforts of the Department of Interior's Bureau of Ocean Energy Management and assist the growing domestic coast wind energy industry.

Water Power.—The Committee recommends $200,000,000 for Water Power.

The Secretary is encouraged to utilize existing authorities to waive cost share for water power technologies research, development, demonstration, and deployment activities.

The Committee recognizes the importance of the Department's hydropower and marine energy workforce development programs,

including the hydropower and marine energy collegiate competitions and the marine energy graduate student research program and fellowships.

The Committee recommends $59,000,000 for hydropower and pumped storage activities. Within available funds for hydropower, the Committee recommends up to $5,000,000 to continue industry-led research, development, demonstration, and deployment efforts of innovative technologies for fish passage at hydropower facilities, as well as analysis of hydrologic climate science and water basin data to understand the impact of a changing climate on hydropower. The Committee recommends up to $5,000,000 for innovative analytics to optimize hydropower applications such as machine learning-based hydrologic forecasts and operations optimization technology advancement.

Tidal and river in-stream energy sources are becoming more viable as technology for hydrokinetic devices develop and matures and could be instrumental in providing cost-effective renewable energy production to certain areas. However, significant data gaps exist that could limit utilization of these resources. The Committee encourages the Department to coordinate with regulatory agencies and subject matter experts to prioritize and address key data and information gaps. The Committee also encourages the Department to support baseline environmental studies to enable regulatory agencies to rigorously and expeditiously evaluate near-future tidal energy development proposals.

Within available funds for hydropower, the Committee recommends up to $10,000,000 for small hydropower innovation testing, and initiatives, including industry-led competitive solicitations for advanced turbine demonstrations, improved environmental performance, and advanced manufacturing and supply chain innovations.

The Committee recommends up to $141,000,000 for Marine Energy. The Department is encouraged to utilize existing cost share waiver authorities under section 988 of the Energy Policy Act of 2005, when applicable and as appropriate, for marine energy research, development, demonstration, and deployment activities. The Committee recognizes the importance of more frequent, consistent, and less prescriptive funding opportunities to optimize the impacts of university-led foundational research and private sector-led technology development activities to accelerate commercialization of the marine energy sector.

Within available funds for Marine Energy, the Committee recommends not less than $43,300,000 to address infrastructure needs at marine energy technology sites, including $21,300,000 for the Department's Marine and Coastal Research Laboratory. The Committee encourages the Department to continue the advancement, improvement, and completion of ongoing projects, including the construction of the grid connected wave energy test facility.

The Committee recommends up to $20,000,000 for continuation of foundational research activities led by the National Marine Energy Centers and affiliated universities and research institutions. The Committee recommends up to $10,000,000 for operations at the National Marine Energy Centers to support market adoption and build a skilled workforce.

The Committee further recommends up to $35,000,000 for competitive solicitations to support private sector-led projects to rapidly design, fabricate, and test marine energy systems, subsystems, and components in order to increase power production and improve reliability at a variety of technology readiness levels. The Committee encourages the Department to give priority to more mature devices nearing market adoption, to advance or complete ongoing projects, or validate marine energy systems that provide reliability and resiliency for islanded communities with high-propensity for electrical outages.

The Committee recommends up to $8,000,000 for continuation of the Testing Expertise and Access for Marine Energy Research Community. The Committee continues to be supportive of the Atlantic Marine Energy Center.

The Committee recommends $24,000,000 for the Powering the Blue Economy initiative and directs the Department to continue leveraging existing core capabilities at national laboratories to execute this work, in partnership with universities and industry. The Committee is invested in the Department's Powering the Blue Economy efforts, and encourages the Department to continue focusing on cross-cutting initiatives within EERE and with other Federal partners that integrate marine energy harvesting, energy storage, and continuous, wide area monitoring.

The Committee directs the Department to coordinate with the U.S. Navy and other Federal agencies on marine energy technology development for national security and other applications.

Geothermal Technologies.—The Committee recommends $118,000,000 for Geothermal Technologies for research, development, and demonstration, including implementation of the recommendations outlined in the GeoVision study and authorized in the Energy Act of 2020 (Public Law 116–206).

The Committee recommends up to $100,000,000 for enhanced geothermal system demonstrations and next-generation geothermal demonstration projects in diverse geographic areas, including at least one demonstration project in an area with no obvious surface expression, to develop deep, direct use of geothermal technologies to distribute geothermal heat through an integrated energy system or district heating system. Awards for geothermal exploration activities, including test drilling, shall recognize the diversity of geologic terrains, resource depths, and exploration costs across the United States.

Renewable Energy Grid Integration.—The Committee recommends $45,000,000 for activities to facilitate the integration of grid activities among renewable energy technologies and to include integrated system analysis, technical assistance, and innovative municipal or community-driven initiatives to increase the use and integration of renewable energy in the United States.

ENERGY EFFICIENCY

Advanced Manufacturing [IEDO and AMMTO].—Within Advanced Manufacturing, the Committee recommends $275,000,000 for the Industrial Efficiency and Decarbonization Office [IEDO] and $220,000,000 for the Advanced Materials and Manufacturing Technologies Office [AMMTO].

Within available funds for AMMTO, the Committee recommends $25,000,000 for the Manufacturing Demonstration Facility [MDF] and the Carbon Fiber Technology Facility. Within available funds for the MDF, the Committee recommends $5,000,000 for the development of processes for materials solutions.

The Committee recommends up to $20,000,000 to continue development of additive manufacturing involving nanocellulose feedstock materials made from forest products. This work shall be conducted in partnership with the MDF in order to leverage expertise and capabilities for large scale additive manufacturing.

Within available funds, the Committee recommends up to $15,000,000 to provide ongoing support for the Combined Heat and Power [CHP] Technical Assistance Partnerships and related CHP Technical Partnership activities. The Department is directed to collaborate with industry on the potential energy efficiency and energy security gains to be realized with district energy systems.

The Committee notes that drying processes consume approximately 10 percent of the process energy used in the manufacturing sector. Within available funds, up to $10,000,000 is recommended for the issuance of a competitive solicitation for university and industry-led teams to improve the efficiency of industrial drying processes.

The Committee recommends up to $35,000,000 for the lab-embedded entrepreneurship program to support entrepreneurial fellows with access to national laboratory research facilities, expertise, and mentorship to assist with the commercialization of clean energy technologies. The Committee directs EERE to coordinate with other applied energy offices, including FECM, NE, and OCED, to explore opportunities for additional entrepreneurial support for the Department's broad clean energy portfolio. The Committee also encourages the Department to consider expanding their support of entrepreneurship beyond national laboratories to include support for communities of clean tech entrepreneurs in pursuit of commercialization at research universities and Department funded organizations in the form of stipends, training, mentorship, and access to critical equipment.

The Committee recommends up to $5,000,000 for the Department to partner with industry experienced in the industrialization of additive manufacturing of structural components to develop a framework to guide process improvement that will enhance the competitiveness of additive manufacturing technologies for rapidly and sustainably manufacturing large-scale structures.

The Committee notes the important role large-area additive manufacturing can play in helping to advance the deployment of building, transportation, and clean energy technologies. The Department is directed to further foster the partnership between the national laboratories, universities, and industry to use bio-based thermoplastics composites, such as micro- and nanocellulosic materials, and large 3–D printing to overcome challenges to the cost and deployment of building, transportation, and energy technologies.

The Department is encouraged to dedicate funding towards demonstrations of viable technologies that are ready for deployment at scale, such as industrial heat pumps. The Department is also encouraged to coordinate industrial heat decarbonization efforts with

Industrial Coordination to maximize the effectiveness of investments.

The Committee is aware of the Department's efforts to establish a domestic advanced battery supply chain. The Committee notes the Department's previous awards focused on lithium-ion based battery chemistries. The Committee encourages the Department to accelerate the deployment of domestic alternative battery manufacturing for grid-scale battery energy storage. The Department is also encouraged to craft programmatic advanced battery solicitations focused on a broad spectrum of non-lithium battery chemistries for long-duration energy storage.

BUILDING TECHNOLOGIES

The Committee recommends $332,000,000 for Building Technologies.

Across all of these efforts, where appropriate, the Buildings Technologies Office is encouraged to collaborate with OE and CESER, especially including efforts pertaining to improved building-to-grid interactions and integration of energy storage and renewable energy. Within available funds for Emerging Technologies, the Committee encourages the Department to make funding available for Heating, Ventilation, and Air Conditioning [HVAC] and Refrigeration Research, Development and deployment, including heat pumps, heat pump water heaters and boilers. The Department shall focus its efforts to address whole building energy performance and cost issues to inform efforts to advance beneficial electrification and greenhouse gas mitigation without compromising building energy performance. The Committee encourages the Department to develop strategies and activities to increase adoption of energy-saving and emissions-saving technologies for low-income households, multi-family buildings, and minority communities.

The Committee recommends not less than $75,000,000 for Equipment and Buildings Standards.

The Committee recommends up to $30,000,000 for the Building Energy Codes Program to increase training, including certifications, and provide technical assistance to States, local Governments, regional collaboratives, workforce development providers, homebuilders, office builders, architects and engineers, and other organizations that develop, adopt, or assist with the adoption or compliance with model building energy codes and standards to improve energy efficiency and resilience.

The Committee supports continued research to quantify the resilience impacts of energy codes for buildings, occupants, and communities. Recognizing that the pandemic has presented challenges to permit processing for building departments reliant on paper-based systems, the Committee encourages the development of cloud-based software that can facilitate permit processing for projects that conserve energy or promote resilience as well as efforts to help departments modernize systems.

The Committee directs EERE to carry out the Grid-interactive Efficient Buildings [GEB] program to ensure that a high level of energy efficiency is a core element of the program and a baseline characteristic for GEBs, which are also connected, smart, and flexible. EERE shall engage with the public and private sectors, includ-

ing the building and manufacturing industries and State and local Governments, to share information on GEB technologies, costs, and benefits, and to provide information to position American companies to lead in this area. In addition, EERE is reminded to follow the National Technology Transfer and Advancement Act and related guidance in testing and applying relevant existing and emerging standards developed by non-governmental organizations.

