

FOSSIL ENERGY RESEARCH AND DEVELOPMENT ACT OF
2019

SEPTEMBER 17, 2020.—Committed to the Committee of the Whole House on the
State of the Union and ordered to be printed

Ms. JOHNSON of Texas, from the Committee on Science, Space, and
Technology, submitted the following

R E P O R T

together with

MINORITY VIEWS

[To accompany H.R. 3607]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 3607) to amend the Energy Policy Act of 2005 to direct Federal research in fossil energy and to promote the development and demonstration of environmentally responsible coal and natural gas technologies, and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the bill as amended do pass.

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I. AMENDMENT

The amendment is as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) **SHORT TITLE.**—This Act may be cited as the “Fossil Energy Research and Development Act of 2019”.

(b) **TABLE OF CONTENTS.**—The table of contents for this Act is as follows:

Sec. 1. Short title; table of contents.
Sec. 2. Definitions.
Sec. 3. Fossil energy objectives.
Sec. 4. Carbon capture technologies.
Sec. 5. Natural gas carbon capture research, development, and demonstration program.
Sec. 6. Carbon storage validation and testing.
Sec. 7. Carbon utilization.
Sec. 8. Advanced energy systems.
Sec. 9. Rare earth elements.
Sec. 10. Methane hydrate research amendments.
Sec. 11. Carbon removal.
Sec. 12. Methane leak detection and mitigation.
Sec. 13. Waste gas utilization.
Sec. 14. National energy technology laboratory reforms.
Sec. 15. Climate Solutions Challenges.
Sec. 16. Table of contents amendments.

SEC. 2. DEFINITIONS.

For purposes of this Act:

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

SEC. 3. FOSSIL ENERGY OBJECTIVES.

Section 961 of the Energy Policy Act of 2005 (42 U.S.C. 16291) is amended—

(1) in subsection (a)—

(A) by striking paragraph (2) and inserting the following:
“(2) Decreasing the cost of emissions control technologies for fossil energy production, generation, and delivery.”;

(B) by striking paragraph (7) and inserting the following:
“(7) Increasing the export of emissions control technologies from the United States for fossil energy-related equipment, technology, and services.”; and

(C) by adding at the end the following:

“(8) Improving the conversion, use, and storage of carbon oxides.

“(9) Lowering greenhouse gas emissions for all fossil fuel production, generation, delivery, and utilization, to the maximum extent possible.

“(10) Preventing, predicting, monitoring, and mitigating the unintended leaking of methane, carbon dioxide, or other fossil fuel-related emissions into the atmosphere.

“(11) Improving the separation and purification of helium from fossil fuel resources.

“(12) Reducing water use, improving water reuse, and minimizing the surface and subsurface environmental impact in the development of unconventional domestic oil and natural gas resources.

“(13) Developing carbon removal and utilization technologies, products, and methods that result in net reductions in greenhouse gas emissions, including direct air capture and storage and carbon use and reuse for commercial application.”;

(2) in subsection (b), by striking paragraphs (1) through (3) and inserting the following:

“(1) \$825,000,000 for fiscal year 2020;

“(2) \$866,250,000 for fiscal year 2021;

“(3) \$909,563,000 for fiscal year 2022;

“(4) \$955,041,000 for fiscal year 2023; and

“(5) \$1,002,793,000 for fiscal year 2024.”; and

(3) by striking subsections (c) through (e) and inserting the following:

“(c) **PRIORITIZATION.**—In carrying out this section, the Secretary shall prioritize technologies and strategies that have the potential to meet emissions reduction goals in the agreement of the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change.

“(d) **LIMITATION.**—None of the funds authorized under this section may be used for Fossil Energy Environmental Restoration or Import/Export Authorization.”.

SEC. 4. CARBON CAPTURE TECHNOLOGIES.

(a) **CARBON CAPTURE PROGRAM.**—Section 962 of the Energy Policy Act of 2005 (42 U.S.C. 16292) is amended to read as follows:

“SEC. 962. CARBON CAPTURE TECHNOLOGIES.

“(a) **IN GENERAL.**—The Secretary shall conduct a program of research, development, demonstration, and commercial application of carbon capture technologies, which shall include facilitation of the development and use of—

“(1) carbon capture technologies for coal and natural gas;

“(2) innovations to significantly decrease emissions at existing power plants; and

“(3) advanced separation technologies.

“(b) **INVESTMENT.**—As a part of the program under subsection (a), the Secretary shall maintain robust investments in carbon capture technologies for coal and natural gas applications.

“(c) **LARGE-SCALE PILOTS.**—In carrying out this section, the Secretary is encouraged to support pilot projects that test carbon capture technologies on coal and natural gas power and industrial systems below the 100 megawatt scale, consistent with section 988(b).

“(d) **COST AND PERFORMANCE GOALS.**—In carrying out the program under subsection (a), the Secretary shall establish cost and performance goals to assist in the transition of carbon capture research to commercially viable technologies.

“(e) **CARBON CAPTURE PILOT TEST CENTERS.**—

“(1) **IN GENERAL.**—As a part of the program under subsection (a), not later than 1 year after the date of the enactment of the Fossil Energy Research and Development Act of 2019, the Secretary shall award grants to eligible entities for the operation of not less than three Carbon Capture Test Centers (in this subsection, known as the ‘Centers’) to provide unique testing capabilities for innovative carbon capture technologies for power and industrial systems.

“(2) **PURPOSE.**—Each Center shall—

“(A) advance research, development, demonstration, and commercial application of carbon capture technologies for power and industrial systems; and

“(B) test technologies that represent the scale of technology development beyond laboratory testing, but not yet advanced to testing under operational conditions at commercial scale.

“(3) **APPLICATION.**—An entity seeking to operate a Center under this subsection shall submit to the Secretary an application at such time and in such manner as the Secretary may require.

“(4) **PRIORITY CRITERIA.**—In selecting applications to operate a Center under this subsection, the Secretary shall prioritize applicants that—

“(A) have access to existing or planned research facilities with modular technology capabilities;

“(B) are institutions of higher education with established expertise in engineering and design for carbon capture technologies, or partnerships with such institutions;

“(C) have access to existing research and test facilities for pre-combustion, post-combustion, or oxy-combustion technologies; or

“(D) have test capabilities to address scaling challenges of integrating carbon capture technologies with utility scale power plants.

“(5) **CONSIDERATIONS.**—In awarding grants for the operation of the Centers under this subsection, the Secretary shall ensure that—

“(A) the portfolio of Centers includes a diverse representation of regional and resource characteristics; and

“(B) each new Center demonstrates unique research capabilities, unique regional benefits, or new technology development opportunities.

“(6) **SCHEDULE.**—Each grant to operate a Center under this subsection shall be awarded for a term of not more than 5 years, subject to the availability of appropriations. The Secretary may renew such 5-year term without limit, subject to a rigorous merit review.

“(7) **TERMINATION.**—To the extent otherwise authorized by law, the Secretary may eliminate a Center during any 5-year term described in paragraph (6) if such Center is underperforming.

“(f) DEMONSTRATIONS.—

“(1) IN GENERAL.—As a part of the program under subsection (a), the Secretary may provide grants for large-scale demonstration projects for power and industrial systems that test the scale of technology necessary to gain the operational data needed to understand the technical and performance risks of the technology before the application of the technology at commercial scale, in accordance with this subsection.

“(2) ENGINEERING AND DESIGN STUDIES.—The Secretary is authorized to fund front-end engineering and design studies in addition to, or in advance of, issuing an award for a demonstration project under this subsection.

“(3) APPLICATION.—An entity seeking an award to conduct a demonstration project under this subsection shall submit to the Secretary an application at such time and in such manner as the Secretary may require.

“(4) LIMITATIONS.—The Secretary shall only provide an award under this subsection after reviewing each applicant and application regarding—

- “(A) financial strength;
- “(B) construction schedule;
- “(C) market risk; and
- “(D) contractor history.

“(5) REQUIREMENTS.—A demonstration project funded under this subsection shall—

- “(A) utilize technologies that have completed pilot-scale testing or the equivalent, as determined by the Secretary;
- “(B) secure and maintain agreements for the utilization or sequestration of captured carbon dioxide; and
- “(C) upon completion, demonstrate carbon capture technologies on a power or industrial system capable of capturing not less than 100,000 tons of carbon dioxide annually.

“(g) DEFINITION OF POWER SYSTEM.—In this section, the term ‘power system’ means any electricity generating unit that utilizes fossil fuels to generate electricity provided to the electric grid or directly to a consumer.

“(h) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

- “(1) \$300,000,000 for fiscal year 2020;
- “(2) \$315,000,000 for fiscal year 2021;
- “(3) \$330,750,000 for fiscal year 2022;
- “(4) \$347,288,000 for fiscal year 2023; and
- “(5) \$364,652,000 for fiscal year 2024.”.

(b) GAO STUDY.—

(1) IN GENERAL.—Not later than 1 year after the date of enactment of this Act, the Comptroller General of the United States shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report on the results of a study of the Department’s successes, failures, practices, and improvements in carrying out demonstration projects for carbon capture technologies for power and industrial systems. In conducting the study, the Comptroller General shall consider—

- (A) applicant and contractor qualifications;
- (B) project management practices at the Department;
- (C) economic or market changes and other factors impacting project viability;
- (D) completion of third-party agreements, including power purchase agreements and carbon dioxide offtake agreements;
- (E) regulatory challenges; and
- (F) construction challenges.

(2) CONSIDERATION.—The Secretary shall consider any relevant recommendations, as determined by the Secretary, provided in the report required under paragraph (1), and shall adopt such recommendations as the Secretary considers appropriate.

(3) POWER SYSTEM DEFINED.—In this section, the term “power system” means any electricity generating unit that utilizes fossil fuels to generate electricity provided to the electric grid or directly to a consumer.

SEC. 5. NATURAL GAS CARBON CAPTURE RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.

(a) IN GENERAL.—Subtitle F of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16291 et seq.) is amended by adding at the end the following:

“SEC. 969. NATURAL GAS CARBON CAPTURE RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.

“(a) DEFINITIONS.—In this section:

“(1) NATURAL GAS.—The term ‘natural gas’ includes any fuel consisting in whole or in part of—

“(A) natural gas;

“(B) liquid petroleum gas;

“(C) synthetic gas derived from petroleum or natural gas liquids;

“(D) any mixture of natural gas and synthetic gas; or

“(E) any product derived directly from natural gas, including hydrogen.

“(2) QUALIFYING ELECTRIC GENERATION FACILITY.—The term ‘qualifying electric generation facility’ means a facility that generates electric energy through the use of natural gas.

“(3) QUALIFYING TECHNOLOGY.—The term ‘qualifying technology’ means any technology to capture carbon dioxide produced during the generation of electricity from natural gas power systems

“(b) ESTABLISHMENT OF RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.—

“(1) IN GENERAL.—The Secretary shall establish a program under which the Secretary shall, through a competitive, merit-reviewed process, award grants to eligible entities to conduct research, development, and demonstration of qualifying technologies.

“(2) OBJECTIVES.—The objectives of the program established under paragraph (1) shall be—

“(A) to conduct research to accelerate the development of qualifying technologies to reduce the quantity of carbon dioxide emissions released from qualifying electric generation facilities, including—

“(i) pre- and post-combustion capture technologies; and

“(ii) technologies to improve the thermodynamics, kinetics, scalability, durability, and flexibility of carbon capture technologies for use during the generation of electricity from natural gas power systems;

“(B) to expedite and carry out demonstration projects (including pilot projects) for qualifying technologies in partnership with qualifying electric generation facilities in order to demonstrate the technical feasibility and economic potential for commercial deployment of technologies developed pursuant to subparagraph (A); and

“(C) to identify any barriers to the commercial deployment of any qualifying technologies under development pursuant to research conducted pursuant to subparagraph (A).

“(3) ELIGIBLE ENTITIES.—An entity eligible to receive a grant under this subsection is—

“(A) a National Laboratory;

“(B) an institution of higher education;

“(C) a research facility;

“(D) a multi-institutional collaboration; or

“(E) another appropriate entity or combination of any of the entities specified in subparagraphs (A) through (D).

“(c) CARBON CAPTURE FACILITIES DEMONSTRATION PROGRAM.—

“(1) ESTABLISHMENT.—As part of the program established under paragraph (1), the Secretary shall establish a demonstration program under which the Secretary shall, through a competitive, merit-reviewed process, enter into cooperative agreements with entities that submit applications pursuant to paragraph (4) for demonstration or pilot projects to construct and operate, by not later than September 30, 2025, up to five facilities to capture carbon dioxide from qualifying electric generation facilities. The Secretary shall, to the maximum extent practicable, provide technical assistance to any entity seeking to enter into such a cooperative agreement in obtaining any necessary permits and licenses to demonstrate qualifying technologies.

“(2) COOPERATIVE AGREEMENTS.—The Secretary may enter into a cooperative agreement under this subsection with industry stakeholders, including any such industry stakeholder operating in partnership with National Laboratories, institutions of higher education, multi-institutional collaborations, and other appropriate entities.

“(3) GOALS.—Each demonstration or pilot project carried out pursuant to the demonstration program under this subsection shall—

“(A) be designed to further the development of qualifying technologies that may be used by a qualifying electric generation facility;

“(B) be financed in part by the private sector;

“(C) if necessary, secure agreements for the offtake of carbon dioxide emissions captured by qualifying technologies during the project; and

“(D) support energy production in the United States.

“(4) REQUEST FOR APPLICATIONS.—Not later than 120 days after the date of enactment of this Act, the Secretary shall solicit applications for cooperative agreements for projects—

“(A) to demonstrate qualifying technologies at up to five qualifying electric generation facilities; and

“(B) to construct and operate three or more facilities to capture carbon dioxide from a qualifying electric generation facility.

“(5) REVIEW OF APPLICATIONS.—In considering applications submitted under paragraph (4), the Secretary, to the maximum extent practicable, shall—

“(A) ensure a broad geographic distribution of project sites;

“(B) ensure that a broad selection of qualifying electric generation facilities are represented;

“(C) ensure that a broad selection of qualifying technologies are represented;

“(D) require information and knowledge gained by each participant in the demonstration program to be transferred and shared among all participants in the demonstration program; and

“(E) leverage existing—

“(i) public-private partnerships; and

“(ii) Federal resources.

“(d) COST SHARING.—In carrying out this section, the Secretary shall require cost sharing in accordance with section 988.

“(e) REPORT.—Not later than 180 days after the date on which the Secretary solicits applications under subsection (c)(3), and annually thereafter, the Secretary shall submit to the appropriate committees of jurisdiction of the Senate and the House of Representatives a report that includes—

“(1) a detailed description of how applications for cooperative agreements under subsection (b) will be solicited and evaluated, including—

“(A) a list of any activities carried out by the Secretary to solicit or evaluate applications; and

“(B) a process for ensuring that any projects carried out under a cooperative agreement are designed to result in the development or demonstration of qualifying technologies;

“(2)(A) in the case of the first report under this subsection, a detailed list of technical milestones for the development and demonstration of each qualifying technology pursued under subsection (b); and

“(B) in the case of each subsequent report under this subsection, the progress made towards achieving such technical milestones during the period covered by the report; and

“(3) with respect to the demonstration program established under subsection (c), includes—

“(A) an estimate of the cost of licensing, permitting, constructing, and operating each carbon capture facility expected to be constructed under that demonstration program;

“(B) a schedule for the planned construction and operation of each demonstration or pilot project; and

“(C) an estimate of any financial assistance, compensation, or incentives proposed to be paid by the host State, Indian Tribe, or local government with respect to each facility.

“(f) FUNDING.—For each of fiscal years 2020 through 2025, out of any amounts appropriated to the Department to carry out fossil energy research and development activities and not otherwise obligated, the Secretary may use to carry out this section not more than \$50,000,000.”.

(b) CLERICAL AMENDMENT.—The table of contents for the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 600) is amended by inserting after the item relating to section 968 the following:

“Sec. 969. Natural gas carbon capture research, development, and demonstration program.”.

SEC. 6. CARBON STORAGE VALIDATION AND TESTING.

Section 963 of the Energy Policy Act of 2005 (42 U.S.C. 16293) is amended to read as follows:

“SEC. 963. CARBON STORAGE VALIDATION AND TESTING.

“(a) CARBON STORAGE.—The Secretary, in consultation with the Administrator of the Environmental Protection Agency, shall carry out a program of research, development, and demonstration for carbon storage. The program shall—

“(1) in coordination with relevant Federal agencies, develop and maintain mapping tools and resources that assess the capacity of geologic storage formations in the United States;

“(2) develop monitoring tools, modeling of geologic formations, and analyses to predict and verify carbon dioxide containment and account for sequestered carbon dioxide in geologic storage sites;

“(3) research potential environmental, safety, and health impacts in the event of a leak to the atmosphere or to an aquifer, and any corresponding mitigation actions or responses to limit harmful consequences;

“(4) evaluate the interactions of carbon dioxide with formation solids and fluids, including the propensity of injections to induce seismic activity;

“(5) assess and ensure the safety of operations related to geologic sequestration of carbon dioxide;

“(6) determine the fate of carbon dioxide concurrent with and following injection into geologic formations;

“(7) support cost and business model assessments to examine the economic viability of technologies and systems developed under this program; and

“(8) provide information to State, local, and Tribal governments, the Environmental Protection Agency, and other appropriate entities, to support development of a regulatory framework for commercial-scale sequestration operations that ensure the protection of human health and the environment.

“(b) GEOLOGIC SETTINGS.—In carrying out research activities under this section, the Secretary shall consider a variety of candidate geologic settings, both onshore and offshore, including—

“(1) operating oil and gas fields;

“(2) depleted oil and gas fields;

“(3) residual oil zones;

“(4) unconventional reservoirs and rock types;

“(5) unmineable coal seams;

“(6) saline formations in both sedimentary and basaltic geologies;

“(7) geologic systems that may be used as engineered reservoirs to extract economical quantities of brine from geothermal resources of low permeability or porosity; and

“(8) geologic systems containing in situ carbon dioxide mineralization formations.

“(c) REGIONAL CARBON SEQUESTRATION PARTNERSHIPS.—

“(1) IN GENERAL.—The Secretary shall carry out large-scale carbon sequestration demonstrations for geologic containment of carbon dioxide to collect and validate information on the cost and feasibility of commercial deployment of technologies for the geologic containment of carbon dioxide. The Secretary may fund new demonstrations or expand the work completed at one or more of the existing regional carbon sequestration partnerships.

“(2) DEMONSTRATION COMPONENTS.—Each demonstration described in paragraph (1) shall include longitudinal tests involving carbon dioxide injection and monitoring, mitigation, and verification operations.

“(3) CLEARINGHOUSE.—The National Energy Technology Laboratory shall act as a clearinghouse of shared information and resources for the regional carbon sequestration partnerships and any new demonstrations funded under this section.

“(4) REPORT.—Not later than 1 year after the date of enactment of the Fossil Energy Research and Development Act of 2019, the Secretary shall provide to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report that—

“(A) assesses the progress of all regional carbon sequestration partnerships;

“(B) identifies the remaining challenges in achieving carbon sequestration that is reliable and safe for the environment and public health; and

“(C) creates a roadmap for Department of Energy carbon storage research and development activities through 2030 with the goal of reducing economic and policy barriers to commercial carbon sequestration.

“(5) LARGE-SCALE CARBON SEQUESTRATION.—For purposes of this subsection, ‘large-scale carbon sequestration’ means a scale that demonstrates the ability to inject and sequester several million metric tons carbon dioxide for at least 10 years.

“(d) INTEGRATED STORAGE PROJECTS.—The Secretary may carry out a program for the purpose of transitioning the large-scale carbon sequestration demonstration projects under subsection (c) into integrated, commercial storage complexes. The program shall focus on—

“(1) qualifying geologic storage sites in order to accept large volumes of carbon dioxide acceptable for commercial contracts;

“(2) understanding the technical and commercial viability of storage sites;

“(3) developing the qualification processes that will be necessary for a diverse range of geologic storage sites to commercially accept carbon dioxide; and

“(4) any other activities the Secretary determines necessary to transition the large scale demonstration storage projects into commercial ventures.

“(e) COST SHARING.—The Secretary shall require cost sharing under this section in accordance with section 988.

“(f) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

“(1) \$120,000,000 for fiscal year 2020;

“(2) \$126,000,000 for fiscal year 2021;

“(3) \$132,300,000 for fiscal year 2022;

“(4) \$138,915,000 for fiscal year 2023; and

“(5) \$145,860,750 for fiscal year 2024.”.

SEC. 7. CARBON UTILIZATION.

(a) PROGRAM.—Subtitle F of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16291 et seq.) is amended by inserting after section 963 (42 U.S.C. 16293) the following:

“SEC. 963A. CARBON UTILIZATION.

“(a) IN GENERAL.—The Secretary shall carry out a program of research, development, and demonstration for carbon utilization. The program shall—

“(1) assess and monitor potential changes in life cycle carbon dioxide and other greenhouse gas emissions, and other environmental safety indicators of new technologies, practices, processes, or methods, used in enhanced hydrocarbon recovery as part of the activities authorized in section 963 of the Energy Policy Act of 2005 (42 U.S.C. 16293);

“(2) identify and evaluate novel uses for carbon, including the conversion of carbon oxides, in a manner that, on a full life-cycle basis, achieves a permanent reduction in, or avoidance of a net increase in carbon dioxide in the atmosphere, for use in commercial and industrial products, such as—

“(A) chemicals;

“(B) plastics;

“(C) building materials;

“(D) fuels;

“(E) cement;

“(F) products of coal utilization in power systems (as such term is defined in section 962(e)), or other applications; or

“(G) other products with demonstrated market value;

“(3) carbon capture technologies for industrial systems;

“(4) identify and assess alternative uses for coal that result in no net emissions of carbon dioxide or other pollutants, including products derived from carbon engineering, carbon fiber, and coal conversion methods.

“(b) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

“(1) \$25,000,000 for fiscal year 2020;

“(2) \$26,250,000 for fiscal year 2021;

“(3) \$27,562,500 for fiscal year 2022;

“(4) \$28,940,625 for fiscal year 2023; and

“(5) \$30,387,656 for fiscal year 2024.”.

(b) STUDY.—The Secretary shall enter into an agreement with the National Academies to conduct a study assessing the barriers, and opportunities related to the commercial application of carbon dioxide in the United States. Such study shall—

(1) analyze the technical feasibility, related challenges, and impacts to commercializing carbon dioxide, including—

(A) creating a national system of carbon dioxide pipelines and geologic sequestration sites;

(B) mitigating environmental and landowner impacts; and

(C) regional economic challenges and opportunities;

(2) identify potential markets, industries, or sectors that may benefit from greater access to commercial carbon dioxide;

(3) assess the current state of infrastructure and any necessary updates to allow for the integration of safe and reliable carbon dioxide transportation, utilization, and storage;

(4) estimate the economic, climate, and environmental impacts of any well-integrated national carbon dioxide pipeline system, including suggestions for policies that could improve the economic impact of the system;

(5) assess the global status and progress of carbon utilization technologies (both chemical and biological) in practice today that utilize waste carbon (including carbon dioxide, carbon monoxide, methane, and biogas) from power generation, biofuels production, and other industrial processes;

(6) identify emerging technologies and approaches for carbon utilization that show promise for scale-up, demonstration, deployment, and commercialization;

(7) analyze the factors associated with making carbon utilization technologies viable at a commercial scale, including carbon waste stream availability, economics, market capacity, energy and lifecycle requirements;

(8) assess the major technical challenges associated with increasing the commercial viability of carbon reuse technologies, and identify the research and development questions that will address those challenges;

(9) assess current research efforts, including engineering and computational, that are addressing these challenges and identify gaps in the current research portfolio; and

(10) develop a comprehensive research agenda that addresses both long- and short-term research needs and opportunities.

SEC. 8. ADVANCED ENERGY SYSTEMS.

Subtitle F of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16291 et seq.) is further amended by adding at the end the following:

“SEC. 969A. ADVANCED ENERGY SYSTEMS.

“(a) **IN GENERAL.**—The Secretary shall conduct a program, with the purpose of reducing emissions from fossil fuel power generation by not less than 50 percent, of research, development, demonstration, and commercial application with respect to the following:

“(1) High-efficiency turbines in accordance with the program under section 969A–1.

“(2) Supercritical and ultrasupercritical carbon dioxide, with an emphasis on developing directly-fired and indirectly fired cycles in the next 10 years.

“(3) Advanced combustion systems, including oxy-combustion systems and chemical looping.

“(4) Fuel cell technologies for low-cost, high-efficiency, fuel-flexible, modular power systems, including solid oxide fuel cell technology for commercial, residential, and distributed generation systems, using improved manufacturing production and processes.

“(5) Gasification systems to enable carbon capture, improve efficiency, and reduce capital and operating costs.

“(6) Thermal cycling with ramping or rapid black start capabilities that do not compromise efficiency or environmental performance.

“(7) Small-scale and modular coal-fired technologies with reduced carbon outputs or carbon capture that can support incremental power generation capacity additions.

“(b) **PRIORITY.**—In carrying out the program under subsection (a), the Secretary is encouraged to prioritize transformational technologies that enable a step change in reduction of emissions as compared to the technology in existence on the date of enactment of this section.

“(c) **AUTHORIZATION OF APPROPRIATIONS.**—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section and section 969A–1—

“(1) \$150,000,000 for fiscal year 2020;

“(2) \$157,500,000 for fiscal year 2021;

“(3) \$165,375,000 for fiscal year 2022;

“(4) \$173,643,750 for fiscal year 2023; and

“(5) \$182,325,938 for fiscal year 2024.

“SEC. 969A–1. HIGH EFFICIENCY GAS TURBINES.

“(a) **IN GENERAL.**—The Secretary of Energy, through the Office of Fossil Energy, shall carry out a multiyear, multiphase program of research, development, and technology demonstration to improve the efficiency of gas turbines used in power generation systems and to identify the technologies that ultimately will lead to gas turbine combined cycle efficiency of 67 percent or simple cycle efficiency of 50 percent.

“(b) **PROGRAM ELEMENTS.**—The program under this section shall—

“(1) support first-of-a-kind engineering and detailed gas turbine design for megawatt-scale and utility-scale electric power generation, including—

- “(A) high temperature materials, including superalloys, coatings, and ceramics;
 - “(B) improved heat transfer capability;
 - “(C) manufacturing technology required to construct complex three-dimensional geometry parts with improved aerodynamic capability;
 - “(D) combustion technology to produce higher firing temperature while lowering nitrogen oxide and carbon monoxide emissions per unit of output;
 - “(E) advanced controls and systems integration;
 - “(F) advanced high performance compressor technology; and
 - “(G) validation facilities for the testing of components and subsystems;
 - “(2) include technology demonstration through component testing, subscale testing, and full-scale testing in existing fleets;
 - “(3) include field demonstrations of the developed technology elements so as to demonstrate technical and economic feasibility; and
 - “(4) assess overall combined cycle and simple cycle system performance.
- “(c) PROGRAM GOALS.—The goals of the multiphase program established under subsection (a) shall be—
- “(1) in phase I—
 - “(A) to develop the conceptual design of advanced high efficiency gas turbines that can achieve at least 65-percent combined cycle efficiency or 47-percent simple cycle efficiency on a lower heating value basis; and
 - “(B) to develop and demonstrate the technology required for advanced high efficiency gas turbines that can achieve at least 65-percent combined cycle efficiency or 47-percent simple cycle efficiency on a lower heating value basis; and
 - “(2) in phase II, to develop the conceptual design for advanced high efficiency gas turbines that can achieve at least 67-percent combined cycle efficiency or 50-percent simple cycle efficiency on a lower heating value basis.
- “(d) PROPOSALS.—Within 180 days after the date of enactment of this Act, the Secretary shall solicit grant and contract proposals from industry, small businesses, universities, and other appropriate parties for conducting activities under this Act. In selecting proposals, the Secretary shall emphasize—
- “(1) the extent to which the proposal will stimulate the creation or increased retention of jobs in the United States; and
 - “(2) the extent to which the proposal will promote and enhance United States technology leadership.
- “(e) COMPETITIVE AWARDS.—The provision of funding under this section shall be on a competitive basis with an emphasis on technical merit.
- “(f) COST SHARING.—Section 988 of the Energy Policy Act of 2005 (42 U.S.C. 16352) shall apply to an award of financial assistance made under this section.
- “(g) LIMITS ON PARTICIPATION.—The limits on participation applicable under section 999E of the Energy Policy Act of 2005 (42 U.S.C. 16375) shall apply to financial assistance awarded under this section.”.

SEC. 9. RARE EARTH ELEMENTS.

Subtitle F of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16291 et seq.) is further amended by adding at the end the following:

“SEC. 969B. RARE EARTH ELEMENTS.

“(a) IN GENERAL.—In coordination with the relevant Federal agencies, the Secretary shall conduct research to develop and assess methods to separate and recover rare earth elements and other strategic minerals and coproducts from coal and coal byproduct streams. The program shall—

- “(1) develop advanced rare earth element separation and extraction processes using coal-based resources as feedstock materials;
- “(2) assess the technical and economic feasibility of recovering rare earth elements from coal-based resources and validate such feasibility with prototype systems producing salable, high-purity rare earth elements from coal-based resources; and
- “(3) assess and mitigate any environmental and public health impacts of recovering rare earth elements from coal-based resources.

“(b) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

- “(1) \$23,000,000 for fiscal year 2020;
- “(2) \$24,150,000 for fiscal year 2021;
- “(3) \$25,357,500 for fiscal year 2022;
- “(4) \$26,625,375 for fiscal year 2023; and
- “(5) \$27,956,644 for fiscal year 2024.”.

SEC. 10. METHANE HYDRATE RESEARCH AMENDMENTS.

(a) IN GENERAL.—Section 4(b) of the Methane Hydrate Research and Development Act of 2000 (30 U.S.C. 2003(b)) is amended to read as follows:

“(b) GRANTS, CONTRACTS, COOPERATIVE AGREEMENTS, INTERAGENCY FUNDS TRANSFER AGREEMENTS, AND FIELD WORK PROPOSALS.—

“(1) ASSISTANCE AND COORDINATION.—In carrying out the program of methane hydrate research and development authorized by this section, the Secretary may award grants, or enter into contracts or cooperative agreements to—

“(A) conduct research to identify the environmental, health, and safety impacts of methane hydrate development;

“(B) assess and develop technologies to mitigate environmental impacts of the exploration and commercial development of methane hydrates as an energy resource, including the use of seismic testing, and to reduce the public health and safety risks of drilling through methane hydrates;

“(C) conduct research to assess and mitigate the environmental impact of hydrate degassing (including natural degassing and degassing associated with commercial development); or

“(D) expand education and training programs in methane hydrate resource research and resource development through fellowships or other means for graduate education and training.

“(2) ENVIRONMENTAL MONITORING AND RESEARCH.—The Secretary shall conduct a long-term environmental monitoring and research program to study the effects of production from methane hydrate reservoirs.