Within available funds, the Committee recommends not less than $60,000,000 for the Residential Building Integration program, including not less than $5,000,000 for grid-interactive efficient buildings. The Department is encouraged to include partnerships with cities, States, affordable housing entities, utilities, manufacturers, and others to spur innovative approaches and drive investment in home energy upgrades. The Committee recommends these funds to advance building upgrades and weatherization of homes, as well as to advance work in grid-integrated efficient buildings and inclusion of smart grid systems, demand flexibility and new initiatives in workforce training to ensure the technology and research findings reach practitioners. The Committee encourages funding to be concentrated on industry teams to facilitate research, demonstrate and test new systems, and facilitate widespread deployment and dissemination of information and best practices through direct engagement with builders, the construction trades, equipment manufacturers, smart grid technology and systems suppliers, integrators, and State and local Governments and other market transformation activities. Further, the Committee recommends funding to facilitate deep whole-house energy efficiency retrofits, particularly those using innovations from the Advanced Building Construction Initiative, such as demonstrations, outreach, engagement, and training to private sector contractors, including continuing efforts to advance smart home technology.

The Committee recognizes the importance of improving internal and external environments at K–12 schools. In order to ensure the Administration is providing the most comprehensive information regarding Federal opportunities for assistance to schools, the Committee directs the Department to update the requirements and report required by Section 1001 of the Energy Act of 2020, Division Z, Public Law 116–260, the Consolidated Appropriations Act of 2021. The Department shall include all new and existing Federal opportunities for schools to improve their environments for our students.

Significant research and development gaps remain to transition lower-carbon and zero-carbon fuels in buildings. The Department is encouraged to continue exploring research and development that can advance systems and appliances, driven by delivered fuels including renewable fuels and hydrogen, to meet consumer demands for high efficiency and environmentally friendly products in residential and commercial building applications, including heat pumps with power generation and water heating, increased utilization of renewable fuels and hydrogen, appliance venting, hybrid fuel-fired and electrically-driven systems, distributed carbon capture, mitigation of behind-the-meter methane emissions, and onsite (micro) combined heat and power to include cooling and integration with renewables.

ing the building and manufacturing industries and State and local Governments, to share information on GEB technologies, costs, and benefits, and to provide information to position American companies to lead in this area. In addition, EERE is reminded to follow the National Technology Transfer and Advancement Act and related guidance in testing and applying relevant existing and emerging standards developed by non-governmental organizations.

Within available funds, the Committee recommends not less than $60,000,000 for the Residential Building Integration program, including not less than $5,000,000 for grid-interactive efficient buildings. The Department is encouraged to include partnerships with cities, States, affordable housing entities, utilities, manufacturers, and others to spur innovative approaches and drive investment in home energy upgrades. The Committee recommends these funds to advance building upgrades and weatherization of homes, as well as to advance work in grid-integrated efficient buildings and inclusion of smart grid systems, demand flexibility and new initiatives in workforce training to ensure the technology and research findings reach practitioners. The Committee encourages funding to be concentrated on industry teams to facilitate research, demonstrate and test new systems, and facilitate widespread deployment and dissemination of information and best practices through direct engagement with builders, the construction trades, equipment manufacturers, smart grid technology and systems suppliers, integrators, and State and local Governments and other market transformation activities. Further, the Committee recommends funding to facilitate deep whole-house energy efficiency retrofits, particularly those using innovations from the Advanced Building Construction Initiative, such as demonstrations, outreach, engagement, and training to private sector contractors, including continuing efforts to advance smart home technology.

The Committee recognizes the importance of improving internal and external environments at K–12 schools. In order to ensure the Administration is providing the most comprehensive information regarding Federal opportunities for assistance to schools, the Committee directs the Department to update the requirements and report required by Section 1001 of the Energy Act of 2020, Division Z, Public Law 116–260, the Consolidated Appropriations Act of 2021. The Department shall include all new and existing Federal opportunities for schools to improve their environments for our students.

Significant research and development gaps remain to transition lower-carbon and zero-carbon fuels in buildings. The Department is encouraged to continue exploring research and development that can advance systems and appliances, driven by delivered fuels including renewable fuels and hydrogen, to meet consumer demands for high efficiency and environmentally friendly products in residential and commercial building applications, including heat pumps with power generation and water heating, increased utilization of renewable fuels and hydrogen, appliance venting, hybrid fuel-fired and electrically-driven systems, distributed carbon capture, mitigation of behind-the-meter methane emissions, and onsite (micro) combined heat and power to include cooling and integration with renewables.

Within available funds, the Committee recommends not less than $70,000,000 for the Commercial Building Integration program for core research and development of more cost-effective integration techniques and technologies that could help the transition toward deep retrofits. In addition, the Committee encourages the Department to increase engagement with private sector stakeholders to develop market-transforming policies and investments in commercial building retrofits.

The Committee recommends up to $40,000,000 to develop programs to support a skilled, robust, diverse, and nationally representative building energy efficiency and building energy retrofit workforce. The Department is encouraged to work with 2-year community and technical colleges, labor, and nongovernmental and industry consortia to advance job training programs and to collaborate with the Department of Education, the Department of Labor, and the residential and commercial efficiency building industry to ensure support is reaching small energy efficiency businesses that have had difficult accessing Federal workforce support.

STATE AND COMMUNITY ENERGY PROGRAMS

The Committee recommends $493,000,000 for State and Community Energy Programs including $22,000,000 for program direction.

Within this amount, $326,000,000 is recommended for the Weatherization Assistance Program [WAP], $10,000,000 for Training and Technical Assistance, and $30,000,000 for the Weatherization Readiness Fund.

The Committee notes that the Department is working to update the Weatherization Assistance Program and encourages the Department to update the calculation of the Savings-to-Investment Ratio [SIR] to reflect total whole home savings and to account for the total value measures that keep homes prepared for future climate conditions. The Committee also encourages the Department to continue its work enabling States to create priority lists of measures to reduce energy audit time and increase the rate of production.

The Committee recommends $66,000,000 for State Energy Program [SEP] grants. The Committee encourages the Department to work with all relevant stakeholders to identify efficiencies for delivering weatherization services and examine options to streamline policies and procedures when other funding sources are utilized in conjunction with funds from the Department. Within available funds, the Committee directs the Department to encourage States to prioritize funding for initiatives that promote green, healthy, and climate resilient schools, libraries, and other public buildings.

The Committee supports WAP's continued participation in the interagency working group on Healthy Homes and Energy with the Department of Housing and Urban Development. The Department is encouraged to further coordinate with the Office of Lead Hazard Control and Healthy Homes on energy-related housing projects. The Committee encourages the Department to begin tracking the occurrence of window replacements, which supports the reduction of lead-based paint hazards in homes.

The Committee recognizes the importance of providing Federal funds under the Weatherization and Intergovernmental Program to

States and Tribes in a timely manner to avoid any undue delay of services to eligible low-income households, and to encourage local high-impact energy efficiency and renewable energy initiatives and energy emergency preparedness. Therefore, the Department is encouraged to ensure application guidance is released to States, Tribes and other direct grantees not later than 60 days after enactment of this act. The Department is also encouraged to obligate formula grant funds recommended for WAP and SEP to States, Tribes, and other direct grantees not later than each State's agree upon program year start date. The Committee is concerned with the reduction of mission-critical staff at the Office of Weatherization and Intergovernmental Programs and directs the office to achieve staffing levels that will allow it to provide robust training, technical assistance, and oversight for WAP and SEP.

The Committee continues to support WAP grant recipients that have previously worked with the Department's Weatherization Innovation Pilot Program, for the purpose of developing and implementing State and regional programs to treat harmful substances, including vermiculite.

The Department is encouraged to work with all relevant stakeholders to identify efficiencies for delivering weatherization services and examine options to streamline policies and procedures when other funding sources are utilized in conjunction with funds from the Department.

The Department is directed to provide the Committee, not later than 90 days after enactment of this act, a briefing regrading ongoing efforts at the Department to collaborate with the Department of Health and Human Services' Low Income Home Energy Assistance Program [LIHEAP] program and the Department of Housing and Urban Development's HOME Investment Partnerships Program [HOME]. The Department is encouraged to work collaboratively with other Federal agencies and to outline ways the various weatherization and home assistance programs can better integrate assistance for structurally deficient but weatherable residences.

MANUFACTURING AND ENERGY SUPPLY CHAINS

The Committee recommends $19,000,000 for the Office of Manufacturing and Energy Supply Chains [MESC] including $1,000,000 for program direction. Within available funds, the Committee recommends up to $15,000,000 for the Industrial Assessment Center [IAC] program. The Committee further directs the Department to apply the additional funding to support regions that are currently designated as underserved through the IAC program.

FEDERAL ENERGY MANAGEMENT PROGRAM

The Committee recommends $57,000,000 for the Federal Energy Management Program including $14,000,000 for program direction. The Committee recommends not less than $20,000,000 for the Department to continue its work through the Assisting Federal Facilities with Energy Conservation Technologies [AFFECT] program. The Committee also recommends $2,000,000 for workforce development and the Performance Based Contract National Resource Initiative.

The Committee directs the Department to continue requiring all AFFECT grant funding to be leveraged through private sector investment in Federal infrastructure to ensure maximum overall investment in resiliency, efficiency, emissions reductions, and security. The Department shall direct funding to projects that attracted at least 10 dollars for each Federal dollar invested and that utilize public-private partnerships like Energy Savings Performance Contracts and Utility Energy Service Contracts.