“(3) COMPETITIVE PEER REVIEW.—Funds made available to carry out paragraphs (1) and (2) shall be made available based on a competitive process using external scientific peer review of proposed research.”.

(b) CONFORMING AMENDMENT.—Section 4(e) of such Act (30 U.S.C. 2003(e)) is amended in the matter preceding paragraph (1) by striking “subsection (b)(1)” and inserting “paragraphs (1) and (2) of subsection (b)”.

(c) AUTHORIZATION OF APPROPRIATIONS.—Section 7 of such Act (30 U.S.C. 2006) is amended to read as follows:

“SEC. 7. AUTHORIZATION OF APPROPRIATIONS.

“Of the amounts made available under section 961 of the Energy Policy Act of 2005 (42 U.S.C. 16291), there are authorized to be appropriated to the Secretary to carry out this Act \$15,000,000, to remain available until expended, for each of fiscal years 2020 through 2024.”.

SEC. 11. CARBON REMOVAL.

Subtitle F of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16291 et seq.) is further amended by adding at the end the following:

“SEC. 969C. CARBON REMOVAL.

“(a) ESTABLISHMENT.—The Secretary, in coordination with the appropriate Federal agencies, shall establish a research, development, and demonstration program to remove carbon dioxide from the atmosphere on a large scale. The program may include activities in—

“(1) direct air capture and storage technologies;

“(2) enhanced carbon mineralization;

“(3) bioenergy with carbon capture and sequestration;

“(4) agricultural and grazing practices;

“(5) forest management and afforestation; and

“(6) planned or managed carbon sinks, including natural and artificial.

“(b) PRIORITIZATION.—In carrying out the program established in subsection (a), the Secretary shall prioritize—

“(1) the activities described in paragraphs (1) and (2) of subsection (a), acting through the Assistant Secretary for Fossil Energy; and

“(2) the activities described in subsection (a)(3), acting through the Assistant Secretary for Energy Efficiency and Renewable Energy and the Assistant Secretary for Fossil Energy.

“(c) CONSIDERATIONS.—The program under this section shall identify and develop carbon removal technologies and strategies that consider the following:

“(1) Land use changes, including impacts on natural and managed ecosystems.

“(2) Ocean acidification.

“(3) Net greenhouse gas emissions.

“(4) Commercial viability.

“(5) Potential for near-term impact.

“(6) Potential for carbon reductions on a gigaton scale.

“(7) Economic co-benefits.

“(d) ACCOUNTING.—The Department shall collaborate with the Environmental Protection Agency and other relevant agencies to develop and improve accounting frameworks and tools to accurately measure carbon removal and sequestration methods and technologies across the Federal Government.

“(e) AIR CAPTURE TECHNOLOGY PRIZE.—Not later than 1 year after the date of enactment of this Act, as part of the program carried out under this section, the Secretary shall carry out a program to award competitive technology prizes for carbon dioxide capture from ambient air or water. In carrying out this subsection, the Secretary shall—

“(1) in accordance with section 24 of the Stevenson-Wylder Technology Innovation Act of 1980 (15 U.S.C. 3719), develop requirements for—

“(A) the prize competition process;

“(B) minimum performance standards for projects eligible to participate in the prize competition; and

“(C) monitoring and verification procedures for projects selected to receive a prize award;

“(2) establish minimum levels for the capture of carbon dioxide from ambient air or water that are required to qualify for a prize award; and

“(3) offer prize awards for any of the following:

“(A) A design for a promising capture technology that will—

“(i) be operated on a demonstration scale; and

“(ii) have the potential to achieve significant reduction in the level of carbon dioxide in the atmosphere.

“(B) A successful bench-scale demonstration of a capture technology.

“(C) An operational capture technology on a commercial scale.

“(f) DIRECT AIR CAPTURE TEST CENTER.—

“(1) IN GENERAL.—Not later than 1 year after the date of enactment of the Fossil Energy Research and Development Act of 2019, the Secretary shall award grants to one or more eligible entities for the operation of one or more test centers (in this subsection, known as ‘Centers’) to provide unique testing capabilities for innovative direct air capture and storage technologies.

“(2) PURPOSE.—Each Center shall—

“(A) advance research, development, demonstration, and commercial application of direct air capture and storage technologies;

“(B) support pilot plant and full-scale demonstration projects and test technologies that represent the scale of technology development beyond laboratory testing but not yet advanced to test under operational conditions at commercial scale;

“(C) develop front-end engineering design and economic analysis; and

“(D) maintain a public record of pilot and full-scale plant performance.

“(3) PRIORITY CRITERIA.—In selecting applications to operate a Center under this subsection, the Secretary shall prioritize applicants that—

“(A) have access to existing or planned research facilities;

“(B) are institutions of higher education with established expertise in engineering for direct air capture technologies, or partnerships with such institutions; or

“(C) have access to existing research and test facilities for bulk materials design and testing, component design and testing, or professional engineering design.

“(4) SCHEDULE.—Each grant to operate a Center under this subsection shall be awarded for a term of not more than 5 years, subject to the availability of appropriations. The Secretary may renew such 5-year term without limit, subject to a rigorous merit review.

“(5) TERMINATION.—To the extent otherwise authorized by law, the Secretary may eliminate the center during any 5-year term described in the last paragraph if it is underperforming.

“(g) LARGE-SCALE PILOTS AND DEMONSTRATIONS.—In supporting the technology development activities under this section, the Secretary is encouraged to support carbon removal pilot and demonstration projects, including—

“(1) pilot projects that test direct air capture systems capable of capturing 10 to 100 tonnes of carbon oxides per year to provide data for demonstration-scale projects; and

“(2) direct air capture demonstration projects capable of capturing greater than 1,000 tonnes of carbon oxides per year.

“(h) INTRA-AGENCY RESEARCH.—In carrying out the program established in (a), the Secretary shall encourage and promote collaborations among relevant offices and agencies within the Department.

“(i) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

- “(1) \$75,000,000 for fiscal year 2020, \$15,000,000 of which are authorized to carry out subsection (e);
- “(2) \$63,000,000 for fiscal year 2021;
- “(3) \$66,150,000 for fiscal year 2022;
- “(4) \$69,458,000 for fiscal year 2023; and
- “(5) \$72,930,000 for fiscal year 2024.”.

SEC. 12. METHANE LEAK DETECTION AND MITIGATION.

Subtitle F of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16291 et seq.) is further amended by adding at the end the following:

“SEC. 969D. METHANE LEAK DETECTION AND MITIGATION.

“(a) IN GENERAL.—The Secretary, in consultation with the Administrator of the Environmental Protection Agency and other appropriate Federal agencies, shall carry out a program of methane leak detection and mitigation research, development, demonstration, and commercial application for technologies and methods that significantly reduce emissions. In carrying out the program, the Secretary shall—

- “(1) develop cooperative agreements with State or local governments or private entities to provide technical assistance to—
 - “(A) prevent or respond to methane leaks, including detection, mitigation, and identification of leaks throughout the natural gas infrastructure (which includes natural gas storage, pipelines, and natural gas production sites); and
 - “(B) protect public health in the event of a major methane leak;
- “(2) promote demonstration and adoption of effective methane emissions-reduction technologies in the private sector;
- “(3) in coordination with representatives from private industry, State and local governments, and institutions of higher education, create a publicly accessible resource for best practices in the design, construction, maintenance, performance, monitoring, and incident response for—
 - “(A) pipeline systems;
 - “(B) wells;
 - “(C) compressor stations;
 - “(D) storage facilities; and
 - “(E) other vulnerable infrastructure;
- “(4) identify high-risk characteristics of pipelines, wells, and materials, geologic risk factors, or other key factors that increase the likelihood of methane leaks; and
- “(5) in collaboration with private entities and institutions of higher education, quantify and map significant geologic methane seeps across the United States.

“(b) CONSIDERATIONS.—In carrying out the program under this section, the Secretary shall consider the following:

- “(1) Historical data of methane leaks.
- “(2) Public health consequences.
- “(3) Public safety.
- “(4) Novel materials and designs for pipelines, compressor stations, components, and wells (including casing, cement, wellhead).
- “(5) Regional geologic traits.
- “(6) Induced and natural seismicity.

“(c) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

- “(1) \$22,000,000 for fiscal years 2020;
- “(2) \$23,100,000 for fiscal years 2021;
- “(3) \$24,255,000 for fiscal years 2022;
- “(4) \$25,467,750 for fiscal years 2023; and
- “(5) \$26,741,138 for fiscal years 2024.”.

SEC. 13. WASTE GAS UTILIZATION.

Subtitle F of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16291 et seq.) is further amended by adding at the end the following:

“SEC. 969E. WASTE GAS UTILIZATION.

“The Secretary shall carry out a program of research, development, and demonstration for waste gas utilization. The program shall—

- “(1) identify and evaluate novel uses for light hydrocarbons, such as methane, ethane, propane, butane, pentane and hexane, produced during oil and shale gas production, including the production of chemicals or transportation fuels;

- “(2) develop advanced gas conversion technologies that are modular and compact, and may leverage advanced manufacturing technologies;
- “(3) support demonstration activities at operating oil and gas facilities to test the performance and cost-effectiveness of new gas conversion technologies; and
- “(4) assess and monitor potential changes in life cycle greenhouse gas emissions that may result from the use of technologies developed under this program.”.

SEC. 14. NATIONAL ENERGY TECHNOLOGY LABORATORY REFORMS.

(a) SPECIAL HIRING AUTHORITY FOR SCIENTIFIC, ENGINEERING, AND PROJECT MANAGEMENT PERSONNEL.—

(1) IN GENERAL.—The Director of the National Energy Technology Laboratory shall have the authority to—

(A) make appointments to positions in the Laboratory to assist in meeting a specific project or research need, without regard to civil service laws, of individuals who—

(i) have an advanced scientific or engineering background; or

(ii) have a business background and can assist in specific technology-to-market needs;

(B) fix the basic pay of any employee appointed under this section at a rate not to exceed level II of the Executive Schedule; and

(C) pay any employee appointed under this section payments in addition to basic pay, except that the total amount of additional payments paid to an employee under this subsection for any 12-month period shall not exceed the least of—

(i) \$25,000;

(ii) the amount equal to 25 percent of the annual rate of basic pay of that employee; and

(iii) the amount of the limitation that is applicable for a calendar year under section 5307(a)(1) of title 5, United States Code.

(2) LIMITATIONS.—

(A) IN GENERAL.—The term of any employee appointed under this section shall not exceed 3 years.

(B) FULL-TIME EMPLOYEES.—Not more than 10 full-time employees appointed under this subsection may be employed at the National Energy Technology Laboratory at any given time.

(b) DISCRETIONARY RESEARCH AND DEVELOPMENT.—

(1) IN GENERAL.—The Secretary shall establish mechanisms under which the Director of the National Energy Technology Laboratory may use an amount that is, in total, not less than 2 percent and not more than 4 percent of all funds available to the Laboratory for the following purposes:

(A) To fund innovative research that is conducted at the Laboratory and supports the mission of the Department.

(B) To fund technology development programs that support the transition of technologies developed by the Laboratory into the commercial market.

(C) To fund workforce development activities to strengthen external engineering and manufacturing partnerships to ensure safe, efficient, productive, and useful fossil energy technology production.

(D) To fund the revitalization, recapitalization, or minor construction of the Laboratory infrastructure.

(2) PRIORITIZATION.—The Director shall prioritize innovative experiments and proposals proposed by scientists and researchers at the National Energy Technology Laboratory.

(3) ANNUAL REPORT ON USE OF AUTHORITY.—Not later than March 1 of each year, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report on the use of the authority under this subsection during the preceding fiscal year.

(c) LABORATORY OPERATIONS.—The Secretary shall delegate human resources operations of the National Energy Technology Laboratory to the Director of the National Energy Technology Laboratory.

(d) REVIEW.—Not later than 2 years after the date of enactment of this Act, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report assessing the National Energy Technology Laboratory’s management and research. The report shall include—

(1) an assessment of the quality of science and research at the National Energy Technology Laboratory relative to similar work at other national laboratories;

- (2) a review of the effectiveness of authorities provided in subsections (a) and (b); and
- (3) recommendations for policy changes within the Department and legislative changes to provide the National Energy Technology Laboratory the necessary tools and resources to advance its research mission.

SEC. 15. CLIMATE SOLUTIONS CHALLENGES.

(a) **AUTHORITY.**—Not later than 180 days after the date of enactment of this Act, the Secretary of Energy shall establish a program to be known as “Fossil Energy Climate Solutions Challenges” for carrying out prize competitions described under subsection (d) pursuant to section 24 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3719) relating to the climate and energy.

(b) **PRIZE COMMITTEES.**—

(1) **IN GENERAL.**—The Secretary shall assemble a prize committee that shall define the scope and detail of, and provide the requirements for, the prize competitions under this section. Such committee may be composed of—

(A) members from the Office of Fossil Energy, Advanced Research Projects Energy, Office of Technology Transitions, or other offices that most appropriately corresponds with the topic of the prize competition; and

(B) representatives of any other entities, as determined appropriate by the Secretary, including other Federal agencies, State and local governments, and the private sector.

(2) **DEFINING TOPIC AREAS.**—The prize committee may modify and define the scope of the prize areas described under subsection (c), so long as such modification is in accordance with descriptions in such subsection.

(3) **INCENTIVE FOR PRIZE COMPETITION.**—The prize committee for each prize competition shall determine the incentive for the prize competition. In determining the incentive, the committee shall consider—

(A) a cash prize;

(B) access to Government facilities, such as through a lab-embedded entrepreneurship program of the Department of Energy, a cooperative research and development agreement, or other method;

(C) advance market commitments for technologies of use or promise to the Federal Government; and

(D) any other incentive provided for by law.

(4) **JUDGING CRITERIA.**—The prize committee for each prize competition shall establish judging criteria for the competition that shall include, at a minimum—

(A) potential for the solution to become a commercial product or service or advance knowledge to further the public good;

(B) consideration of how likely the solution is to lead to subsequent research, development, deployment, or manufacturing in the United States;

(C) the degree to which the solution will lower the climate footprint of the United States; and

(D) the degree to which the solution will lower the global climate footprint.

(5) **CONSIDERATION.**—In carrying out this section, the committee shall take into consideration the best practices provided for in the challenges and prizes toolkit made publicly available on December 15, 2016, by the General Services Administration.

(c) **PRIZE COMPETITIONS.**—In carrying out the program, the Secretary shall offer prize awards for any of the following:

(1) Solutions to capture carbon emissions from sources that would otherwise be emitted to the atmosphere.

(2) Solutions to convert carbon emissions to a beneficial use that does not result in near-term re-release into the atmosphere, unless such re-release offsets the emission of additional carbon into the atmosphere, such that the net effect of the solution is to reduce the overall amount of carbon being emitted to the atmosphere.

(3) Other solutions that have potential to achieve reduction in greenhouse gas emissions associated with fossil-based energy production.

(d) **ACCEPTANCE OF FUNDS.**—In addition to such sums as may be appropriated or otherwise made available to the Secretary to award prizes under this section, the Secretary may accept funds from other Federal agencies, private sector entities, and State and local governments to award prizes under this section. The Secretary may not give any special consideration relating to the selection of awards under the prize competition to any private sector entity or individual in return for a donation to the Secretary or prize committee.

(e) **ELIGIBILITY.**—Notwithstanding section 24(g)(3) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3719(g)(3)), a group may be eligible for an award under this section if one or more members of such group is a citizen or permanent resident of the United States.

(f) **COMPLETION OF PRIZE COMPETITIONS.**—The prize competitions carried out under this section shall be completed not later than the date that is 5 years after the program is established under subsection (a).

(g) **AUTHORIZATION OF APPROPRIATIONS.**—There is authorized to be appropriated \$15,000,000 to carry out this section, to remain available until expended.

SEC. 16. TABLE OF CONTENTS AMENDMENTS.

The table of contents for the Energy Policy Act of 2005 (42 U.S.C. 15801 note) is amended by amending the items relating to subtitle F of title IX to read as follows:

- “Sec. 961. Fossil energy.
- “Sec. 962. Carbon capture technologies.
- “Sec. 963. Carbon storage validation and testing.
- “Sec. 963A. Carbon utilization.
- “Sec. 964. Research and development for coal mining technologies.
- “Sec. 965. Oil and gas research programs.
- “Sec. 966. Low-volume oil and gas reservoir research program.
- “Sec. 967. Complex well technology testing facility.
- “Sec. 968. Methane hydrate research.
- “Sec. 969. Natural gas carbon capture research, development, and demonstration program.
- “Sec. 969A. Advanced energy systems.
- “Sec. 969A–1. High efficiency gas turbines.
- “Sec. 969B. Rare earth elements.
- “Sec. 969C. Carbon removal.
- “Sec. 969D. Methane leak detection and mitigation.
- “Sec. 969E. Waste gas utilization.”.

II. PURPOSE OF THE BILL

The purpose of H.R. 3607, *the Fossil Energy Research and Development Act of 2019*, sponsored by Mr. Veasey and cosponsored by Mr. Schweikert, Ms. Johnson, Mr. Fitzpatrick, Ms. Fletcher, Mr. McKinley, Mr. Lamb, Ms. Torres Small, Mr. Malinowski, and Mr. McAdams, is to direct federal research in fossil energy and to promote the development and demonstration of environmentally responsible coal and natural gas technologies.

III. BACKGROUND AND NEED FOR THE LEGISLATION

The DOE Office of Fossil Energy (FE) supports research to develop new technologies and methods to reduce the environmental impact of fossil fuel production and use, with a major focus on the capture and storage of carbon dioxide emissions. A portion of this research also focuses on improving the efficiency of fossil fuel power plants. Coal and natural gas account for about 56% of electricity generation and will likely continue to be a major part of the U.S. energy portfolio in the decades to come.¹ However, financial analysts have determined that greenhouse gas emissions and other pollution associated with fossil fuels add risk to investing in these technologies in the long-term.² Developing environmental mitigation strategies for these resources is not only an environmental concern, but also an economic one for these industries.³ Moreover, while carbon emissions growth has leveled off in the United States in recent years, this is due mainly to the transition from coal to less expensive natural gas. Studies have found that this transition

¹ Annual Energy Outlook 2018, U.S. Energy Information Administration, <https://www.eia.gov/outlooks/aeo/>.

² Morgan Stanley, “Is the Climate Changing for Fossil Fuel Investments?”, October 9, 2018, <https://www.morganstanley.com/articles/fossil-fuels>.

³ Risky Business: The Economic Risks of Climate Change in the United States, 2014, <https://riskybusiness.org/report/national/>; and Risky Business Project, From Risk to Return: Investing in a Clean Energy Economy, 2016, <https://riskybusiness.org/fromrisktoreturn/>.

to natural gas alone is unlikely to be sufficient to mitigate the most significant potential impacts of climate change.^{4 5 6} The International Energy Agency has projected that deploying carbon capture on natural gas fired power plants will likely be critical to meeting meaningful emissions reductions targets in the long term.⁷

In 2018, the Coal Utilization Research Council (CURC) and the Electric Power Research Institute, Inc. (EPRI) developed the CURC EPRI Advanced Fossil Energy Technology Roadmap, which identified several research, development, demonstration (RD&D) needs to commercialize carbon capture, utilization, and storage (CCUS) technologies.⁸ And last year, the National Academies produced a report entitled “Negative Emissions Technologies and Reliable Sequestration: A Research Agenda” which identified RD&D needs to explore the viability of various approaches to removing carbon emissions from the atmosphere.⁹

Both of these reports provided a framework for H.R. 3607. If enacted, this bill would reauthorize and expand RD&D of carbon capture technologies for power plants and industrial sources. It would also authorize R&D activities in carbon storage, carbon utilization, improvements in efficiency, and rare earth elements. In addition, the bill would launch new initiatives in carbon dioxide removal, waste gas utilization, and methane leak detection and mitigation. Finally, it would authorize special hiring authority and laboratory-directed research and development (LDRD) activities for the DOE Office of Fossil Energy’s laboratory, the National Energy Technology Laboratory (NETL) located in West Virginia, Pennsylvania, and Oregon, providing the lab with similar tools that have enabled successful technology development initiatives at DOE’s other national laboratories.¹⁰

The Act authorizes 5% annual funding increases over five years for fossil energy RD&D activities, beginning with \$825 million in Fiscal Year 2020 to carry out the Act.

IV. COMMITTEE HEARINGS

Pursuant to Section 103(i) of H. Res. 6, the Committee designates the following hearings as having been used to develop or consider the legislation:

The Energy Subcommittee held a hearing on June 19, 2019 to examine research and development needs to mitigate the environ-

⁴Hirji, Zahra, “Slowing Climate Change Will Require Vastly More Carbon Capture, Study Says,” Inside Climate News, January 30, 2017, <https://insideclimatenews.org/news/30012017/global-warming-carbon-capture-paris-climate-agreement>.

⁵Harder, Amy, “Natural gas is helping combat climate change—but not enough,” Axios, June 10, 2019. <https://www.axios.com/natural-gas-is-helping-combat-climate-change-but-not-enough-bbad3dd2-b3f8-43bb-827c-ffad24e145c9.html>.

⁶Roberts, David, “More natural gas isn’t a “middle ground”—it’s a climate disaster,” Vox, May 30, 2019. <https://www.vox.com/energy-and-environment/2019/5/30/18643819/climate-change-natural-gas-middle-ground>.

⁷“Technology Roadmap—Carbon Capture and Storage,” <http://www.iea.org/publications/freepublications/publication/TechnologyRoadmapCarbonCaptureandStorage.pdf>.

⁸<http://www.curc.net/curc-epri-advanced-technology-roadmap-1>.

⁹<https://www.nap.edu/catalog/25259/negative-emissions-technologies-and-reliable-sequestration-a-research-agenda>.

¹⁰NETL is unique among DOE’s 17 national laboratories in that it is the only one that is government-owned, government-operated (GOGO). The others are all government-owned, contractor-operated (GOCO) labs. According to a 2015 report from the Congressionally-mandated Commission to Review the Effectiveness of the National Energy Laboratories (CRENEL), NETL has thus far been unable to use certain tools and processes that have enabled the flexibility and effectiveness of the other DOE labs. <https://www.energy.gov/labcommission/downloads/final-report-commission-review-effectiveness-national-energy-laboratories>.

mental impacts of the extraction and use of fossil fuels in support of a draft of H.R. 3607.

WITNESSES

Ms. Shannon Angielski, Principal, Van Ness Feldman LLP and Executive Director of the Carbon Utilization Research Council (CURC).

Mr. Elgie Holstein, Senior Director for Strategic Planning, Environmental Defense Fund (EDF).

Mr. Jeff Bobeck, Director of Energy Policy Engagement, Center for Climate and Energy Solutions (C2ES).

Ms. Erin Burns, Director of Policy, Carbon180.

Dr. Erik K. Webb, Senior Manager, Geoscience Research and Applications Group, Sandia National Laboratories.

V. COMMITTEE CONSIDERATION AND VOTES

The Subcommittee on Energy met to consider H.R. 3607 on July 10, 2019.

Chairman Lamb offered a Manager's amendment to include technical changes to the bill. *The amendment was agreed to by voice vote.*

Mr. Lipinski offered an amendment which instructs the Secretary of Energy to establish a prize competition to be known as the "Fossil Energy Climate Solutions Challenges." *The amendment was agreed to by voice vote.*

Mr. Cloud offered an amendment which instructs the Administrator of the Environmental Protection Agency not to consider any technology, or level of emission reduction, that is demonstrated as a result of financial assistance under this Act for regulatory purposes, with certain exceptions. *The amendment was withdrawn.*

H.R. 3607 was forwarded by the Subcommittee to the full Committee (as amended) by the Yeas and Nays: 7-5.

The Full Committee met to consider H.R. 3607 on July 24, 2019.

Mr. Weber offered an amendment to alter the fossil energy program's mission areas, amongst other portions of the bill, to focus less on mitigating coal's and natural gas' environmental impacts. The amendment also lowers the amounts authorized to be appropriated to carry out the Act. *The amendment was rejected by the Yeas and Nays: 13-21.*

Mr. Foster offered an amendment that instructs the Secretary of Energy to carry out research that improves the separation and purification of helium from fossil fuels. *The amendment was agreed to by voice vote.*

Mr. Lucas offered an amendment to add a research, development, and demonstration program to improve the environmental impacts of natural gas technologies, particularly through advancing carbon capture technologies. The amendment was agreed to by voice vote.

Mr. Tonko offered an amendment to expand the research, development, and demonstration activities carried out to advance high-efficiency gas turbines. *The amendment was agreed to by voice vote.*

Mr. Weber offered an amendment to add a Sense of Congress stating that power produced by fossil fuels is essential for maintaining the U.S. economic growth and global competitiveness.

Mr. Perlmutter offered a second-degree amendment to replace the word, “essential” with, “important” in Mr. Weber’s amendment. *The amendment was rejected by the Yeas and Nays: 4–31.*

Mr. Weber’s amendment was rejected by the Yeas and Nays: 16–19.

H.R. 3607 was forwarded by the full Committee to the full House (as amended) by the Yeas and Nays: 22–13.

VI. SUMMARY OF MAJOR PROVISIONS OF THE BILL

H.R. 3607 would reauthorize and expand research, development, and demonstration of carbon capture technologies for power plants and industrial sources. It would also authorize R&D activities in carbon storage, carbon utilization, improvements in efficiency, and rare earth elements. In addition, the bill would launch new initiatives in carbon dioxide removal, waste gas utilization, and methane leak detection and mitigation. Finally, it would authorize special hiring authority and laboratory-directed research and development (LDRD) activities for the DOE Office of Fossil Energy’s laboratory, the National Energy Technology Laboratory (NETL) located in West Virginia, Pennsylvania, and Oregon, providing the lab with similar tools that have enabled successful technology development initiatives at DOE’s other national laboratories.

VII. SECTION-BY-SECTION ANALYSIS (BY TITLE AND SECTION)

Section. 1. Short title

Fossil Energy Research and Development Act of 2019

Section. 2. Definitions

Provides definitions for “Department” and “Secretary”.

Section. 3. Fossil Energy Objectives

Adds five new objectives to the current list of objectives in statute for DOE’s fossil energy research activities. These additions expand the statutory scope of the Office of Fossil Energy by directing the Department to focus on improving conversion, use, and storage of carbon dioxide from fossil fuels, lowering greenhouse gas emissions across the fossil fuel lifecycle, preventing methane leaks, reducing water use, improving the separation and purification of helium from fossil fuel resources, and developing carbon removal and utilization technologies. Amends two objectives to focus on decreasing the cost and increasing the export of emissions control technologies.

Authorizes five years of funding for fossil energy RD&D activities beginning with \$825 million in Fiscal Year 2020, and including a 5% annual funding increase each year to account for inflation and growth.

Prioritizes technologies and strategies that have the potential to meet emissions reduction goals in the Paris Agreement.

Section. 4. Carbon Capture Technologies

Directs the Secretary to conduct research, development, demonstration, and commercial application activities for carbon capture

technologies. Authorizes and encourages support for large-scale pilot projects.

Authorizes the establishment of not less than three Carbon Capture Pilot Test Centers, which are intended to be public-private partnerships to enable the development and testing of carbon capture technologies with the necessary scale and modular capabilities to yield meaningful results for commercial application of these technologies on power and industrial systems.

Adds reforms and additional oversight to the establishment of new demonstration activities.

Directs the Government Accountability Office to examine the Department's practices in carrying out demonstration projects for carbon capture technologies.

Of the amounts authorized in Section 3, authorizes five years of funding for these activities beginning with \$300 million in Fiscal Year 2020, and including a 5% annual funding increase each year to account for inflation and growth.

Section 5. Natural Gas Carbon Capture Research, Development, Demonstration, and Commercial Application Program

Establishes a program to conduct research, development, and demonstration of technologies to capture carbon dioxide produced during the generation of electricity from natural gas power systems.

Authorizes \$50 million per year for five years for these activities.

Section 6. Carbon Storage Validation and Testing

Reauthorizes research, development, and demonstration activities in carbon storage. Removes the current limitation of seven large-scale carbon sequestration demonstrations to allow for additional demonstrations as the Secretary sees fit. Directs the National Energy Technology Laboratory to act as the clearinghouse of information for the regional sequestration partnerships. Directs DOE to submit a report to Congress detailing the progress and remaining challenges for carbon sequestration.

Authorizes a program for integrated storage projects focusing on the qualification of storage sites and the technical and commercial viability of these locations and geologic structures.

Of the amounts authorized in Section 3, authorizes five years of funding for these activities beginning with \$120 million in Fiscal Year 2020, and including a 5% annual funding increase each year to account for inflation and growth.

Section 7. Carbon Utilization

Establishes a research, development, and demonstration program for carbon utilization. This section authorizes research to identify and evaluate novel uses for carbon.

Of the amounts authorized in Section 3, authorizes five years of funding for these activities beginning with \$25 million in Fiscal Year 2020, and including a 5% annual funding increase each year to account for inflation and growth.

Directs the National Academies to conduct a study examining the barriers and opportunities related to commercial application of carbon dioxide.

Section. 8. Advanced Energy Systems

Authorizes a program of research, development, demonstration, and commercial application to lower emissions and improve the efficiency of fossil fuel power generation. This includes R&D activities related to high-efficiency turbines, supercritical and ultrasupercritical CO₂, advanced combustion systems, fuel cell technologies, gasification systems, thermal cycling, and modular coal-fired technologies with carbon capture.

Of the amounts authorized in Section 3, authorizes five years of funding for these activities beginning with \$150 million in Fiscal Year 2020, and including a 5% annual funding increase each year to account for inflation and growth.

Section. 9. Rare Earth Elements

Directs the Secretary to conduct research and development to separate and recover rare earth elements and strategic minerals from coal and coal byproduct streams, including research to assess and mitigate any environmental and public health impacts associated with these processes.

Of the amounts authorized in Section 3, authorizes five years of funding for these activities beginning with \$23 million in Fiscal Year 2020, and including a 5% annual funding increase each year to account for inflation and growth.

Section. 10. Methane Hydrates Research Amendments

Amends the Methane Hydrates Research and Development Act of 2000 to add further considerations of environmental impacts as the Department of Energy pursues this area of research. Of the amounts authorized in Section 3, authorizes \$15 million per year for five years for these activities.

Section. 11. Carbon Removal

Establishes a research, development, and demonstration program to examine the methods, technologies, and strategies to remove carbon dioxide from the atmosphere at a large scale.

Establishes an Air Capture Technology Prize and a Direct Air Capture Test Center.

Of the amounts authorized in Section 3, authorizes five years of funding for these activities beginning with \$60 million (not including one-year funding for the prize competition) in Fiscal Year 2020, and including a 5% annual funding increase each year to account for inflation and growth. It also authorizes an additional \$15 million in FY 2020 (\$75 million total for activities pursuant to this Section) for a prize competition to develop direct air capture technologies.