The Committee also directs the Department to establish an improved process to assist in guiding infrastructure investments through energy performance contracts management, including but not limited to Energy Savings Performance Contracts and Utility Energy Savings Contracts in order to effectively and efficiently reduce costs, reduce greenhouse gas emissions, and improve facilities. The Committee directs the Department to ensure the availability of sufficient acquisition FTEs to address energy saving measures, as well as to streamline and find efficiencies in the approval of projects to continue to provide climate, resilience, and economic benefits.

CORPORATE SUPPORT

Strategic Programs.—The Committee recommends $21,000,000 for Strategic Programs.

Facilities and Infrastructure.—The Committee recommends $57,000,000 for the Energy Materials and Processing at Scale research capability at the National Renewable Energy Laboratory.

CYBERSECURITY, ENERGY SECURITY, AND EMERGENCY RESPONSE

Appropriations, 2023	$200,000,000
Budget estimate, 2024	245,475,000
Committee recommendation	200,000,000

The Committee recommends $200,000,000 for the Office of Cybersecurity, Energy Security, and Emergency Response [CESER]. Within available funds, the Committee recommends $25,000,000 for program direction.

Additional direction related to Department-wide crosscutting initiatives is provided under the heading Crosscutting Initiatives in the front matter of the Department of Energy.

The Department is directed to include an itemization of funding levels below the control point in future budget submissions.

The Committee remains concerned about the longstanding lack of clarity on the Department's cyber research and development responsibilities and directs CESER to coordinate with the Office of Electricity and relevant applied energy offices in clearly defining these program activities. The Department is directed to provide the Committee a briefing on how it will remedy this issue within 90 days of passage of this act.

Recent cyberattacks underscore the importance of preparing a highly trained cybersecurity workforce in the United States. Challenges with cybersecurity require a community of industry, educators, and innovators working together. Collaboration increases relevance for all institutions by keeping pace with the malicious threat. The Department is encouraged to develop cybersecurity con-

sortiums of public-private-partnerships between universities, local and State government, and private industry to develop a community of relevance in cybersecurity workforce development for the energy sector. The Department is directed to provide the Committee a briefing on these consortiums and collaborations within 90 days of passage of this act.

Risk Management Technology and Tools.—The Committee provides $4,000,000 for consequence-driven cyber-informed engineering, and $4,000,000 to support efforts to enable security by design through execution of the National cyber-informed engineering strategy.

CESER is directed to provide energy cybersecurity expertise and capabilities to other Department offices to ensure cybersecurity is integrated by design in energy delivery systems and other energy projects funded by the Department.

The recommendation provides not less than $4,000,000 to conduct a demonstration program of innovative technologies, such as technologies for monitoring vegetation management, to improve grid resiliency from wildfires.

The Committee recommends up to $5,000,000 for university-based research and development of scalable cyber-physical platforms for resilient and secure electric power systems that are flexible, modular, self-healing, and autonomous. This activity should be conducted with the Office of Electricity.

The Committee encourages the establishment of a regional center to foster partnerships between national laboratories, universities, electricity sector utilities, and State and local government entities to identify and mitigate the prevalent and constantly evolving national security threats to regional infrastructure.

Response and Restoration.—The Committee places a high priority on ensuring the protection of the electric grid against cyberattacks and extreme weather events. The Response and Restoration program coordinates a national effort to secure the U.S. energy infrastructure against all hazards, reduce impacts from disruptive events, and assist industry with restoration efforts. The program delivers a range of capabilities including energy sector emergency response and recovery, including emergency response of a cyber nature; near-real-time situational awareness and information sharing about the status of the energy systems to improve risk management; and analysis of evolving threats and hazards to energy infrastructure.

The recommendation provides up to $3,000,000 for regional-scale high-performance computer simulations of earthquake analysis of the energy system. The Committee directs the Department to continue to support this work which is focused on achieving enhanced resilience of the Nation's critical energy system.

Information Sharing, Partnerships, and Exercises.—The Information Sharing, Partnerships, and Exercises program supports energy sector security and resilience through coordination with government and industry partners. This program provides technical assistance that incorporates exercises to strengthen Federal, regional, State, Tribal, and territorial abilities to work together to prepare for and mitigate the effects of an energy sector emergency and fo-

cuses on training the next generation workforce on energy sector risks.

The Committee is supportive of Departmental initiatives focused on cybersecurity risk information-sharing and secure data anonymization and analysis for both operational and information technology components of equipment commonly utilized in both the bulk power system and distribution systems. The Department is encouraged to prioritize enrolling under-resourced electric utilities in such programs, particularly rural electric cooperatives and municipally-owned entities.

ELECTRICITY

Appropriations, 2023	$350,000,000
Budget estimate, 2024	297,475,000
Committee recommendation	290,000,000

The Committee recommends $290,000,000 for the Office of Electricity. Within available funds, the Committee recommends $18,000,000 for program direction.

Additional direction related to Department-wide crosscutting initiatives is provided under the heading Crosscutting Initiatives in the front matter of the Department of Energy.

The fiscal year 2023 Act directed the Department to complete a study related to the ability of the electric system to meet the demand of new electric vehicle charging infrastructure. The study would anticipate the growth in the use of electric vehicles to help meet our climate goals, and would assess how much additional electric generation, transmission, and distribution capacity will need to be added to the electric system to meet demand. The Department is directed to provide this report immediately.

The Department is encouraged to provide assistance to aid electric cooperatives and municipal power utilities to deploy energy storage and micro grid technologies.

GRID CONTROLS AND COMMUNICATIONS

Transmission Reliability and Resilience—Human Operator-Centric Data Analytics and Predictive Models to Secure Critical U.S. Energy Infrastructure.—The Committee provides not less than $4,000,000 for university-based research and development to develop and deploy advanced data analytics and predictive models that incorporate human operator behavior to better understand, predict, prevent, and mitigate cascading failures in power grids.

Energy Delivery Grid Operations Technology.—The Department is encouraged to work with National Labs and relevant stakeholders to help identify viable future grid realization pathways to a large-scale transmission system buildout that would accomplish clean energy goals. The Committee notes that stakeholder engagement will help define new scenarios for analysis to reach grid decarbonization goals cost-effectively and under new high-stress conditions.

Within available funds, the Department is directed develop a national platform to host the data and models necessary to deliver public-private analytics of grid reliability impact of the clean energy transition.

Resilient Distribution Systems.—Within available funds, the Committee directs the Department to continue efforts to support the integration of sensors into the Nation's electric distribution systems, fundamental research and field validation of microgrid controllers and systems, and transactive energy concepts, including studies and evaluations of energy usage behavior in response to price signals. The Committee places a high priority on addressing the challenges facing the electric power grid by developing innovative technologies, tools, and techniques to modernize the distribution portion of the electricity delivery system. Resilient distribution systems pursue strategic investments to improve reliability, resilience, outage, recovery, and operational efficiency, building upon previous and ongoing grid modernization efforts.

The recommendation provides up to $45,000,000 to public utility commissions and State energy offices for technical assistance in understanding distribution planning, interconnection, and modeling of distributed energy sources with their utilities, their customers, and the broader wholesale market. Advanced computing methods and algorithms available at the national laboratories shall be sought for performing more efficient and accurate modeling that accounts for a volatile climate and extreme weather events.

The recommendation provides up to $10,000,000 for a demonstration project with the Department's Grid Sensors and Sensor Analytics program. The demonstration activities may focus on utilizing data from distribution utilities that have deployed advanced metering infrastructure.

Within available funds, the Committee recommends $10,000,000 for coordinated research, development, deployment, and training related to advanced microgrid-enabling technologies, with a focus on underserved and Indigenous communities in remote and islanded areas. The Committee directs the Department to partner with organizations with specialized experience addressing local energy challenges, including community-based organizations and institutions of higher education, with a priority for minority-serving institutions.

Cyber Resilient & Secure Utility Communications Networks.—Within available funds, the Committee encourages the Department to pursue university-based research and development of scalable cyber-physical platforms for hyper-resilient and secure electric power systems that are flexible, modular, self-healing, and autonomous. This activity shall be conducted in coordination with [CESER].

The Committee recognizes that high priority should continue to be placed on addressing challenges that could compromise the electric power grid by developing the innovative technologies, tools, and techniques to modernize the distribution portion of the electricity delivery system. Furthermore, the Committee recommends up to $5,000,000 to the Office of Electricity to partner with utility-led facilities to evaluate and commission new distribution communications and control technologies for a secure smart grid.

The Committee recognizes that the DarkNet project will explore opportunities to get the Nation's critical infrastructure off the Internet and shield the Nation's electricity infrastructure from disruptive cyber penetration. Additionally, expanding the communica-

tion network architecture and developing cutting-edge networking technologies will provide advanced security to the Nation's aging electricity infrastructure.

GRID HARDWARE, COMPONENTS, AND SYSTEMS

Energy Storage.—The Committee urges the Department to continue furthering coordination between the Office of Electricity, the Office of Science, the Office of Energy Efficiency and Renewable Energy, and other Department offices to achieve commercially viable grid-scale battery storage.

The Committee supports optimal operations of the Grid Storage Launchpad.

The recommendation provides not less than $23,000,000 for a competitive pilot demonstration grant program, as authorized in section 3201 of the Energy Act of 2020, for energy storage projects that are wholly U.S.-made, sourced, and supplied. The Department is directed to include large scale commercial development and deployment of long cycle life and their components.

The Committee recognizes the increase in domestic manufacturing opportunities for electric battery production and is aware of the Department's efforts to expand the capabilities, competitiveness, and sustainability of the United States in advanced battery manufacturing. As the Department continues its efforts to scale up a domestic advanced battery supply chain, including battery manufacturing demonstration projects, the Committee encourages the Department to consider advanced battery charge control optimization technologies, beyond traditional CC/CV charging, as outlined by National Renewable Energy Laboratory Strategic Partnership Project Report TP–5700–82532, to dramatically improve battery cycle life and promote critical mineral and material sustainability. This activity should be conducted in coordination with the office of Energy Efficiency and Renewable Energy.