Section. 12. Methane Leak Detection and Mitigation

Establishes a program at the Department of Energy, in coordination with the appropriate Federal agencies, to examine technologies and methods to detect and mitigate methane leaks. The section also authorizes the Department to develop cooperative agreements with State or local governments as well as private entities in order to provide technical assistance to prevent or respond to methane leaks and protect public health in the event of a major methane leak. The section directs DOE to create a publicly accessible re-

source for industry best practices to prevent methane leaks across the range of methane infrastructure and equipment.

Of the amounts authorized in Section 3, authorizes five years of funding for these activities beginning with \$23 million in Fiscal Year 2020, and including a 5% annual funding increase each year to account for inflation and growth.

Section. 13. Waste gas Utilization

Establishes a research, development, and demonstration program to examine technologies and methods that would utilize waste gases, including methane, ethane, propane, butane, pentane, and hexane, produced during oil and shale gas production, including the production of chemicals or transportation fuels.

Section. 14. National Energy Technology Laboratory Reforms

Provides the Director of the National Energy Technology Laboratory (NETL) special hiring authority that would allow NETL to better recruit highly talented individuals for certain positions and add additional workforce flexibility to meet research needs. This authority allows the Director to hire employees for a term of three years without following the federal hiring process or the federal pay scale (with limitations to the latter). Along with these exceptions, the Director may also terminate the employee at any time due to performance or changing priorities. The subsection specifies that the special hiring authority be used for meeting specific project or research needs of the Department. The number of employees at the laboratory under special-hiring authority is capped at no more than ten at any given time.

The section also provides NETL with a discretionary budget, the amount of which is to be between 2 and 4 percent of the laboratory's overall budget. These funds can be used for research, technology transition, workforce development or minor infrastructure improvements or construction. The Secretary is required to submit an annual report to Congress on the use of this authority.

The final part of this section requires that the Secretary submit to Congress a review that includes an assessment of the quality of science and research at NETL relative to other national laboratories, an assessment of the new authorities authorized under this section, and recommendations for additional policy changes to better advance NETL's mission.

Section. 15. Climate Solutions Challenges

Establishes a prize competition for solutions to reduce greenhouse gas emissions associated with fossil-based energy production.

VIII. COMMITTEE VIEWS

The Committee expects that the Department of Energy's Office of Fossil Energy will coordinate closely with other federal agencies and offices within the Department in carrying out relevant activities authorized in H.R. 3607. Such would include coordination with the Office of Energy Efficiency and Renewable Energy's Advanced Manufacturing Office on research, development, and demonstration activities in industrial carbon capture and coordination with the Bioenergy Technologies Office on research, development, and dem-

onstration activities in bioenergy with carbon capture and sequestration.

IX. COST ESTIMATE

Pursuant to clause 3(c)(2) of rule XIII of the Rules of the House of Representatives, the Committee adopts as its own the estimate of new budget authority, entitlement authority, or tax expenditures or revenues contained in the cost estimate prepared by the Director of the Congressional Budget Office pursuant to section 402 of the Congressional Budget Act of 1974.

X. CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

At a Glance			
H.R. 3607, Fossil Energy Research and Development Act of 2019			
As ordered reported by the House Committee on Science, Space, and Technology on July 24, 2019			
By Fiscal Year, Millions of Dollars	2020	2020-2024	2020-2029
Direct Spending (Outlays)	0	*	*
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	*	*
Spending Subject to Appropriation (Outlays)	102	2,537	4,484
Statutory pay-as-you-go procedures apply?	Yes	Mandate Effects	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2030?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No
* = between -\$500,000 and zero			
The bill would			
<ul style="list-style-type: none"> Authorize appropriations totaling \$4.6 billion over the 2020-2025 period for the Department of Energy's fossil energy research and development activities Authorize the appropriation of \$15 million for the department to carry out prize competitions for ideas that reduce carbon emissions from fossil fuel-based energy production 			
Estimated budgetary effects would primarily stem from			
<ul style="list-style-type: none"> Spending of the authorized appropriations 			
Detailed estimate begins on the next page.			

Bill summary: H.R. 3607 would authorize appropriations totaling \$4.6 billion over the 2020–2025 period for the Department of Energy's (DOE's) fossil energy research and development activities. The bill would recodify existing activities under DOE's Office of Fossil Energy, and would direct the department to establish research, development, and demonstration programs for carbon removal, carbon utilization, and waste gas utilization. H.R. 3607 also would authorize the appropriation of \$15 million for DOE to carry out prize competitions for ideas to reduce carbon emissions from fossil fuel-based energy production. The bill would permit DOE to collect and spend donations to award prizes.

Estimated Federal cost: The estimated budgetary effect of H.R. 3607 is shown in Table 1. The costs of the legislation fall within budget function 270 (energy).

TABLE 1.—ESTIMATED BUDGETARY EFFECTS OF H.R. 3607^a

	By fiscal year, millions of dollars—											
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2020–2024	2020–2029
Increases in Spending Subject to Appropriation												
Fossil Energy Activities:												
Authorization	825	866	910	955	1,003	50	0	0	0	0	4,559	4,609
Estimated Outlays	99	335	558	701	827	806	559	322	184	76	2,520	4,467
Prize Competitions:												
Authorization	15	0	0	0	0	0	0	0	0	0	15	15
Estimated Outlays	1	2	4	4	4	0	0	0	0	0	15	15
Other Provisions:												
Estimated Authoriza- tion	2	0	0	0	0	0	0	0	0	0	2	2
Estimated Outlays	2	0	0	0	0	0	0	0	0	0	2	2
Total Changes:												
Estimated Authoriza- tion	842	866	910	955	1,003	50	0	0	0	0	4,576	4,626
Estimated Outlays	102	337	562	705	831	806	559	322	184	76	2,537	4,484

^a Enacting H.R. 3607 could affect direct spending; however, CBO estimates that the net effect would be negligible over the 2019–2029 period.

Basis of estimate: For this estimate, CBO assumes that H.R. 3607 will be enacted near the start of 2020 and that the authorized and necessary amounts will be provided in each year. Estimated outlays are based on historical spending patterns for the affected and similar activities.

H.R. 3607 would authorize appropriations totaling \$4.6 billion over the 2020–2025 period. CBO estimates that implementing the bill would cost \$2.5 billion over the 2020–2024 period.

Fossil energy activities: Section 3 would authorize appropriations totaling \$4.6 billion over the 2020–2024 period for activities under DOE’s fossil energy program. The bill would direct DOE to carry out research, development, and demonstration programs for carbon capture and storage, carbon use, advanced energy systems, carbon removal, methane hydrates, methane leak detection and mitigation, use of waste gas, and the separation of rare earth elements from coal and coal byproducts. In addition, section 5 would direct DOE to use up to \$50 million in 2025 for research, development, and demonstration projects related to the capture of carbon from natural gas.

CBO estimates that implementing sections 3 and 5 would cost \$2.5 billion over the 2020–2024 period. In 2019, DOE received an appropriation of \$740 million for fossil energy research and development.

Prize competitions: Section 15 would authorize the appropriation of \$15 million for DOE to carry out prize competitions for ideas and solutions to capture, convert, and reduce carbon emissions from fossil fuel-based energy production. CBO estimates that implementing the prize competitions would cost \$15 million over the 2020–2024 period.

Other provisions: H.R. 3607 would authorize the Director of the National Energy Technology Laboratory to make appointments to certain positions within the laboratory. The bill would direct DOE

to establish mechanisms for the laboratory to allocate a percentage of its funds toward innovative research, technology development, workforce development, and minor construction. In addition, H.R. 3607 would require a report by the Government Accountability Office on demonstration projects for carbon capture technologies, and would direct DOE to enter into an agreement with the National Academies to study the opportunities for and barriers to commercializing carbon dioxide. Based on the costs of similar tasks, CBO estimates that implementing those provisions would cost \$2 million; such spending would be subject to the availability of appropriated funds.

Pay-As-You-Go Considerations: H.R. 3607 would permit DOE to accept donations to award prizes for the prize competitions. CBO estimates that any donations, which would be recorded in the federal budget as offsetting receipts, would be insignificant and offset by an expenditure soon thereafter. Thus, we estimate that the net effect on direct spending would be negligible over the 2020–2029 period.

Increase in long-term deficits: None.

Mandates: None.

Estimate prepared by: Federal Costs: Janani Shankaran and Kathleen Gramp; Mandates: Brandon Lever.

Estimate reviewed by: Kim P. Cawley, Chief, Natural and Physical Resources Cost Estimates Unit. H. Samuel Papenfuss, Deputy Assistant Director for Budget Analysis.

XI. FEDERAL MANDATES STATEMENT

H.R. 3607 contains no unfunded mandates.

XII. COMMITTEE OVERSIGHT FINDINGS AND RECOMMENDATIONS

The Committee's oversight findings and recommendations are reflected in the body of the report.

XIII. STATEMENT ON GENERAL PERFORMANCE GOALS AND OBJECTIVES

The objective of the legislation is to direct federal research to carry out research, development, demonstration, and commercial application programs in fossil energy with the goal of improving the efficiency, effectiveness, and environmental performance of fossil energy production, upgrading, conversion, and consumption.

XIV. FEDERAL ADVISORY COMMITTEE STATEMENT

H.R. 3607 does not create any advisory committees.

XV. DUPLICATION OF FEDERAL PROGRAMS

Pursuant to clause 3(c)(5) of rule XIII of the Rules of the House of Representatives, the Committee finds that no provision of H.R. 3607 establishes or reauthorizes a program of the federal government known to be duplicative of another federal program, including any program that was included in a report to Congress pursuant to section 21 of Public Law 111–139 or the most recent Catalog of Federal Domestic Assistance.

XVI. EARMARK IDENTIFICATION

Pursuant to clause 9(e), 9(f), and 9(g) of rule XXI, the Committee finds that H.R. 3607 contains no earmarks, limited tax benefits, or limited tariff benefits.

XVII. APPLICABILITY TO THE LEGISLATIVE BRANCH

The Committee finds that H.R. 3607 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVIII. STATEMENT ON PREEMPTION OF STATE, LOCAL, OR TRIBAL LAW

This bill is not intended to preempt any state, local, or tribal law.

XIX. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italics, and existing law in which no change is proposed is shown in roman):

ENERGY POLICY ACT OF 2005**SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

(a) **SHORT TITLE.**—This Act may be cited as the “Energy Policy Act of 2005”.

(b) **TABLE OF CONTENTS.**—The table of contents for this Act is as follows:

Sec. 1. Short title; table of contents.

* * * * *

TITLE IX—RESEARCH AND DEVELOPMENT

* * * * *

Subtitle F—Fossil Energy

[Sec. 961. Fossil energy.

[Sec. 962. Coal and related technologies program.

[Sec. 963. Carbon capture and sequestration research, development, and demonstration program.

[Sec. 964. Research and development for coal mining technologies.

[Sec. 965. Oil and gas research programs.

[Sec. 966. Low-volume oil and gas reservoir research program.

[Sec. 967. Complex well technology testing facility.

[Sec. 968. Methane hydrate research.**]**

Sec. 961. Fossil energy.

Sec. 962. Carbon capture technologies.

Sec. 963. Carbon storage validation and testing.

Sec. 963A. Carbon utilization.

Sec. 964. Research and development for coal mining technologies.

Sec. 965. Oil and gas research programs.

Sec. 966. Low-volume oil and gas reservoir research program.

Sec. 967. Complex well technology testing facility.

Sec. 968. Methane hydrate research.

Sec. 969. Natural gas carbon capture research, development, and demonstration program.

Sec. 969A. Advanced energy systems.

Sec. 969A–1. *High efficiency gas turbines.*
 Sec. 969B. *Rare earth elements.*
 Sec. 969C. *Carbon removal.*
 Sec. 969D. *Methane leak detection and mitigation.*
 Sec. 969E. *Waste gas utilization.*

* * * * *

TITLE IX—RESEARCH AND DEVELOPMENT

* * * * *

Subtitle F—Fossil Energy

SEC. 961. FOSSIL ENERGY.

(a) IN GENERAL.—The Secretary shall carry out research, development, demonstration, and commercial application programs in fossil energy, including activities under this subtitle, with the goal of improving the efficiency, effectiveness, and environmental performance of fossil energy production, upgrading, conversion, and consumption. Such programs take into consideration the following objectives:

(1) Increasing the energy conversion efficiency of all forms of fossil energy through improved technologies.

【(2) Decreasing the cost of all fossil energy production, generation, and delivery.】

(2) *Decreasing the cost of emissions control technologies for fossil energy production, generation, and delivery.*

(3) Promoting diversity of energy supply.

(4) Decreasing the dependence of the United States on foreign energy supplies.

(5) Improving United States energy security.

(6) Decreasing the environmental impact of energy-related activities.

【(7) Increasing the export of fossil energy-related equipment, technology, and services from the United States.】

(7) *Increasing the export of emissions control technologies from the United States for fossil energy-related equipment, technology, and services.*

(8) *Improving the conversion, use, and storage of carbon oxides.*

(9) *Lowering greenhouse gas emissions for all fossil fuel production, generation, delivery, and utilization, to the maximum extent possible.*

(10) *Preventing, predicting, monitoring, and mitigating the unintended leaking of methane, carbon dioxide, or other fossil fuel-related emissions into the atmosphere.*

(11) *Improving the separation and purification of helium from fossil fuel resources.*

(12) *Reducing water use, improving water reuse, and minimizing the surface and subsurface environmental impact in the development of unconventional domestic oil and natural gas resources.*

(13) *Developing carbon removal and utilization technologies, products, and methods that result in net reductions in greenhouse gas emissions, including direct air capture and storage and carbon use and reuse for commercial application.*

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out fossil energy research, development, demonstration, and commercial application activities, including activities authorized under this subtitle—

- [(1) \$611,000,000 for fiscal year 2007;
- [(2) \$626,000,000 for fiscal year 2008; and
- [(3) \$641,000,000 for fiscal year 2009.]]
- (1) *\$825,000,000 for fiscal year 2020;*
- (2) *\$866,250,000 for fiscal year 2021;*
- (3) *\$909,563,000 for fiscal year 2022;*
- (4) *\$955,041,000 for fiscal year 2023; and*
- (5) *\$1,002,793,000 for fiscal year 2024.*

[(c) ALLOCATIONS.—From amounts authorized under subsection (a), the following sums are authorized:

- [(1) For activities under section 962—
 - [(A) \$367,000,000 for fiscal year 2007;
 - [(B) \$376,000,000 for fiscal year 2008; and
 - [(C) \$394,000,000 for fiscal year 2009.
- [(2) For activities under section 964—
 - [(A) \$20,000,000 for fiscal year 2007;
 - [(B) \$25,000,000 for fiscal year 2008; and
 - [(C) \$30,000,000 for fiscal year 2009.
- [(3) For activities under section 966—
 - [(A) \$1,500,000 for fiscal year 2007; and
 - [(B) \$450,000 for each of fiscal years 2008 and 2009.
- [(4) For the Office of Arctic Energy under section 3197 of the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (42 U.S.C. 7144d) \$25,000,000 for each of fiscal years 2007 through 2009.

[(d) EXTENDED AUTHORIZATION.—There are authorized to be appropriated to the Secretary for the Office of Arctic Energy established under section 3197 of the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (42 U.S.C. 7144d) \$25,000,000 for each of fiscal years 2010 through 2012.

[(e) LIMITATIONS.—

[(1) USES.—None of the funds authorized under this section may be used for Fossil Energy Environmental Restoration or Import/Export Authorization.

[(2) INSTITUTIONS OF HIGHER EDUCATION.—Of the funds authorized under subsection (c)(2), not less than 20 percent of the funds appropriated for each fiscal year shall be dedicated to research and development carried out at institutions of higher education.]]

(c) *PRIORITIZATION.—In carrying out this section, the Secretary shall prioritize technologies and strategies that have the potential to meet emissions reduction goals in the agreement of the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change.*

(d) *LIMITATION.—None of the funds authorized under this section may be used for Fossil Energy Environmental Restoration or Import/Export Authorization.*

[SEC. 962. COAL AND RELATED TECHNOLOGIES PROGRAM.

[(a) IN GENERAL.—In addition to the programs authorized under title IV, the Secretary shall conduct a program of technology research, development, demonstration, and commercial application for coal and power systems, including programs to facilitate production and generation of coal-based power through—

- [(1)** innovations for existing plants (including mercury removal);
- [(2)** gasification systems;
- [(3)** advanced combustion systems;
- [(4)** turbines for synthesis gas derived from coal;
- [(5)** carbon capture and sequestration research and development;
- [(6)** coal-derived chemicals and transportation fuels;
- [(7)** liquid fuels derived from low rank coal water slurry;
- [(8)** solid fuels and feedstocks;
- [(9)** advanced coal-related research;
- [(10)** advanced separation technologies; and
- [(11)** fuel cells for the operation of synthesis gas derived from coal.

[(b) COST AND PERFORMANCE GOALS.—

[(1) IN GENERAL.—In carrying out programs authorized by this section, during each of calendar years 2008, 2010, 2012, and 2016, and during each fiscal year beginning after September 30, 2021, the Secretary shall identify cost and performance goals for coal-based technologies that would permit the continued cost-competitive use of coal for the production of electricity, chemical feedstocks, and transportation fuels.

[(2) ADMINISTRATION.—In establishing the cost and performance goals, the Secretary shall—

[(A) consider activities and studies undertaken as of the date of enactment of this Act by industry in cooperation with the Department in support of the identification of the goals;

[(B) consult with interested entities, including—

- [(i)** coal producers;
- [(ii)** industries using coal;
- [(iii)** organizations that promote coal and advanced coal technologies;
- [(iv)** environmental organizations;
- [(v)** organizations representing workers; and
- [(vi)** organizations representing consumers;

[(C) not later than 120 days after the date of enactment of this Act, publish in the Federal Register proposed draft cost and performance goals for public comments; and

[(D) not later than 180 days after the date of enactment of this Act and every 4 years thereafter, submit to Congress a report describing the final cost and performance goals for the technologies that includes—

- [(i)** a list of technical milestones; and
- [(ii)** an explanation of how programs authorized in this section will not duplicate the activities authorized under the Clean Coal Power Initiative authorized under title IV.

[(c) POWDER RIVER BASIN AND FORT UNION LIGNITE COAL MERCURY REMOVAL.—

[(1) IN GENERAL.—In addition to the programs authorized by subsection (a), the Secretary shall establish a program to test and develop technologies to control and remove mercury emissions from subbituminous coal mined in the Powder River Basin, and Fort Union lignite coals, that are used for the generation of electricity.

[(2) EFFICACY OF MERCURY REMOVAL TECHNOLOGY.—In carrying out the program under paragraph (1), the Secretary shall examine the efficacy of mercury removal technologies on coals described in that paragraph that are blended with other types of coal.

[(d) FUEL CELLS.—

[(1) IN GENERAL.—The Secretary shall conduct a program of research, development, demonstration, and commercial application on fuel cells for low-cost, high-efficiency, fuel-flexible, modular power systems.

[(2) DEMONSTRATIONS.—The demonstrations referred to in paragraph (1) shall include solid oxide fuel cell technology for commercial, residential, and transportation applications, and distributed generation systems, using improved manufacturing production and processes.

[SEC. 963. CARBON CAPTURE AND SEQUESTRATION RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.

[(a) IN GENERAL.—The Secretary shall carry out a 10-year carbon capture and sequestration research, development, and demonstration program to develop carbon dioxide capture and sequestration technologies related to industrial sources of carbon dioxide for use—

[(1) in new coal utilization facilities; and

[(2) on the fleet of coal-based units in existence on the date of enactment of this Act.

[(b) OBJECTIVES.—The objectives of the program under subsection (a) shall be—

[(1) to develop carbon dioxide capture technologies, including adsorption and absorption techniques and chemical processes, to remove the carbon dioxide from gas streams containing carbon dioxide potentially amenable to sequestration;

[(2) to develop technologies that would directly produce concentrated streams of carbon dioxide potentially amenable to sequestration;

[(3) to increase the efficiency of the overall system to reduce the quantity of carbon dioxide emissions released from the system per megawatt generated;

[(4) in accordance with the carbon dioxide capture program, to promote a robust carbon sequestration program and continue the work of the Department, in conjunction with the private sector, through regional carbon sequestration partnerships; and

[(5) to expedite and carry out large-scale testing of carbon sequestration systems in a range of geologic formations that will provide information on the cost and feasibility of deployment of sequestration technologies.

[(c) PROGRAMMATIC ACTIVITIES.—

[(1) FUNDAMENTAL SCIENCE AND ENGINEERING RESEARCH AND DEVELOPMENT AND DEMONSTRATION SUPPORTING CARBON CAPTURE AND SEQUESTRATION TECHNOLOGIES AND CARBON USE ACTIVITIES.—

[(A) IN GENERAL.—The Secretary shall carry out fundamental science and engineering research (including laboratory-scale experiments, numeric modeling, and simulations) to develop and document the performance of new approaches to capture and sequester, or use carbon dioxide to lead to an overall reduction of carbon dioxide emissions.

[(B) PROGRAM INTEGRATION.—The Secretary shall ensure that fundamental research carried out under this paragraph is appropriately applied to energy technology development activities, the field testing of carbon sequestration, and carbon use activities, including—

[(i) development of new or advanced technologies for the capture and sequestration of carbon dioxide;

[(ii) development of new or advanced technologies that reduce the cost and increase the efficacy of advanced compression of carbon dioxide required for the sequestration of carbon dioxide;

[(iii) modeling and simulation of geologic sequestration field demonstrations;

[(iv) quantitative assessment of risks relating to specific field sites for testing of sequestration technologies;

[(v) research and development of new and advanced technologies for carbon use, including recycling and reuse of carbon dioxide; and

[(vi) research and development of new and advanced technologies for the separation of oxygen from air.

[(2) FIELD VALIDATION TESTING ACTIVITIES.—

[(A) IN GENERAL.—The Secretary shall promote, to the maximum extent practicable, regional carbon sequestration partnerships to conduct geologic sequestration tests involving carbon dioxide injection and monitoring, mitigation, and verification operations in a variety of candidate geologic settings, including—

[(i) operating oil and gas fields;

[(ii) depleted oil and gas fields;

[(iii) unmineable coal seams;

[(iv) deep saline formations;

[(v) deep geologic systems that may be used as engineered reservoirs to extract economical quantities of heat from geothermal resources of low permeability or porosity; and

[(vi) deep geologic systems containing basalt formations.

[(B) OBJECTIVES.—The objectives of tests conducted under this paragraph shall be—

[(i) to develop and validate geophysical tools, analysis, and modeling to monitor, predict, and verify carbon dioxide containment;

[(ii) to validate modeling of geologic formations;

[(iii) to refine sequestration capacity estimated for particular geologic formations;

[(iv) to determine the fate of carbon dioxide concurrent with and following injection into geologic formations;

[(v) to develop and implement best practices for operations relating to, and monitoring of, carbon dioxide injection and sequestration in geologic formations;

[(vi) to assess and ensure the safety of operations related to geologic sequestration of carbon dioxide;

[(vii) to allow the Secretary to promulgate policies, procedures, requirements, and guidance to ensure that the objectives of this subparagraph are met in large-scale testing and deployment activities for carbon capture and sequestration that are funded by the Department of Energy; and

[(viii) to provide information to States, the Environmental Protection Agency, and other appropriate entities to support development of a regulatory framework for commercial-scale sequestration operations that ensure the protection of human health and the environment.

[(3) LARGE-SCALE CARBON DIOXIDE SEQUESTRATION TESTING.—

[(A) IN GENERAL.—The Secretary shall conduct not less than 7 initial large-scale sequestration tests, not including the FutureGen project, for geologic containment of carbon dioxide to collect and validate information on the cost and feasibility of commercial deployment of technologies for geologic containment of carbon dioxide. These 7 tests may include any Regional Partnership projects awarded as of the date of enactment of the Department of Energy Carbon Capture and Sequestration Research, Development, and Demonstration Act of 2007.

[(B) DIVERSITY OF FORMATIONS TO BE STUDIED.—In selecting formations for study under this paragraph, the Secretary shall consider a variety of geologic formations across the United States, and require characterization and modeling of candidate formations, as determined by the Secretary.

[(C) SOURCE OF CARBON DIOXIDE FOR LARGE-SCALE SEQUESTRATION TESTS.—In the process of any acquisition of carbon dioxide for sequestration tests under subparagraph (A), the Secretary shall give preference to sources of carbon dioxide from industrial sources. To the extent feasible, the Secretary shall prefer tests that would facilitate the creation of an integrated system of capture, transportation and sequestration of carbon dioxide. The preference provided for under this subparagraph shall not delay the implementation of the large-scale sequestration tests under this paragraph.

[(D) DEFINITION.—For purposes of this paragraph, the term “large-scale” means the injection of more than 1,000,000 tons of carbon dioxide from industrial sources annually or a scale that demonstrates the ability to inject

and sequester several million metric tons of industrial source carbon dioxide for a large number of years.

[(4) PREFERENCE IN PROJECT SELECTION FROM MERITORIOUS PROPOSALS.—In making competitive awards under this subsection, subject to the requirements of section 989, the Secretary shall—

[(A) give preference to proposals from partnerships among industrial, academic, and government entities; and

[(B) require recipients to provide assurances that all laborers and mechanics employed by contractors and subcontractors in the construction, repair, or alteration of new or existing facilities performed in order to carry out a demonstration or commercial application activity authorized under this subsection shall be paid wages at rates not less than those prevailing on similar construction in the locality, as determined by the Secretary of Labor in accordance with subchapter IV of chapter 31 of title 40, United States Code, and the Secretary of Labor shall, with respect to the labor standards in this paragraph, have the authority and functions set forth in Reorganization Plan Numbered 14 of 1950 (15 Fed. Reg. 3176; 5 U.S.C. Appendix) and section 3145 of title 40, United States Code.

[(5) COST SHARING.—Activities under this subsection shall be considered research and development activities that are subject to the cost sharing requirements of section 988(b).

[(6) PROGRAM REVIEW AND REPORT.—During fiscal year 2011, the Secretary shall—

[(A) conduct a review of programmatic activities carried out under this subsection; and

[(B) make recommendations with respect to continuation of the activities.

[(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out this section—

[(1) \$240,000,000 for fiscal year 2008;

[(2) \$240,000,000 for fiscal year 2009;

[(3) \$240,000,000 for fiscal year 2010;

[(4) \$240,000,000 for fiscal year 2011; and

[(5) \$240,000,000 for fiscal year 2012.]

SEC. 962. CARBON CAPTURE TECHNOLOGIES.

(a) *IN GENERAL.*—The Secretary shall conduct a program of research, development, demonstration, and commercial application of carbon capture technologies, which shall include facilitation of the development and use of—

(1) carbon capture technologies for coal and natural gas;

(2) innovations to significantly decrease emissions at existing power plants; and

(3) advanced separation technologies.

(b) *INVESTMENT.*—As a part of the program under subsection (a), the Secretary shall maintain robust investments in carbon capture technologies for coal and natural gas applications.

(c) *LARGE-SCALE PILOTS.*—In carrying out this section, the Secretary is encouraged to support pilot projects that test carbon capture technologies on coal and natural gas power and industrial systems below the 100 megawatt scale, consistent with section 988(b).

(d) *COST AND PERFORMANCE GOALS.*—*In carrying out the program under subsection (a), the Secretary shall establish cost and performance goals to assist in the transition of carbon capture research to commercially viable technologies.*

(e) *CARBON CAPTURE PILOT TEST CENTERS.*—

(1) *IN GENERAL.*—*As a part of the program under subsection (a), not later than 1 year after the date of the enactment of the Fossil Energy Research and Development Act of 2019, the Secretary shall award grants to eligible entities for the operation of not less than three Carbon Capture Test Centers (in this subsection, known as the “Centers”) to provide unique testing capabilities for innovative carbon capture technologies for power and industrial systems.*

(2) *PURPOSE.*—*Each Center shall—*

(A) *advance research, development, demonstration, and commercial application of carbon capture technologies for power and industrial systems; and*

(B) *test technologies that represent the scale of technology development beyond laboratory testing, but not yet advanced to testing under operational conditions at commercial scale.*

(3) *APPLICATION.*—*An entity seeking to operate a Center under this subsection shall submit to the Secretary an application at such time and in such manner as the Secretary may require.*

(4) *PRIORITY CRITERIA.*—*In selecting applications to operate a Center under this subsection, the Secretary shall prioritize applicants that—*

(A) *have access to existing or planned research facilities with modular technology capabilities;*

(B) *are institutions of higher education with established expertise in engineering and design for carbon capture technologies, or partnerships with such institutions;*

(C) *have access to existing research and test facilities for pre-combustion, post-combustion, or oxy-combustion technologies; or*

(D) *have test capabilities to address scaling challenges of integrating carbon capture technologies with utility scale power plants.*

(5) *CONSIDERATIONS.*—*In awarding grants for the operation of the Centers under this subsection, the Secretary shall ensure that—*

(A) *the portfolio of Centers includes a diverse representation of regional and resource characteristics; and*

(B) *each new Center demonstrates unique research capabilities, unique regional benefits, or new technology development opportunities.*

(6) *SCHEDULE.*—*Each grant to operate a Center under this subsection shall be awarded for a term of not more than 5 years, subject to the availability of appropriations. The Secretary may renew such 5-year term without limit, subject to a rigorous merit review.*

(7) *TERMINATION.*—*To the extent otherwise authorized by law, the Secretary may eliminate a Center during any 5-year term described in paragraph (6) if such Center is underperforming.*

(f) DEMONSTRATIONS.—

(1) IN GENERAL.—As a part of the program under subsection (a), the Secretary may provide grants for large-scale demonstration projects for power and industrial systems that test the scale of technology necessary to gain the operational data needed to understand the technical and performance risks of the technology before the application of the technology at commercial scale, in accordance with this subsection.

(2) ENGINEERING AND DESIGN STUDIES.—The Secretary is authorized to fund front-end engineering and design studies in addition to, or in advance of, issuing an award for a demonstration project under this subsection.

(3) APPLICATION.—An entity seeking an award to conduct a demonstration project under this subsection shall submit to the Secretary an application at such time and in such manner as the Secretary may require.

(4) LIMITATIONS.—The Secretary shall only provide an award under this subsection after reviewing each applicant and application regarding—

- (A) financial strength;*
- (B) construction schedule;*
- (C) market risk; and*
- (D) contractor history.*

(5) REQUIREMENTS.—A demonstration project funded under this subsection shall—

- (A) utilize technologies that have completed pilot-scale testing or the equivalent, as determined by the Secretary;*
- (B) secure and maintain agreements for the utilization or sequestration of captured carbon dioxide; and*
- (C) upon completion, demonstrate carbon capture technologies on a power or industrial system capable of capturing not less than 100,000 tons of carbon dioxide annually.*

(g) DEFINITION OF POWER SYSTEM.—In this section, the term “power system” means any electricity generating unit that utilizes fossil fuels to generate electricity provided to the electric grid or directly to a consumer.

(h) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

- (1) \$300,000,000 for fiscal year 2020;*
- (2) \$315,000,000 for fiscal year 2021;*
- (3) \$330,750,000 for fiscal year 2022;*
- (4) \$347,288,000 for fiscal year 2023; and*
- (5) \$364,652,000 for fiscal year 2024.*

SEC. 963. CARBON STORAGE VALIDATION AND TESTING.