The Committee recognizes the importance of Silane gas in building a competitive domestic advanced battery supply chain and that the limited number of domestic sources for Silane and the potential export of available Silane for foreign use represents a risk to our National security and the development and preservation of domestic critical infrastructure including electrification of transportation, buildings, manufacturing, and grid reliability and resiliency supporting a clean energy transition. Multiple domestic sources of Silane are needed to maintain the country's leadership in advanced batteries and to support the creation of well-paying jobs that will come from building a robust domestic battery industry.

Transformer Resilience and Advanced Components.—The Committee encourages research to reduce costs associated with high voltage direct current converter stations. The Committee recognizes the Department's role in the development of a standardized power electronic converter applied across a range of grid applications, coupled with the need to reduce transmission costs and improve reliability through advanced technological research. The Committee emphasizes the security and economic imperative of fostering and maintaining a robust domestic supply chain of transformers and components, including the largest capacity transformers.

The Secretary shall carry out research to find safe and effective capture and reuse technologies, or safe and effective alternatives, for the use of sulfur hexafluoride in power generation and transmission equipment, including circuit breakers, switchgear, and gas insulated lines.

Applied Grid Transformation Solutions.—Within available funds, the Department is directed to identify and address technical and regulatory barriers impeding grid integration of distributed energy systems to reduce energy costs and improve the resiliency and reliability of the electric grid.

GRID DEPLOYMENT

Appropriations, 2023	$64,707,000
Budget estimate, 2024	106,600,000
Committee recommendation	60,000,000

The Committee recommends $60,000,000 for the Grid Deployment Office. Within available funds, the Committee recommends $6,000,000 for program direction.

Transmission Planning and Permitting.—The Department is directed to consider designating transmission facilities as being in the National interest under Section 216a of the Federal Power Act through the issuance of facility-specific national interest electric transmission corridors.

Distribution and Markets.—Within the available funds, not less than $10,000,000 shall be directed specifically to provide technical assistance and guidance for state Public Utility Commissions and Regional Transmission Organizations to model the operating behavior of, and develop rate or market designs, to incorporate expanded integration of Long Duration Energy Storage resources on the grid.

Within available funds, the Department is directed to provide technical and financial assistance to States and regions to develop market governance, planning and policy, and regulatory development assistance related to the formation, expansion, or improvement of grid regions to ensure a clean, reliable, resilient, and equitable grid. Further, the Department is encouraged to investigate market improvements, specifically to evaluate wholesale market opportunities such as expansion of energy imbalance markets.

The Committee encourages the Department to deploy transmission facilities and related technologies by enhancing the reliability and resilience of the bulk power system, including High voltage direct current [HVDC] transmission networks and interregional connections, and integrating power-generating resources into the electric grid. Further, the Department is encouraged to develop opportunities for connecting areas of high energy resources to areas of high energy demand, including offshore transmission, and for linking together transmission planning regions and other activities that would ensure deployment of bulk power across a national electric grid.

The Fiscal Year 2023 Act directed the Department to complete a report that explores the obstacles and opportunities for adoption of information technology modernization technologies by utilities bound by the current cost-of-service regulatory model. Further, the report shall include the current treatment of the adoption of such

technologies in rate recovery. The Department is directed to provide this report immediately.

NUCLEAR ENERGY

Appropriations, 2023	$1,773,000,000
Budget estimate, 2024	1,562,620,000
Committee recommendation	1,550,887,000

The Committee recommends $1,550,887,000 for Nuclear Energy. Within available funds, the Committee recommends $85,500,000 for program direction.

The Department is reminded that it does not have authority to redirect any appropriations between control points. Transfer or reprogramming of funds requires Congressional approval. The Department may not repurpose or re-scope projects identified in control points without prior Congressional notification.

Advanced Nuclear Materials.—The Committee recommends up to $5,000,000 for the Department to continue its work on material testing, including work with national labs, the electric power industry, and other institutions of higher education to support advanced manufacturing and the development and qualification of high-performance materials with improved high temperature strength and resistance to corrosion and irradiation effects for use in advanced nuclear reactors. Test programs shall be conducted to assess and capture a broad range of environmental data necessary to inform component design, life predictions, and regulatory acceptance. Facilities for component and system testing at-scale and in prototypic non-aqueous environments shall be established to develop a supply chain from material supply to component manufacturing and system demonstration.

NEUP, SBIR/STTR, and TCF.—The recommendation continues a separate control point to fund NEUP and other crosscutting program responsibilities [SBIR, STTR, and TCF]. The Department is directed to provide to the Committee prior to the obligation of these funds a detailed spending and execution plan for NEUP activities. The Department is directed to provide to the Committee not later 90 days after enactment of this act a briefing on the implementation of NEUP. The Fiscal Year 2023 Act directed the Department to provide the Committee a report detailing the needs of university reactor refurbishments and the potential need to upgrade or build additional university reactors. The report shall include a detailed plan including total lifecycle costs and associated funding profiles for potential new university reactors. As in fiscal year 2023, the Committee does not provide funds for the planning and construction of new university nuclear reactors, until it can review the required report. Further, within available funds for NEUP, SBIR/STTR, and TCF, the Committee recommends $6,500,000 for the University Nuclear Leadership Program, previously funded as the Integrated University Program. The Committee notes the importance of this program, in developing highly qualified nuclear specialists to meet national needs. Further, the Committee notes its support for the diversification of financial assistance it provides through the program to include supporting nontechnical nuclear research that serves to increase community participation and confidence in nuclear energy systems.

The Committee recognizes the importance of creating a domestic graphite supply for the nuclear energy industry. The Department is encouraged to explore activities to secure a domestic supply of nuclear grade graphite at synthetic graphite facilities that are U.S.-based and U.S.-owned.

NUCLEAR ENERGY ENABLING TECHNOLOGIES

The Committee recommendation provides up to $8,000,000 for integrated energy systems, including projects with hydrogen co-located with nuclear.

Joint Modeling and Simulation Program.—The Committee recommendation continues the requirement that use and application of the codes and tools shall be funded by the end user, not the Joint Modeling and Simulation Program.

Nuclear Science User Facilities.—The recommendation includes up to $12,000,000 for computational support.

FUEL CYCLE RESEARCH, DEVELOPMENT, AND DEMONSTRATION

To support availability of high-assay low-enriched uranium [HALEU] and other advanced nuclear fuels, consistent with section 2001 of the Energy Act of 2020, the recommendation includes $150,500,000, including $1,500,000 for Mining, Shipping, and Transportation; $125,000,000 for Advanced Nuclear Fuel Availability; and not less than $24,000,000 within Material Recovery and Waste Form Development.

Advanced Nuclear Fuel Availability.—The Committee supports the budget request for the Advanced Nuclear Fuel Availability program. The Committee encourages the Department to ensure that all federally-funded transfers and shipments of uranium hexafluoride and depleted uranium hexafluoride, shall to the extent practicable, use American manufactured shipping cylinders and transportation casks.

The recommendation also includes further funding for the Advanced Nuclear Fuel Availability program derived from unobligated advanced emergency appropriations funding.

The Committee encourages the Department to support the commercialization activities associated with laser enrichment technology in furtherance of expanding U.S. supply of HALEU.

Material Recovery and Waste Form Development.—The Committee recommends $47,000,000 for Material Recovery and Waste Form Development, including not less than $24,000,000 for EBR–II Processing for HALEU. The Department is encouraged to continue activities related to the ZIRCEX process.

Accident Tolerant Fuels.—The Committee recommends $108,900,000 for development of nuclear fuels with enhanced accident-tolerant characteristics to significantly mitigate the potential consequences of a nuclear accident. The recommendation provides not less than $25,000,000 for further development of silicon carbide ceramic matrix composite fuel cladding for light water reactors. The Committee is concerned about the current role the private sector is playing to ensure accident tolerant fuels are commercialized in a timely manner. The Department is directed to provide the Committee a Multi-Year Program Plan no later than 30 days after enactment of this act, discussing how the program can be phased

out and how much further funding is needed to meet its initial goals. The report shall also discuss a timeline for safe and effective review of these new fuels for commercialized use.

TRISO Fuel and Graphite Qualification.—The Committee provides $25,000,000 to continue TRISO fuel and graphite qualification and maintain a base research and development program in support of expanding industry needs for advanced fuels.

Integrated Waste Management System.—The Department is directed to move forward under existing authority to identify a site for a Federal interim storage facility. The Department is further directed to use a consent-based approach when undertaking these activities. The Department is reminded that the Nuclear Waste Policy Act provides for a wide variety of activities that may take place prior to the limitation in that act.

Within available funds, the Committee provides up to $10,000,000 for an advanced metallic fuels program.

REACTOR CONCEPTS RESEARCH, DEVELOPMENT, AND DEMONSTRATION

Advanced Small Modular Reactor Research, Development, and Demonstration.—The Committee supports the budget request which provides no further funding for the existing cooperative agreement DENE0008928. The recommendation includes further funding for ongoing demonstration activities derived from unobligated advanced emergency appropriations funding.

The Department is directed to provide to the Committee not later than 90 days after enactment of this act a briefing on the Tennessee Valley Authority's new nuclear project at the Clinch River Nuclear site, including: the Department's investment to date in the TVA Clinch River Nuclear site and a detailed breakdown of what further Federal support would be needed to deploy new nuclear technology at the Clinch River Nuclear site.

Advanced Reactor Technologies.—The Committee recommends up to $5,000,000 for continued work on the Supercritical Transformational Electric Power Research and Development. The Committee supports the collaboration between the national laboratories and industry partners to develop and validate sCO_2 power conversion specifically for modular micronuclear reactors by spring of 2024. This work will continue to be coordinated with the Office of Fossil Energy and Carbon Management.

The Committee recommends up to $20,000,000 for MARVEL. The Committee recommends up to $20,000,000 for MW-scale reactor research and development. The Department is encouraged to move expeditiously on the solicitation and award of these funds and to streamline its procurement process to ensure implementation is not delayed.