(a) CARBON STORAGE.—The Secretary, in consultation with the Administrator of the Environmental Protection Agency, shall carry out a program of research, development, and demonstration for carbon storage. The program shall—

- (1) in coordination with relevant Federal agencies, develop and maintain mapping tools and resources that assess the capacity of geologic storage formations in the United States;*
- (2) develop monitoring tools, modeling of geologic formations, and analyses to predict and verify carbon dioxide containment*

and account for sequestered carbon dioxide in geologic storage sites;

(3) research potential environmental, safety, and health impacts in the event of a leak to the atmosphere or to an aquifer, and any corresponding mitigation actions or responses to limit harmful consequences;

(4) evaluate the interactions of carbon dioxide with formation solids and fluids, including the propensity of injections to induce seismic activity;

(5) assess and ensure the safety of operations related to geologic sequestration of carbon dioxide;

(6) determine the fate of carbon dioxide concurrent with and following injection into geologic formations;

(7) support cost and business model assessments to examine the economic viability of technologies and systems developed under this program; and

(8) provide information to State, local, and Tribal governments, the Environmental Protection Agency, and other appropriate entities, to support development of a regulatory framework for commercial-scale sequestration operations that ensure the protection of human health and the environment.

(b) **GEOLOGIC SETTINGS.**—In carrying out research activities under this section, the Secretary shall consider a variety of candidate geologic settings, both onshore and offshore, including—

(1) operating oil and gas fields;

(2) depleted oil and gas fields;

(3) residual oil zones;

(4) unconventional reservoirs and rock types;

(5) unmineable coal seams;

(6) saline formations in both sedimentary and basaltic geologies;

(7) geologic systems that may be used as engineered reservoirs to extract economical quantities of brine from geothermal resources of low permeability or porosity; and

(8) geologic systems containing in situ carbon dioxide mineralization formations.

(c) **REGIONAL CARBON SEQUESTRATION PARTNERSHIPS.**—

(1) **IN GENERAL.**—The Secretary shall carry out large-scale carbon sequestration demonstrations for geologic containment of carbon dioxide to collect and validate information on the cost and feasibility of commercial deployment of technologies for the geologic containment of carbon dioxide. The Secretary may fund new demonstrations or expand the work completed at one or more of the existing regional carbon sequestration partnerships.

(2) **DEMONSTRATION COMPONENTS.**—Each demonstration described in paragraph (1) shall include longitudinal tests involving carbon dioxide injection and monitoring, mitigation, and verification operations.

(3) **CLEARINGHOUSE.**—The National Energy Technology Laboratory shall act as a clearinghouse of shared information and resources for the regional carbon sequestration partnerships and any new demonstrations funded under this section.

(4) **REPORT.**—Not later than 1 year after the date of enactment of the Fossil Energy Research and Development Act of 2019, the Secretary shall provide to the Committee on Science,

Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report that—

(A) assesses the progress of all regional carbon sequestration partnerships;

(B) identifies the remaining challenges in achieving carbon sequestration that is reliable and safe for the environment and public health; and

(C) creates a roadmap for Department of Energy carbon storage research and development activities through 2030 with the goal of reducing economic and policy barriers to commercial carbon sequestration.

(5) LARGE-SCALE CARBON SEQUESTRATION.—For purposes of this subsection, “large-scale carbon sequestration” means a scale that demonstrates the ability to inject and sequester several million metric tons carbon dioxide for at least 10 years.

(d) INTEGRATED STORAGE PROJECTS.—The Secretary may carry out a program for the purpose of transitioning the large-scale carbon sequestration demonstration projects under subsection (c) into integrated, commercial storage complexes. The program shall focus on—

(1) qualifying geologic storage sites in order to accept large volumes of carbon dioxide acceptable for commercial contracts;

(2) understanding the technical and commercial viability of storage sites;

(3) developing the qualification processes that will be necessary for a diverse range of geologic storage sites to commercially accept carbon dioxide; and

(4) any other activities the Secretary determines necessary to transition the large scale demonstration storage projects into commercial ventures.

(e) COST SHARING.—The Secretary shall require cost sharing under this section in accordance with section 988.

(f) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

(1) \$120,000,000 for fiscal year 2020;

(2) \$126,000,000 for fiscal year 2021;

(3) \$132,300,000 for fiscal year 2022;

(4) \$138,915,000 for fiscal year 2023; and

(5) \$145,860,750 for fiscal year 2024.

SEC. 963A. CARBON UTILIZATION.

(a) IN GENERAL.—The Secretary shall carry out a program of research, development, and demonstration for carbon utilization. The program shall—

(1) assess and monitor potential changes in life cycle carbon dioxide and other greenhouse gas emissions, and other environmental safety indicators of new technologies, practices, processes, or methods, used in enhanced hydrocarbon recovery as part of the activities authorized in section 963 of the Energy Policy Act of 2005 (42 U.S.C. 16293);

(2) identify and evaluate novel uses for carbon, including the conversion of carbon oxides, in a manner that, on a full life-cycle basis, achieves a permanent reduction in, or avoidance of

a net increase in carbon dioxide in the atmosphere, for use in commercial and industrial products, such as—

- (A) chemicals;
- (B) plastics;
- (C) building materials;
- (D) fuels;
- (E) cement;
- (F) products of coal utilization in power systems (as such term is defined in section 962(e)), or other applications; or
- (G) other products with demonstrated market value;
- (3) carbon capture technologies for industrial systems;
- (4) identify and assess alternative uses for coal that result in no net emissions of carbon dioxide or other pollutants, including products derived from carbon engineering, carbon fiber, and coal conversion methods.

(b) AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

- (1) \$25,000,000 for fiscal year 2020;
- (2) \$26,250,000 for fiscal year 2021;
- (3) \$27,562,500 for fiscal year 2022;
- (4) \$28,940,625 for fiscal year 2023; and
- (5) \$30,387,656 for fiscal year 2024.

* * * * *

SEC. 969. NATURAL GAS CARBON CAPTURE RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.

(a) DEFINITIONS.—In this section:

(1) NATURAL GAS.—The term “natural gas” includes any fuel consisting in whole or in part of—

- (A) natural gas;
- (B) liquid petroleum gas;
- (C) synthetic gas derived from petroleum or natural gas liquids;
- (D) any mixture of natural gas and synthetic gas; or
- (E) any product derived directly from natural gas, including hydrogen.

(2) QUALIFYING ELECTRIC GENERATION FACILITY.—The term “qualifying electric generation facility” means a facility that generates electric energy through the use of natural gas.

(3) QUALIFYING TECHNOLOGY.—The term “qualifying technology” means any technology to capture carbon dioxide produced during the generation of electricity from natural gas power systems

(b) ESTABLISHMENT OF RESEARCH, DEVELOPMENT, AND DEMONSTRATION PROGRAM.—

(1) IN GENERAL.—The Secretary shall establish a program under which the Secretary shall, through a competitive, merit-reviewed process, award grants to eligible entities to conduct research, development, and demonstration of qualifying technologies.

(2) OBJECTIVES.—The objectives of the program established under paragraph (1) shall be—

- (A) to conduct research to accelerate the development of qualifying technologies to reduce the quantity of carbon di-

oxide emissions released from qualifying electric generation facilities, including—

(i) pre- and post-combustion capture technologies; and

(ii) technologies to improve the thermodynamics, kinetics, scalability, durability, and flexibility of carbon capture technologies for use during the generation of electricity from natural gas power systems;

(B) to expedite and carry out demonstration projects (including pilot projects) for qualifying technologies in partnership with qualifying electric generation facilities in order to demonstrate the technical feasibility and economic potential for commercial deployment of technologies developed pursuant to subparagraph (A); and

(C) to identify any barriers to the commercial deployment of any qualifying technologies under development pursuant to research conducted pursuant to subparagraph (A).

(3) *ELIGIBLE ENTITIES.*—An entity eligible to receive a grant under this subsection is—

(A) a National Laboratory;

(B) an institution of higher education;

(C) a research facility;

(D) a multi-institutional collaboration; or

(E) another appropriate entity or combination of any of the entities specified in subparagraphs (A) through (D).

(c) *CARBON CAPTURE FACILITIES DEMONSTRATION PROGRAM.*—

(1) *ESTABLISHMENT.*—As part of the program established under paragraph (1), the Secretary shall establish a demonstration program under which the Secretary shall, through a competitive, merit-reviewed process, enter into cooperative agreements with entities that submit applications pursuant to paragraph (4) for demonstration or pilot projects to construct and operate, by not later than September 30, 2025, up to five facilities to capture carbon dioxide from qualifying electric generation facilities. The Secretary shall, to the maximum extent practicable, provide technical assistance to any entity seeking to enter into such a cooperative agreement in obtaining any necessary permits and licenses to demonstrate qualifying technologies.

(2) *COOPERATIVE AGREEMENTS.*—The Secretary may enter into a cooperative agreement under this subsection with industry stakeholders, including any such industry stakeholder operating in partnership with National Laboratories, institutions of higher education, multi-institutional collaborations, and other appropriate entities.

(3) *GOALS.*—Each demonstration or pilot project carried out pursuant to the demonstration program under this subsection shall—

(A) be designed to further the development of qualifying technologies that may be used by a qualifying electric generation facility;

(B) be financed in part by the private sector;

(C) if necessary, secure agreements for the offtake of carbon dioxide emissions captured by qualifying technologies during the project; and

(D) support energy production in the United States.

(4) *REQUEST FOR APPLICATIONS.*—Not later than 120 days after the date of enactment of this Act, the Secretary shall solicit applications for cooperative agreements for projects—

(A) to demonstrate qualifying technologies at up to five qualifying electric generation facilities; and

(B) to construct and operate three or more facilities to capture carbon dioxide from a qualifying electric generation facility.

(5) *REVIEW OF APPLICATIONS.*—In considering applications submitted under paragraph (4), the Secretary, to the maximum extent practicable, shall—

(A) ensure a broad geographic distribution of project sites;

(B) ensure that a broad selection of qualifying electric generation facilities are represented;

(C) ensure that a broad selection of qualifying technologies are represented;

(D) require information and knowledge gained by each participant in the demonstration program to be transferred and shared among all participants in the demonstration program; and

(E) leverage existing—

(i) public-private partnerships; and

(ii) Federal resources.

(d) *COST SHARING.*—In carrying out this section, the Secretary shall require cost sharing in accordance with section 988.

(e) *REPORT.*—Not later than 180 days after the date on which the Secretary solicits applications under subsection (c)(3), and annually thereafter, the Secretary shall submit to the appropriate committees of jurisdiction of the Senate and the House of Representatives a report that includes—

(1) a detailed description of how applications for cooperative agreements under subsection (b) will be solicited and evaluated, including—

(A) a list of any activities carried out by the Secretary to solicit or evaluate applications; and

(B) a process for ensuring that any projects carried out under a cooperative agreement are designed to result in the development or demonstration of qualifying technologies;

(2)(A) in the case of the first report under this subsection, a detailed list of technical milestones for the development and demonstration of each qualifying technology pursued under subsection (b); and

(B) in the case of each subsequent report under this subsection, the progress made towards achieving such technical milestones during the period covered by the report; and

(3) with respect to the demonstration program established under subsection (c), includes—

(A) an estimate of the cost of licensing, permitting, constructing, and operating each carbon capture facility expected to be constructed under that demonstration program;

(B) a schedule for the planned construction and operation of each demonstration or pilot project; and

(C) *an estimate of any financial assistance, compensation, or incentives proposed to be paid by the host State, Indian Tribe, or local government with respect to each facility.*

(f) *FUNDING.—For each of fiscal years 2020 through 2025, out of any amounts appropriated to the Department to carry out fossil energy research and development activities and not otherwise obligated, the Secretary may use to carry out this section not more than \$50,000,000.*

SEC. 969A. ADVANCED ENERGY SYSTEMS.

(a) *IN GENERAL.—The Secretary shall conduct a program, with the purpose of reducing emissions from fossil fuel power generation by not less than 50 percent, of research, development, demonstration, and commercial application with respect to the following:*

(1) *High-efficiency turbines in accordance with the program under section 969A–1.*

(2) *Supercritical and ultrasupercritical carbon dioxide, with an emphasis on developing directly-fired and indirectly fired cycles in the next 10 years.*

(3) *Advanced combustion systems, including oxy-combustion systems and chemical looping.*

(4) *Fuel cell technologies for low-cost, high-efficiency, fuel-flexible, modular power systems, including solid oxide fuel cell technology for commercial, residential, and distributed generation systems, using improved manufacturing production and processes.*

(5) *Gasification systems to enable carbon capture, improve efficiency, and reduce capital and operating costs.*

(6) *Thermal cycling with ramping or rapid black start capabilities that do not compromise efficiency or environmental performance.*

(7) *Small-scale and modular coal-fired technologies with reduced carbon outputs or carbon capture that can support incremental power generation capacity additions.*

(b) *PRIORITY.—In carrying out the program under subsection (a), the Secretary is encouraged to prioritize transformational technologies that enable a step change in reduction of emissions as compared to the technology in existence on the date of enactment of this section.*

(c) *AUTHORIZATION OF APPROPRIATIONS.—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section and section 969A–1—*

(1) *\$150,000,000 for fiscal year 2020;*

(2) *\$157,500,000 for fiscal year 2021;*

(3) *\$165,375,000 for fiscal year 2022;*

(4) *\$173,643,750 for fiscal year 2023; and*

(5) *\$182,325,938 for fiscal year 2024.*

SEC. 969A–1. HIGH EFFICIENCY GAS TURBINES.

(a) *IN GENERAL.—The Secretary of Energy, through the Office of Fossil Energy, shall carry out a multiyear, multiphase program of research, development, and technology demonstration to improve the efficiency of gas turbines used in power generation systems and to identify the technologies that ultimately will lead to gas turbine*

combined cycle efficiency of 67 percent or simple cycle efficiency of 50 percent.

(b) *PROGRAM ELEMENTS.*—The program under this section shall—

(1) support first-of-a-kind engineering and detailed gas turbine design for megawatt-scale and utility-scale electric power generation, including—

(A) high temperature materials, including superalloys, coatings, and ceramics;

(B) improved heat transfer capability;

(C) manufacturing technology required to construct complex three-dimensional geometry parts with improved aerodynamic capability;

(D) combustion technology to produce higher firing temperature while lowering nitrogen oxide and carbon monoxide emissions per unit of output;

(E) advanced controls and systems integration;

(F) advanced high performance compressor technology; and

(G) validation facilities for the testing of components and subsystems;

(2) include technology demonstration through component testing, subscale testing, and full-scale testing in existing fleets;

(3) include field demonstrations of the developed technology elements so as to demonstrate technical and economic feasibility; and

(4) assess overall combined cycle and simple cycle system performance.

(c) *PROGRAM GOALS.*—The goals of the multiphase program established under subsection (a) shall be—

(1) in phase I—

(A) to develop the conceptual design of advanced high efficiency gas turbines that can achieve at least 65-percent combined cycle efficiency or 47-percent simple cycle efficiency on a lower heating value basis; and

(B) to develop and demonstrate the technology required for advanced high efficiency gas turbines that can achieve at least 65-percent combined cycle efficiency or 47-percent simple cycle efficiency on a lower heating value basis; and

(2) in phase II, to develop the conceptual design for advanced high efficiency gas turbines that can achieve at least 67-percent combined cycle efficiency or 50-percent simple cycle efficiency on a lower heating value basis.