The Committee supports the work being done by the Laboratory Research and Development Program, including work to conduct research for advanced fast reactor technologies development in support of commercial deployment and national priorities.

Light Water Reactor Sustainability.—The most cost-effective way for the United States to maintain low-cost, carbon-free electricity is to safely extend the lives of our Nation's existing nuclear reactors from 60 to 80 years. The Committee encourages the Depart-

ment to maximize benefits of the operating light water reactor fleet under the program.

Advanced Reactor Concepts Industry Awards.—The Advanced Reactor Concepts [ARC] program provided a platform to support innovative advanced reactor designs early in the research phase. The Committee rejects the budget request to eliminate the program and supports the current awards and original contracts set to be completed in 2024. Upon completion of the current awards, no further awards shall be given under this program.

ADVANCED REACTOR DEMONSTRATION PROGRAM

The primary goal of this program is to focus government and industry resources on actual construction of real demonstration reactors that are safe and affordable (to build and operate) in the near and mid-term. It is clear that original goals to deliver advanced reactor demos in the original five to seven year timeline is no longer attainable. The Department is directed to provide to the Committee not later than 180 days after enactment of this act information on the impacts of cost escalations on the Advanced Reactor Demonstration Program [ARDP] projects, including an assessment of additional resources and time needed to successfully complete projects and how those resources may be obtained by the project partners. The report shall also discuss the causes behind the current delays and cost overruns and steps to remedy them. Further, the Committee encourages the Department to consider including the Milestone-Based Demonstration Projects approach as authorized in section 9005 of the Energy Act of 2020 for existing ARDP awards. Finally, the Department is directed to clearly articulate future funding needs for the programs within the ARDP in future budget requests.

National Reactor Innovation Center.—The recommendation includes capital design and construction activities for demonstration reactor test bed preparation at Idaho National Laboratory supporting advanced reactor demonstration activities, including providing $32,000,000 for the continued design and construction for the NRIC LOTUS Test Bed. The Department is directed to provide to the Committee not later than 90 days after enactment of this act a briefing on the support and proposed activities, timelines for these activities, and expected out year costs of the National Reactor Innovation Center.

Regulatory Development.—Within available funds, the Committee recommends up to $10,000,000 for the Advanced Nuclear Licensing Energy Cost-Share Grant Program as authorized under 42 U.S.C. 16280. The Department shall coordinate this work will be coordinated with the financial and technical assistance for reactor siting feasibility studies activities.

INFRASTRUCTURE

INL Facilities Operations and Maintenance.—The recommendation provides $318,924,000 for INL Facilities Operations and Maintenance.

Within available funds, the Committee provides up to $5,000,000 for Reactor Fuels Research Capability.

Idaho Sitewide Safeguard and Security.—The recommendation provides $150,000,000 for Idaho Sitewide Safeguards and Security.

FOSSIL ENERGY AND CARBON MANAGEMENT

Appropriations, 2023	$890,000,000
Budget estimate, 2024	905,475,000
Committee recommendation	892,000,000

The Committee recommends $892,000,000 for Fossil Energy Research and Development. Within available funds, the Committee recommends $79,000,000 for program direction.

Additional direction related to Department-wide crosscutting initiatives is provided under the heading Crosscutting Initiatives in the front matter of the Department of Energy.

The Committee continues to support the budget request, which refocuses funding toward industrial emission reduction and climate-centric activities focused on decarbonization. The Department is encouraged to prioritize Carbon Capture Utilization and Storage [CCUS] funding on projects and research that look to reduce the cost of these technologies for commercial deployment.

The Propane Education and Research Act [PERA] of 1996 authorized the establishment of the Propane Education and Research Council [PERC], which is known as a Federal "checkoff program" designed to support R&D for the propane industry. PERA authorizes the propane industry to collect a fee (currently $.005) on every gallon of propane sold in the U.S. and spend the majority of funds on research and development. The Committee is concerned to learn that PERC was potentially spending larger amounts of its funding for "consumer education activities", including on anti-electrification campaigns in New York State. The Committee directs the Department to do a review of this program and whether it is following its underlying statutory authorities and report to the Committee not later than 30 days after enactment of this act on its findings.

Solid Oxide Fuel Cell Systems & Hydrogen.—The recommendation provides not less than $94,000,000 for the research, development, and demonstration of solid oxide fuel cell systems and hydrogen production, transportation, storage, and use. Further, the Committee encourages studies to assess solutions to decrease potential NOx emissions from the direct combustion of hydrogen in natural gas fired power plants. These studies shall be conducted through both laboratory and in-field testing, in geographically diverse areas, and should include participation by electric power research organizations, universities, national labs, environmental organizations, and utilities. The Committee recognizes the importance of advancing solid oxide fuel cell systems, especially for distributed and central power generation electrolysis, combined heat and power, and storage applications.

University Training and Research.—The Committee supports the Department's efforts to offer undergraduate, graduate, and postgraduate students majoring in STEM disciplines the opportunity to learn about programs, policies, and research, development, demonstration, and deployment initiatives within the Office of Fossil Energy and Carbon Management. Further, the Committee continues to support the control point for the University Training and Research [UTR], which comprises funding for University Coal Re-

search [UCR], Historically Black Colleges and Universities [HBCUs] and other Minority Serving Institutions.

Interagency Working Group on Coal and Power Plant Communities and Economic Revitalization.—The working group is directed to convene relevant stakeholders to discuss waterway freight diversification and economic development in the Ohio, Allegheny, and Monongahela River Corridor.

The Committee supports the continuation of the Energy Department's Cooperative Agreements to develop cost sharing partnerships to conduct basic, fundamental, and applied research that assist industry in developing, deploying, and commercializing efficient, low-carbon, nonpolluting energy technologies that could compete effectively in meeting requirements for clean fuels, chemical feedstocks, electricity, and water resources.

CARBON MANAGEMENT TECHNOLOGIES

CCUS is a process that captures carbon dioxide emissions from sources and either reuses or stores it so it will not enter the atmosphere. The potential for these technologies is considerable, and the use of these technologies will decrease the costs for mitigating climate change in addition to deploying clean energy and energy efficient technologies. The Committee recognizes the benefits of developing carbon capture technologies across multiple sources, including for carbon dioxide removal technologies, and directs the Secretary to invest in a research and development portfolio of carbon capture technologies that will lower the cost of carbon capture, utilization, and storage [CCUS] through continued large-scale demonstration and pilot programs.

National Carbon Capture Center.—The Committee recommends funding for the Department's National Carbon Capture Center consistent with the cooperative agreement. The Department is directed to use funds within Carbon Management Technologies for research and development across a broad range of technology and fuel applications as it determines to be merited.

The Department is directed to conduct CCUS activities, including front-end engineering and design studies, large pilot projects, and demonstration projects that capture and securely store commercial volumes of carbon dioxide from power plants, industrial facilities, or directly from the air consistent with the objectives of title IV of the Energy Act of 2020.

In order to mitigate the detrimental effects of climate change and to meet net-zero goals, it is necessary to accelerate the use of methods for carbon removal and storage, including the use and management of natural systems to sequester carbon and to store it permanently underground via mineralization processes. The Department is directed to establish a program to support research and development of novel, proof-of-principle carbon containment projects with the goal of finding and de-risking methods and locations to remove atmospheric carbon dioxide that are effective, safe, low cost, and scalable. The recommendation provides up to $35,000,000 to support work at multiple sites to pursue research, development, and deployment of carbon containment technologies, including carbon mineralization, and proximate carbon dioxide capturing systems

that also meet regional economic and ecological restoration policy goals such as catastrophic wildfire mitigation and job creation.

The Committee recognizes the benefits of a clear regulatory process for ocean carbon dioxide removal pathways and provides $250,000 to coordinate with the Council on Environmental Quality [Council] to develop a regulatory framework report that provides clarity and guidance of existing laws and regulations that are relevant for the advancement of ocean carbon dioxide removal pathways. The Department and the Council are encouraged to collaborate with the Bureau of Ocean Energy Management, the U.S. Coast Guard, the Environmental Protection Agency, Fish and Wildlife Service, National Oceanic and Atmospheric Administration, and other relevant agencies to coordinate efforts to develop an ocean carbon dioxide removal regulatory framework report. The report is to be completed by the Council no later than 2 years after the date of enactment of this act.

Carbon Capture.—The recommendation provides $135,000,000 for carbon capture. Within available funds, the Committee recommends up to $55,000,000 to support front-end engineering and design studies, large pilot projects, and demonstration projects for all application of carbon capture technologies. The Department is directed to focus on point source capture for industrial sources and small-scale pilots and demos.

Further, within available funds, the Committee provides up to $28,000,000 for Gas Post-Combustion Capture and up to $33,000,000 for Coal and Gas Pre-Combustion Capture.

The Department is encouraged to design and test a system to attach to an engine in on-road or off-road applications with the objective of removing carbon dioxide from its exhaust and examining how such a system can be designed for existing engines used in hard to decarbonize sectors.

Carbon Dioxide Removal.—Within available funds, the Committee provides $10,000,000 for research, development, and demonstration for research, development, and demonstration related to biological carbon sequestration in deep ocean water through macroalgae and other living marine resources. The Department is directed to report to the Committee within 30 of enactment of this act on whether the Direct Air Capture Hubs as authorized under 42 U.S. Code 16298d should be broadened to include other forms of carbon removal.

Carbon Dioxide Conversion.—The Committee supports the research, development, and demonstration program for carbon utilization to advance valuable and innovative uses of captured carbon, including bio-catalyzed, electrochemical, photochemical, thermochemical, and photosynthetic conversion of carbon dioxide to higher-value products such as chemicals, plastics, building materials, and fuels. The Committee provides $7,000,000 for research and demonstration of carbon conversion in durable building materials and not less than $2,000,000 to evaluate carbon oxide utilization pathways for consideration under section 45Q of title 26 CFR. The Committee supports research, development, and demonstration of these pathways in integrating carbon utilization technologies with power plants, industrial processes, and negative emissions technologies. The Secretary is also encouraged to coordinate with

the General Services Administration and the Department of Transportation to support the development of lifecycle assessment frameworks for the procurement of low-carbon construction material.

Carbon Transport and Storage.—The Committee recognizes the successful work of the Regional Carbon Sequestration Partnerships and the important role they play in supporting the research and development of carbon capture, utilization, transportation, and storage. The Committee supports an expanded focus on infrastructure development strategies through continued regional geological characterization to reduce uncertainties, collect data, and facilitate and inform regional permitting and policy challenges. The Department is directed to fulfill prior commitments to the Regional Carbon Sequestration Partnerships. The recommendation provides not less than $35,000,000 for CarbonSAFE and not less than $25,000,000 for the Regional Carbon Sequestration Partnerships. The Department is directed to expeditiously award the fiscal year 2023 funds and to provide the Committee regular updates on these activities. Further, the Committee supports a multiyear solicitation to competitively select at least four partnerships, with each partnership covering multiple basins and multiple States. The competitive solicitation shall encourage extensive engagement of coinvested stakeholders, including companies that emit, transport, utilize and store carbon dioxide, as well as state, Tribal and local governments.

The Committee includes not less than $5,000,000 to continue efforts to support natural gas demand response pilot programs.

Hydrogen and Carbon Management.—The Committee encourages continued work on coal and coal biomass to both liquids and solids activities and encourages the Department to focus on research and development to improve cost and efficiency of coal-to-fuels technology implementation and polygeneration.

The Committee encourages the Department to continue expanding its research and demonstration capabilities toward production, storage, transport, and utilization of hydrogen. This work shall focus on net-negative carbon hydrogen production from gasification and co-gasification of mixed wastes, biomass, plastics and traditional feedstocks, solid oxide electrolysis cell technology development, carbon capture, advanced turbines, natural gas-based hydrogen production, hydrogen pipeline infrastructure, and subsurface hydrogen storage. Research on emerging technologies with low-cost CO_2 capture, such as dry reforming and sorbent enhanced reforming, should be addressed.

The Committee encourages the Department to support research, development, and demonstration activities related to clean hydrogen production with fossil fuel feedstock with the objectives of reducing CO_2 and conventional emissions from hydrogen production and electric power generation. The Department is encouraged to fund research and development of technologies that have the potential to achieve these objectives, including steam methane reforming [SMR] with carbon capture, autothermal reforming [ATR] with carbon capture, sorption enhanced steam methane reforming [SER], natural gas pyrolysis, thermal pyrolysis, catalytic pyrolysis, direct hydrogen production with chemical looping, partial oxidation gas reforming, electric reforming, gasification of solid fuels with biomass co-firing, chemical looping partial oxidation, direct hydrogen

production integrated with direct sCO_2 cycle, and any other technologies deemed relevant by the Secretary.

RESOURCE TECHNOLOGIES AND SUSTAINABILITY

Advanced Remediation Technologies.—The Committee recommends up to $7,000,000 for the Risk Based Data Management System, and in particular, it's functions under FracFocus. The Committee also believes FracFocus should maintain its autonomy and not be incorporated into any Federal agency.

The Committee provides up to $10,000,000 for university research and field investigations in the Gulf of Mexico to confirm the nature, regional context, and hydrocarbon system behavior of gas hydrate deposits.

The Department is encouraged to support continued research and technology development to develop natural resources in the most environmentally prudent way possible. The Committee provides $19,000,000 for Unconventional Field Test Sites. The Department is directed to maintain robust efforts in enhanced recovery technologies.

Methane Mitigation Technologies.—The recommendation provides $58,000,000 for Methane Mitigation Technologies, which includes activities previously funded through Emissions Mitigation from Midstream Infrastructure and Emissions Quantification from Natural Gas Infrastructure. The Committee supports advanced methane mitigation solutions and novel sensor technologies that allow for continuous and remote monitoring of emissions for upstream, midstream and distribution gas infrastructure. Further, the Committee remains supportive of investment in smart pipeline sensors and controls, internal pipeline inspection and repair, and composite and advanced material science technologies.

The Department is encouraged to collaborate with external stakeholders in making use of commercial assets to monitor methane emissions from satellites and other methane emissions detection technologies to isolate the source of emissions at the individual facility level and to explore technologies, including in coordination with public-private partnerships, that promote innovative approaches, such as detection technologies in support of reducing methane gas emissions. The recommendation provides not less than $5,000,000 for advanced observational technologies, as validated in peer-reviewed publications, to globally identify and mitigate methane and volatile organic compound emissions from existing operations assisting worldwide partners and governments deploy targeted reduction measures. Further, the Department is directed to brief the Committee within 180 days of enactment of this act on the progress for this work.

The Committee recognizes that the several million orphaned (unplugged and abandoned) wells in the U.S. are a significant source of fugitive methane emissions. A rapid, cost-effective method is needed for suppressing these emissions before the wells can be properly plugged and abandoned. The Committee recommends up to $6,000,000 for university-led research and development of biofilm based reactive barrier technologies that can significantly reduce atmospheric methane emissions from orphaned wells.

Natural Gas Decarbonization and Hydrogen Technologies.—Within available funds, the Committee recommends up to $8,000,000 for a demonstration project focused on producing hydrogen from the processing of produced water and mineral substances, and transporting hydrogen using existing energy infrastructure.

The Committee supports the Department's efforts to utilize natural gas and related infrastructure more effectively for decarbonization solutions, including research to convert natural gas, natural gas liquids and other gas streams to low-carbon, sustainable products, including chemicals and fuels, such as ammonia and hydrogen. Further, the Committee supports comprehensive planning approaches for transitioning segments of the economy using hydrogen and other low-carbon fuels. This planning should include both production, storage, and transportation of these fuels. The Department is encouraged to establish the Center for Sustainable Fuels and Chemicals at the National Energy Technology Lab.

Within available funding, the Committee recommends up to $5,000,000 to address specific issues related to hydrogen storage, including reservoir modeling of hydrogen storage, geochemistry of hydrogen storage, integrity and reliability of well materials exposed to hydrogen, gas removal of impurities, and risk assessment.

The Committee recommends up to $5,000,000 to develop high-precision hydrogen-sensing technologies. This includes the continued development of hydrogen measurement, reporting, and verification systems, as well as protocols and research and development to support the design and manufacture of hydrogen-sensing equipment appropriate for use in safety systems and leak prevention, detection and repair programs across the hydrogen supply chain. Further, the Committee directs the Department to provide a report within 120 days of enactment of this act summarizing its efforts to-date in these areas, and whether it should create monitoring and verification systems, as well as sensing protocols and technologies for potential use in preventing and detecting hydrogen leaks in different contexts (e.g., transportation, industrial plants, pipelines).

The Committee recommends up to $3,000,000 to study the lifecycle emissions of hydrogen, including examining marginal emissions, the indirect greenhouse gas emissions from hydrogen leakage, examining assumptions about upstream leakage of methane, considering a default 20 year global warming potential value, and accounting for the global warming impacts of black and brown carbon particles from natural, and gas mining and flaring.

Mineral Sustainability.—Within available funds, the Committee directs the Department to continue its external agency activities to develop and test advanced separation technologies and accelerate the advancement of commercially viable technologies for the recovery of rare earth elements and minerals from byproduct sources. The Committee expects research to support pilot-scale and experimental activities for near-term applications, which encompass the extraction and recovery of rare earth elements and minerals. The Committee encourages the Department to continue investments to accelerate the advancement of commercially viable technologies for the recovery of rare earth elements and critical minerals, including from lignite. Further, the Committee encourages the Department to

fund a more detailed assessment of lignite resources and to devise cost-effective methods of removing rare earths from lignite.

The Committee is encouraged by the Department's efforts to support the development of resilient critical mineral and rare-earth element supply chains. The Committee recognizes that innovative refining technologies exist and would enable the United States to compete with China on cost, quality, and environmental impact. The Committee encourages the Department to support projects that will enable these critical minerals to remain within the United States to be recycled and refined back to high-purity qualities and grades.

The Department is directed to continue the Carbon Ore, Rare Earths, and Critical Minerals [CORE–CM] Program.

Within available funds, the Committee recommends up to $6,000,000 for the final year of three for the Department in collaboration with the Department of Commerce and U.S. Geological Survey to pilot a research and development project to enhance the security and stability of the rare earth element supply chain. Research shall include approaches to mining of domestic rare earth elements that are critical to U.S. technology development and manufacturing, as well as emphasize environmentally responsible mining practices. The Department is encouraged to partner with universities in these efforts.

The Committee notes the United States Geological Survey's reports on the heavy reliance on foreign countries, especially China, for raw materials used in energy production. The Committee further directs the Department to submit to the Committee within 90 days of enactment of this act, an assessment of the vulnerabilities to the U.S. energy system from foreign reliance for critical and strategic minerals and actions the Department is taking to increase domestic mineral production.

Within available funding, the Department is directed to establish a Carbon Materials Research Initiative to expand the knowledge of coal, coal-wastes, and carbon ore chemistry.

The Committee directs the Department to conduct research, development, and demonstration of advanced technologies in drilling, geophysics, digital and autonomous subsurface operations, in situ mineral extraction, mineral processing, rock comminution, and low- to zero-CO_2 mining. Further, the Department is directed to establish a capability, in consultation with the Department of Commerce, for traceability of critical materials across the supply chain and support a sustainable domestic workforce in responsible mining of critical materials.

The Committee provides up to $10,000,000 for utilizing coal as a precursor for high-value added products at the Carbon Fiber Technology Facility.

NATIONAL ENERGY TECHNOLOGY LABORATORY

No funds may be used to plan, develop, implement, or pursue the consolidation or closure of any NETL sites.

The Committee recommends $89,000,000 for NETL Research and Operations and not less than $55,000,000 for NETL Infrastructure. Further, within NETL Infrastructure, the Department is directed

TECHNOLOGY TRANSITIONS

Appropriations, 2023	$22,098,000
Budget estimate, 2024	56,550,000
Committee recommendation	20,000,000

The Committee recommends $20,000,000 for the Office of Technology Transitions [OTT].

The Committee recognizes the importance of public-private collaboration to achieve the Department's diverse and important missions. Such collaboration is particularly valuable to accelerate commercialization of technologies based on the Department's research and development investments at national laboratories and research universities. Within available funds, the Committee provides $3,500,000 for the creation of a non-governmental Foundation for Energy Security and Innovation [FESI], authorized by section 10691 of Public Law 117167, which includes $1,500,000 to establish the Foundation and $2,000,000 to initially carry out its activities.

CLEAN ENERGY DEMONSTRATIONS

Appropriations, 2023	$89,000,000
Budget estimate, 2024	215,300,000
Committee recommendation	89,000,000

The Committee recommends $89,000,000 for the Office of Clean Energy Demonstrations [OCED]. Within available funds, the Committee recommends $25,000,000 for program direction.

OCED was established to accelerate the maturation of near- and mid-term clean energy technologies and systems with the goal of quicker commercial adoption and increased availability. The Com-

mittee is encouraged by OCED's preliminary plan to conduct administrative and project management responsibilities for technology demonstrations and is directed to continue to provide the Committee quarterly briefings on these efforts. Further, it is expected that the Department avoid the practice of making awards dependent on funding from future years.

The Department is directed to conduct OCED activities on a competitive basis and include cost-share requirements pursuant to section 988 of the Energy Policy Act of 2005. The Committee encourages the Office of Clean Energy Demonstrations prioritize technology demonstrations in high-emitting and historically difficult-to-abate U.S. energy sectors.

With available funds, the Committee recommends the Department, through the Office of Clean Energy Demonstrations, continue to demonstrate hydrogen end uses for transportation, including hydrogen-fueled internal combustion engine production and advanced hydrogen fueling solutions. Further, the Department is encouraged to improve the engine efficiency and power density of hydrogen fueled transportation solutions and fueling station technologies in order to cover a wide range of applications and be a drop-in solution replacement for many of today's diesel applications.

The Committee expects that the Department will make selections for award negotiation by the end of the calendar year 2023 to support the timely development of Regional Clean Hydrogen Hubs.

ADVANCED RESEARCH PROJECTS AGENCY–ENERGY

Appropriations, 2023	$470,000,000
Budget estimate, 2024	650,200,000
Committee recommendation	450,000,000

The Committee recommends $450,000,000 for the Advanced Research Projects Agency–Energy [ARPA–E]. Within available funds, the Committee recommends $37,000,000 for program direction.

The Department is encouraged to disburse funds appropriated for ARPA–E on eligible projects within a reasonable time period, consistent with past practices.

The Department is directed to review all prior ARPA–E awards and conduct an analysis on market value and technology transfer successes and failures. The Department is directed to brief the Committee not later than 180 days after the passage of this act on the findings of this report.

DEPARTMENT OF ENERGY

[In thousands of dollars]

	2023 appropriations	Budget estimate	Committee recommendation	Committee recommendation compared to—	
				2023 appropriations	Budget estimate
ENERGY PROGRAMS					
Industrial Emissions and Technology Coordination					
Industrial Emissions and Technology Coordination	.....	.....	3,500	+3,500	+3,500
ENERGY EFFICIENCY AND RENEWABLE ENERGY					
Sustainable Transportation:					
Vehicle Technologies	455,000	526,942	455,000	.....	−71,942
Bioenergy Technologies	280,000	323,000	280,000	.....	−43,000
Hydrogen and Fuel Cell Technologies	170,000	163,075	163,075	−6,925	.....
Subtotal, Sustainable Transportation	905,000	1,013,017	898,075	−6,925	−114,942
Renewable Energy:					
Solar Energy Technologies	318,000	378,908	318,000	.....	−60,908
Wind Energy Technologies	132,000	385,000	230,674	+98,674	−154,326
Water Power Technologies	179,000	229,769	200,000	+21,000	−29,769
Geothermal Technologies	118,000	216,000	118,000	.....	−98,000
Renewable Energy Grid Integration	45,000	59,066	45,000	.....	−14,066
Subtotal, Renewable Energy	792,000	1,268,743	911,674	+119,674	−357,069
Energy Efficiency:					
Advanced Manufacturing	450,000	.....	.....	−450,000	.....
Industrial Efficiency & Decarbonization Office	.....	394,245	275,000	+275,000	−119,245
Advanced Materials & Manufacturing Technologies Office	.....	241,497	220,000	+220,000	−21,497
Building Technologies	332,000	347,841	332,000	.....	−15,841
Subtotal, Energy Efficiency	782,000	983,583	827,000	+45,000	−156,583
State and Community Energy Programs:					
Weatherization:					
Weatherization Assistance Program	326,000	.....	326,000	.....	+326,000

[In thousands of dollars]

	2023 appropriations	Budget estimate	Committee recommendation	Committee recommendation compared to—	
				2023 appropriations	Budget estimate
Training and Technical Assistance	10,000		10,000		+10,000
Weatherization Readiness Fund	30,000		30,000		+30,000
Subtotal, Weatherization	366,000		366,000		+366,000
State Energy Program	66,000		66,000		+66,000
Local Government Energy Program	12,000		12,000		+12,000
Energy Future Grants	27,000		27,000		+27,000
Program Direction—State and Community Energy Programs			22,000	+22,000	+22,000
Subtotal, State and Community Energy Programs	471,000		493,000	+22,000	+493,000
Manufacturing and Energy Supply Chains:					
Facility and Workforce Assistance	16,000		16,000		+16,000
Energy Sector Industrial Base Technical Assistance	2,000		2,000		+2,000
Program Direction—Manufacturing and Energy Supply Chains			1,000	+1,000	+1,000
Subtotal, Manufacturing and Energy Supply Chains	18,000		19,000	+1,000	+19,000
Federal Energy Management Program:					
Federal Energy Management	29,000		29,000		+29,000
Federal Energy Efficiency Fund	14,000		14,000		+14,000
Program Direction—Federal Energy Management Program			14,000	+14,000	+14,000
Subtotal, Federal Energy Management Program	43,000		57,000	+14,000	+57,000
Corporate Support:					
Facilities and Infrastructure:					
National Renewable Energy Laboratory [NREL]	160,000	185,391	160,000		−25,391
21–EE–001, Energy Materials Processing at Scale (EMAPS)	45,000	57,000	57,000	+12,000	
Establish New National Laboratory		35,000			−35,000
Subtotal, Facilities and Infrastructure	205,000	277,391	217,000	+12,000	−60,391

Program Direction	223,000	225,623	243,000	+20,000	+17,377
Strategic Programs	21,000	57,759	21,000	.....	−36,759
Subtotal, Corporate Support	449,000	560,773	481,000	+32,000	−79,773
Subtotal, Energy Efficiency and Renewable Energy	3,460,000	3,826,116	3,686,749	+226,749	−139,367
TOTAL, ENERGY EFFICENCY AND RENEWABLE ENERGY	3,460,000	3,826,116	3,686,749	+226,749	−139,367
STATE AND COMMUNITY ENERGY PROGRAMS					
Weatherization:					
Weatherization Assistance Program	.....	375,000	.....	.....	−375,000
Training and Technical Assistance	.....	10,000	.....	.....	−10,000
Weatherization Readiness Fund	.....	51,780	.....	.....	−51,780
Subtotal, Weatherization	.....	436,780	.....	.....	−436,780
State Energy Program	.....	75,000	.....	.....	−75,000
Local Government Energy Program	.....	65,000	.....	.....	−65,000
Energy Future Grants	.....	40,000	.....	.....	−40,000
Energy Burden Reduction Pilot	.....	50,000	.....	.....	−50,000
Interagency Working Group	.....	5,000	.....	.....	−5,000
Program Direction	.....	33,220	.....	.....	−33,220
TOTAL, STATE AND COMMUNITY ENERGY PROGRAMS	.....	705,000	.....	.....	−705,000
MANUFACTURING AND ENERGY SUPPLY CHAINS					
Facility and Workforce Assistance	.....	15,490	.....	.....	−15,490
Global Clean Energy Manufacturing Initiative	.....	75,000	.....	.....	−75,000
Defense Production Act	.....	65,000	.....	.....	−65,000
Program Direction	.....	24,000	.....	.....	−24,000
TOTAL, MANUFACTURING AND ENERGY SUPPLY CHAINS	.....	179,490	.....	.....	−179,490
FEDERAL ENERGY MANAGEMENT PROGRAM					
Federal Energy Management	.....	45,000	.....	.....	−45,000
Federal Energy Efficiency Fund	.....	20,000	.....	.....	−20,000
Net-Zero Laboratory Initiative	.....	.....	.....	.....	.....

[In thousands of dollars]

	2023 appropriations	Budget estimate	Committee recommendation	Committee recommendation compared to—	
				2023 appropriations	Budget estimate
Program Direction		17,200			−17,200
TOTAL, FEDERAL ENERGY MANAGEMENT PROGRAM		82,200			−82,200
CYBERSECURITY, ENERGY SECURITY, AND EMERGENCY RESPONSE					
Risk Management Technology and Tools	125,000	135,000	125,000		−10,000
Response and Restoration	23,000	39,000	23,000		−16,000
Preparedness, Policy, and Risk Analysis	26,857	39,000	27,000	+143	−12,000
Program Direction	25,143	32,475	25,000	−143	−7,475
TOTAL, CYBERSECURITY, ENERGY SECURITY, AND EMERGENCY RESPONSE	200,000	245,475	200,000		−45,475
ELECTRICITY					
Grid Controls and Communications:					
Transmission Reliability and Resilience	34,000	42,500	34,000		−8,500
Energy Delivery Grid Operations Technology	31,000	30,000	37,000	+6,000	+7,000
Resilient Distribution Systems	55,000	47,300	52,000	−3,000	+4,700
Cyber Resilient and Secure Utility Communications Networks	15,000	15,000	15,000		
Subtotal, Grid Controls and Communications	135,000	134,800	138,000	+3,000	+3,200
Grid Hardware, Components, and Systems:					
Energy Storage:					
Research	95,000	78,600	95,500	+500	+16,900
Transformer Resilience and Advanced Components	27,500	21,700	21,500	−6,000	−200
Applied Grid Transformation Solutions	10,000	29,700	17,000	+7,000	−12,700
Subtotal, Grid Hardware, Components, and Systems	132,500	130,000	134,000	+1,500	+4,000
Electricity Innovation and Transition		14,000			−14,000

Grid Deployment:					
Grid Planning and Development	16,000	.....	.....	−16,000	.....
Grid Technical Assistance	25,000	.....	.....	−25,000	.....
Wholesale Electricity Market Technical Assistance and Grants	16,500	.....	.....	−16,500	.....
Interregional and Offshore Transmission Planning	2,000	.....	.....	−2,000	.....
Subtotal, Grid Deployment	59,500	.....	.....	−59,500	.....
Transmission Permitting and Technical Assistance	.....	.....	.....	.....	.....
Program Direction	23,000	18,675	18,000	−5,000	−675
Congressionally Directed Spending	.....	.....	.....	.....	.....
TOTAL, ELECTRICITY	350,000	297,475	290,000	−60,000	−7,475
GRID DEPLOYMENT					
Transmission Planning & Permitting	43,000	56,500	38,250	−4,750	−18,250
Distribution & Markets	16,500	36,750	15,500	−1,000	−21,250
Hydropower Incentives	.....	250	250	+250	.....
Program Direction	.....	13,100	6,000	+6,000	−7,100
TOTAL, GRID DEPLOYMENT OFFICE	59,500	106,600	60,000	+500	−46,600
NUCLEAR ENERGY					
Nuclear Energy Enabling Technologies:					
Crosscutting Technology Development	32,000	32,778	32,778	+778	.....
Joint Modeling and Simulation Program	28,500	28,500	28,500	.....	.....
Nuclear Science User Facilities	35,000	35,000	35,000	.....	.....
Subtotal, Nuclear Energy Enabling Technologies	95,500	96,278	96,278	+778	.....
Fuel Cycle Research and Development:					
Front End Fuel Cycle:					
Mining, Conversion, and Transportation	2,000	1,500	1,500	−500	.....
Advanced Nuclear Fuel Availability	.....	120,000	125,000	+125,000	+5,000
Subtotal, Front End Fuel Cycle	2,000	121,500	126,500	+124,500	+5,000
Material Recovery and Waste Form Development	45,000	39,000	47,000	+2,000	+8,000

DEPARTMENT OF ENERGY—Continued

[In thousands of dollars]

	2023 appropriations	Budget estimate	Committee recommendation	Committee recommendation compared to—	
				2023 appropriations	Budget estimate
Advanced Fuels:					
Accident Tolerant Fuels	114,000	108,900	108,900	−5,100	
Triso Fuel and Graphite Qualification	32,000	25,000	28,000	−4,000	+3,000
Subtotal, Advanced Fuels	146,000	133,900	136,900	−9,100	+3,000
Fuel Cycle Laboratory R&D	29,000	29,000	29,000		
Used Nuclear Fuel Disposition R&D	47,000	46,875	46,875	−125	
Integrated Waste Management System	53,000	53,000	53,000		
Subtotal, Fuel Cycle Research and Development	322,000	423,275	439,275	+117,275	+16,000
Reactor Concepts RD&D:					
Advanced Small Modular Reactor RD&D	165,000	20,000	20,000	−145,000	
Light Water Reactor Sustainability	45,000	35,000	35,000	−10,000	
Advanced Reactor Technologies	49,000	43,200	54,000	+5,000	+10,800
Subtotal, Reactor Concepts RD&D	259,000	98,200	109,000	−150,000	+10,800
Advanced Reactors Demonstration Program:					
National Reactor Innovation Center	50,000	34,000	36,000	−14,000	+2,000
23–E–200 Laboratory for Operations and Testing in the United States	20,000	32,000	32,000	+12,000	
Demonstration 1			2,000	+2,000	+2,000
Demonstration 2			2,000	+2,000	+2,000
Risk Reduction for Future Demonstrations		120,000	120,000	+120,000	
Regulatory Development	10,250	11,000	16,000	+5,750	+5,000
Advanced Reactors Safeguards	4,750	6,000	6,000	+1,250	
Subtotal, Advanced Reactors Demonstration Program	85,000	203,000	214,000	+129,000	+11,000
Infrastructure:					
ORNL Nuclear Facilities O&M	20,000			−20,000	

INL Facilities Operations and Maintenance	318,924	318,924	318,924	.....	.....
Construction:					
16–E–200 Sample Preparation Laboratory, INL	7,300	.....	.....	−7,300	.....
Subtotal, Construction	7,300	.....	.....	−7,300	.....
Subtotal, Infrastructure	346,224	318,924	318,924	−27,300	.....
Idaho Sitewide Safeguards and Security	150,000	177,733	150,000	.....	−27,733
International Nuclear Energy Cooperation	.....	13,000	4,000	+4,000	−9,000
Program Direction	85,000	85,500	85,500	+500	.....
NEUP, SBIR/STTR, and TCF	130,276	146,710	133,910	+3,634	−12,800
Directed R&D and University Programs	.....	.....	.....	.....	.....
TOTAL, NUCLEAR ENERGY	1,473,000	1,562,620	1,550,887	+77,887	−11,733
FOSSIL ENERGY AND CARBON MANAGEMENT					
Carbon Management Technologies:					
Carbon Capture	135,000	144,000	135,000	.....	−9,000
Carbon Dioxide Removal	70,000	70,000	74,000	+4,000	+4,000
Carbon Dioxide Conversion	50,000	50,000	50,000	.....	.....
Carbon Transport and Storage	110,000	110,000	106,000	−4,000	−4,000
Hydrogen with Carbon Management	95,000	85,000	95,000	.....	+10,000
Carbon Management—Policy, Analysis, and Engagement	.....	5,000	2,000	+2,000	−3,000
Subtotal, Carbon Management Technologies	460,000	464,000	462,000	+2,000	−2,000
Advanced Remediation Technologies	55,000	13,000	46,000	−9,000	+33,000
Methane Mitigation Technologies	60,000	100,000	58,000	−2,000	−42,000
Natural Gas Decarbonization and Hydrogen Technologies	26,000	20,000	25,000	−1,000	+5,000
Mineral Sustainability	54,000	45,000	54,000	.....	+9,000
Resource Sustainability—Analysis and Engagement	.....	1,000	.....	.....	−1,000
Subtotal, Resource Technologies and Sustainability	195,000	179,000	183,000	−12,000	+4,000
Energy Asset Transformation	6,000	6,000	6,000	.....	.....
Program Direction	70,000	92,475	79,000	+9,000	−13,475
Special Recruitment Programs	1,000	1,000	1,000	.....	.....
University Training and Research	13,000	19,000	12,000	−1,000	−7,000
NETL Research and Operations	87,000	89,000	89,000	+2,000	.....
NETL Infrastructure	55,000	55,000	55,000	.....	.....
Interagency Working Group	3,000	.....	5,000	+2,000	+5,000
TOTAL, FOSSIL ENERGY AND CARBON MANAGEMENT	890,000	905,475	892,000	+2,000	−13,475

TECHNOLOGY TRANSITIONS					
Foundation for Energy Security and Innovation	.....	31,000	3,500	+3,500	−27,500
Technology Transitions Programs	8,915	11,911	5,000	−3,915	−6,911
Program Direction	13,183	13,639	11,500	−1,683	−2,139
TOTAL, TECHNOLOGY TRANSITIONS	22,098	56,550	20,000	−2,098	−36,550
CLEAN ENERGY DEMONSTRATIONS					
Demonstrations	64,000	170,000	64,000	.....	−106,000
Program Direction	25,000	45,300	25,000	.....	−20,300
TOTAL, CLEAN ENERGY DEMONSTRATIONS	89,000	215,300	89,000	.....	−126,300
ADVANCED RESEARCH PROJECTS AGENCY–ENERGY					
ARPA–E Projects	433,000	595,000	413,000	−20,000	−182,000
Program Direction	37,000	55,200	37,000	.....	−18,200
TOTAL, ARPA–E	470,000	650,200	450,000	−20,000	−200,200
TITLE 17—INNOVATIVE TECHNOLOGY LOAN GUARANTEE PGM					
New Loan Authority	150,000	.....	.....	−150,000	.....
Guaranteed Loan Subsidy (rescission)	−150,000	.....	.....	+150,000	.....
Administrative Costs	66,206	70,000	70,000	+3,794	.....
Offsetting Collections	−35,000	−196,524	−70,000	−35,000	+126,524
TOTAL, TITLE 17—INNOVATIVE TECHNOLOGY LOAN GUARANTEE PROGRAM	31,206	−126,524	.....	−31,206	+126,524
ADVANCED TECHNOLOGY VEHICLES MANUFACTURING LOAN PGM					
Administrative Expenses	9,800	13,000	13,000	+3,200	.....
TOTAL, ADVANCED TECHNOLOGY VEHICLES MANUFACTURING LOAN PROGRAM	9,800	13,000	13,000	+3,200	.....
TRIBAL ENERGY LOAN GUARANTEE PROGRAM					
Guaranteed Loan Subsidy	2,000	.....	.....	−2,000	.....
Administrative Expenses	2,000	6,300	6,300	+4,300	.....
TOTAL, TRIBAL ENERGY LOAN GUARANTEE PROGRAM	4,000	6,300	6,300	+2,300	.....