(d) *PROPOSALS.*—Within 180 days after the date of enactment of this Act, the Secretary shall solicit grant and contract proposals from industry, small businesses, universities, and other appropriate parties for conducting activities under this Act. In selecting proposals, the Secretary shall emphasize—

(1) the extent to which the proposal will stimulate the creation or increased retention of jobs in the United States; and

(2) the extent to which the proposal will promote and enhance United States technology leadership.

(e) *COMPETITIVE AWARDS.*—The provision of funding under this section shall be on a competitive basis with an emphasis on technical merit.

(f) *COST SHARING.*—Section 988 of the Energy Policy Act of 2005 (42 U.S.C. 16352) shall apply to an award of financial assistance made under this section.

(g) *LIMITS ON PARTICIPATION.*—The limits on participation applicable under section 999E of the Energy Policy Act of 2005 (42 U.S.C. 16375) shall apply to financial assistance awarded under this section.

SEC. 969B. RARE EARTH ELEMENTS.

(a) *IN GENERAL.*—In coordination with the relevant Federal agencies, the Secretary shall conduct research to develop and assess methods to separate and recover rare earth elements and other strategic minerals and coproducts from coal and coal byproduct streams. The program shall—

(1) develop advanced rare earth element separation and extraction processes using coal-based resources as feedstock materials;

(2) assess the technical and economic feasibility of recovering rare earth elements from coal-based resources and validate such feasibility with prototype systems producing salable, high-purity rare earth elements from coal-based resources; and

(3) assess and mitigate any environmental and public health impacts of recovering rare earth elements from coal-based resources.

(b) *AUTHORIZATION OF APPROPRIATIONS.*—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

(1) \$23,000,000 for fiscal year 2020;

(2) \$24,150,000 for fiscal year 2021;

(3) \$25,357,500 for fiscal year 2022;

(4) \$26,625,375 for fiscal year 2023; and

(5) \$27,956,644 for fiscal year 2024.

SEC. 969C. CARBON REMOVAL.

(a) *ESTABLISHMENT.*—The Secretary, in coordination with the appropriate Federal agencies, shall establish a research, development, and demonstration program to remove carbon dioxide from the atmosphere on a large scale. The program may include activities in—

(1) direct air capture and storage technologies;

(2) enhanced carbon mineralization;

(3) bioenergy with carbon capture and sequestration;

(4) agricultural and grazing practices;

(5) forest management and afforestation; and

(6) planned or managed carbon sinks, including natural and artificial.

(b) *PRIORITIZATION.*—In carrying out the program established in subsection (a), the Secretary shall prioritize—

(1) the activities described in paragraphs (1) and (2) of subsection (a), acting through the Assistant Secretary for Fossil Energy; and

(2) the activities described in subsection (a)(3), acting through the Assistant Secretary for Energy Efficiency and Renewable Energy and the Assistant Secretary for Fossil Energy.

(c) *CONSIDERATIONS.*—The program under this section shall identify and develop carbon removal technologies and strategies that consider the following:

- (1) *Land use changes, including impacts on natural and managed ecosystems.*
- (2) *Ocean acidification.*
- (3) *Net greenhouse gas emissions.*
- (4) *Commercial viability.*
- (5) *Potential for near-term impact.*
- (6) *Potential for carbon reductions on a gigaton scale.*
- (7) *Economic co-benefits.*

(d) *ACCOUNTING.*—The Department shall collaborate with the Environmental Protection Agency and other relevant agencies to develop and improve accounting frameworks and tools to accurately measure carbon removal and sequestration methods and technologies across the Federal Government.

(e) *AIR CAPTURE TECHNOLOGY PRIZE.*—Not later than 1 year after the date of enactment of this Act, as part of the program carried out under this section, the Secretary shall carry out a program to award competitive technology prizes for carbon dioxide capture from ambient air or water. In carrying out this subsection, the Secretary shall—

(1) *in accordance with section 24 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3719), develop requirements for—*

(A) *the prize competition process;*

(B) *minimum performance standards for projects eligible to participate in the prize competition; and*

(C) *monitoring and verification procedures for projects selected to receive a prize award;*

(2) *establish minimum levels for the capture of carbon dioxide from ambient air or water that are required to qualify for a prize award; and*

(3) *offer prize awards for any of the following:*

(A) *A design for a promising capture technology that will—*

(i) *be operated on a demonstration scale; and*

(ii) *have the potential to achieve significant reduction in the level of carbon dioxide in the atmosphere.*

(B) *A successful bench-scale demonstration of a capture technology.*

(C) *An operational capture technology on a commercial scale.*

(f) *DIRECT AIR CAPTURE TEST CENTER.*—

(1) *IN GENERAL.*—Not later than 1 year after the date of enactment of the Fossil Energy Research and Development Act of 2019, the Secretary shall award grants to one or more eligible entities for the operation of one or more test centers (in this subsection, known as “Centers”) to provide unique testing capabilities for innovative direct air capture and storage technologies.

(2) *PURPOSE.*—Each Center shall—

(A) *advance research, development, demonstration, and commercial application of direct air capture and storage technologies;*

(B) *support pilot plant and full-scale demonstration projects and test technologies that represent the scale of technology development beyond laboratory testing but not*

yet advanced to test under operational conditions at commercial scale;

(C) develop front-end engineering design and economic analysis; and

(D) maintain a public record of pilot and full-scale plant performance.

(3) **PRIORITY CRITERIA.**—In selecting applications to operate a Center under this subsection, the Secretary shall prioritize applicants that—

(A) have access to existing or planned research facilities;

(B) are institutions of higher education with established expertise in engineering for direct air capture technologies, or partnerships with such institutions; or

(C) have access to existing research and test facilities for bulk materials design and testing, component design and testing, or professional engineering design.

(4) **SCHEDULE.**—Each grant to operate a Center under this subsection shall be awarded for a term of not more than 5 years, subject to the availability of appropriations. The Secretary may renew such 5-year term without limit, subject to a rigorous merit review.

(5) **TERMINATION.**—To the extent otherwise authorized by law, the Secretary may eliminate the center during any 5-year term described in the last paragraph if it is underperforming.

(g) **LARGE-SCALE PILOTS AND DEMONSTRATIONS.**—In supporting the technology development activities under this section, the Secretary is encouraged to support carbon removal pilot and demonstration projects, including—

(1) pilot projects that test direct air capture systems capable of capturing 10 to 100 tonnes of carbon oxides per year to provide data for demonstration-scale projects; and

(2) direct air capture demonstration projects capable of capturing greater than 1,000 tonnes of carbon oxides per year.

(h) **INTRA-AGENCY RESEARCH.**—In carrying out the program established in (a), the Secretary shall encourage and promote collaborations among relevant offices and agencies within the Department.

(i) **AUTHORIZATION OF APPROPRIATIONS.**—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—

(1) \$75,000,000 for fiscal year 2020, \$15,000,000 of which are authorized to carry out subsection (e);

(2) \$63,000,000 for fiscal year 2021;

(3) \$66,150,000 for fiscal year 2022;

(4) \$69,458,000 for fiscal year 2023; and

(5) \$72,930,000 for fiscal year 2024.

SEC. 969D. METHANE LEAK DETECTION AND MITIGATION.

(a) **IN GENERAL.**—The Secretary, in consultation with the Administrator of the Environmental Protection Agency and other appropriate Federal agencies, shall carry out a program of methane leak detection and mitigation research, development, demonstration, and commercial application for technologies and methods that significantly reduce emissions. In carrying out the program, the Secretary shall—

(1) develop cooperative agreements with State or local governments or private entities to provide technical assistance to—

- (A) prevent or respond to methane leaks, including detection, mitigation, and identification of leaks throughout the natural gas infrastructure (which includes natural gas storage, pipelines, and natural gas production sites); and
- (B) protect public health in the event of a major methane leak;
- (2) promote demonstration and adoption of effective methane emissions-reduction technologies in the private sector;
- (3) in coordination with representatives from private industry, State and local governments, and institutions of higher education, create a publicly accessible resource for best practices in the design, construction, maintenance, performance, monitoring, and incident response for—
 - (A) pipeline systems;
 - (B) wells;
 - (C) compressor stations;
 - (D) storage facilities; and
 - (E) other vulnerable infrastructure;
- (4) identify high-risk characteristics of pipelines, wells, and materials, geologic risk factors, or other key factors that increase the likelihood of methane leaks; and
- (5) in collaboration with private entities and institutions of higher education, quantify and map significant geologic methane seeps across the United States.
- (b) **CONSIDERATIONS.**—In carrying out the program under this section, the Secretary shall consider the following:
 - (1) Historical data of methane leaks.
 - (2) Public health consequences.
 - (3) Public safety.
 - (4) Novel materials and designs for pipelines, compressor stations, components, and wells (including casing, cement, well-head).
 - (5) Regional geologic traits.
 - (6) Induced and natural seismicity.
- (c) **AUTHORIZATION OF APPROPRIATIONS.**—Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section—
 - (1) \$22,000,000 for fiscal years 2020;
 - (2) \$23,100,000 for fiscal years 2021;
 - (3) \$24,255,000 for fiscal years 2022;
 - (4) \$25,467,750 for fiscal years 2023; and
 - (5) \$26,741,138 for fiscal years 2024.

SEC. 969E. WASTE GAS UTILIZATION.

The Secretary shall carry out a program of research, development, and demonstration for waste gas utilization. The program shall—

- (1) identify and evaluate novel uses for light hydrocarbons, such as methane, ethane, propane, butane, pentane and hexane, produced during oil and shale gas production, including the production of chemicals or transportation fuels;
- (2) develop advanced gas conversion technologies that are modular and compact, and may leverage advanced manufacturing technologies;
- (3) support demonstration activities at operating oil and gas facilities to test the performance and cost-effectiveness of new gas conversion technologies; and

(4) assess and monitor potential changes in life cycle greenhouse gas emissions that may result from the use of technologies developed under this program.

* * * * *

**METHANE HYDRATE RESEARCH AND DEVELOPMENT
ACT OF 2000**

* * * * *

SEC. 4. METHANE HYDRATE RESEARCH AND DEVELOPMENT PROGRAM.

(a) IN GENERAL.—

(1) COMMENCEMENT OF PROGRAM.—Not later than 90 days after the date of enactment of the Energy Research, Development, Demonstration, and Commercial Application Act of 2005, the Secretary, in consultation with the Secretary of Commerce, the Secretary of Defense, the Secretary of the Interior, and the Director, shall commence a program of methane hydrate research and development in accordance with this section.

(2) DESIGNATIONS.—The Secretary, the Secretary of Commerce, the Secretary of Defense, the Secretary of the Interior, and the Director shall designate individuals to carry out this section.

(3) COORDINATION.—The individual designated by the Secretary shall coordinate all activities within the Department of Energy relating to methane hydrate research and development.

(4) MEETINGS.—The individuals designated under paragraph (2) shall meet not later than 180 days after the date of enactment of the Energy Research, Development, Demonstration, and Commercial Application Act of 2005 and not less frequently than every 180 days thereafter to—

- (A) review the progress of the program under paragraph (1); and
- (B) coordinate interagency research and partnership efforts in carrying out the program.

[(b) GRANTS, CONTRACTS, COOPERATIVE AGREEMENTS, INTERAGENCY FUNDS TRANSFER AGREEMENTS, AND FIELD WORK PROPOSALS.—

[(1) ASSISTANCE AND COORDINATION.—In carrying out the program of methane hydrate research and development authorized by this section, the Secretary may award grants to, or enter into contracts or cooperative agreements with, institutions of higher education, oceanographic institutions, and industrial enterprises to—

- [(A) conduct basic and applied research to identify, explore, assess, and develop methane hydrate as a commercially viable source of energy;
- [(B) identify methane hydrate resources through remote sensing;
- [(C) acquire and reprocess seismic data suitable for characterizing methane hydrate accumulations;
- [(D) assist in developing technologies required for efficient and environmentally sound development of methane hydrate resources;

[(E) promote education and training in methane hydrate resource research and resource development through fellowships or other means for graduate education and training;

[(F) conduct basic and applied research to assess and mitigate the environmental impact of hydrate degassing (including both natural degassing and degassing associated with commercial development);

[(G) develop technologies to reduce the risks of drilling through methane hydrates; and

[(H) conduct exploratory drilling, well testing, and production testing operations on permafrost and non-permafrost gas hydrates in support of the activities authorized by this paragraph, including drilling of one or more full-scale production test wells.

[(2) COMPETITIVE PEER REVIEW.—Funds made available under paragraph (1) shall be made available based on a competitive process using external scientific peer review of proposed research.]

(b) *GRANTS, CONTRACTS, COOPERATIVE AGREEMENTS, INTER-AGENCY FUNDS TRANSFER AGREEMENTS, AND FIELD WORK PROPOSALS.*—

(1) *ASSISTANCE AND COORDINATION.*—*In carrying out the program of methane hydrate research and development authorized by this section, the Secretary may award grants, or enter into contracts or cooperative agreements to—*

(A) *conduct research to identify the environmental, health, and safety impacts of methane hydrate development;*

(B) *assess and develop technologies to mitigate environmental impacts of the exploration and commercial development of methane hydrates as an energy resource, including the use of seismic testing, and to reduce the public health and safety risks of drilling through methane hydrates;*

(C) *conduct research to assess and mitigate the environmental impact of hydrate degassing (including natural degassing and degassing associated with commercial development); or*

(D) *expand education and training programs in methane hydrate resource research and resource development through fellowships or other means for graduate education and training.*

(2) *ENVIRONMENTAL MONITORING AND RESEARCH.*—*The Secretary shall conduct a long-term environmental monitoring and research program to study the effects of production from methane hydrate reservoirs.*

(3) *COMPETITIVE PEER REVIEW.*—*Funds made available to carry out paragraphs (1) and (2) shall be made available based on a competitive process using external scientific peer review of proposed research.*

(c) *METHANE HYDRATES ADVISORY PANEL.*—

(1) *IN GENERAL.*—*The Secretary shall establish an advisory panel (including the hiring of appropriate staff) consisting of representatives of industrial enterprises, institutions of higher education, oceanographic institutions, State agencies, and envi-*

ronmental organizations with knowledge and expertise in the natural gas hydrates field, to—

- (A) assist in developing recommendations and broad programmatic priorities for the methane hydrate research and development program carried out under subsection (a)(1);
 - (B) provide scientific oversight for the methane hydrates program, including assessing progress toward program goals, evaluating program balance, and providing recommendations to enhance the quality of the program over time; and
 - (C) not later than 2 years after the date of enactment of the Energy Research, Development, Demonstration, and Commercial Application Act of 2005, and at such later dates as the panel considers advisable, submit to Congress—
 - (i) an assessment of the methane hydrate research program; and
 - (ii) an assessment of the 5-year research plan of the Department of Energy.
- (2) CONFLICTS OF INTEREST.—In appointing each member of the advisory panel established under paragraph (1), the Secretary shall ensure, to the maximum extent practicable, that the appointment of the member does not pose a conflict of interest with respect to the duties of the member under this Act.
- (3) MEETINGS.—The advisory panel shall—
- (A) hold the initial meeting of the advisory panel not later than 180 days after the date of establishment of the advisory panel; and
 - (B) meet biennially thereafter.
- (4) COORDINATION.—The advisory panel shall coordinate activities of the advisory panel with program managers of the Department of Energy at appropriate National Laboratories.
- (d) CONSTRUCTION COSTS.—None of the funds made available to carry out this section may be used for the construction of a new building or the acquisition, expansion, remodeling, or alteration of an existing building (including site grading and improvement and architect fees).
- (e) RESPONSIBILITIES OF THE SECRETARY.—In carrying out [subsection (b)(1)] *paragraphs (1) and (2) of subsection (b)*, the Secretary shall—
- (1) facilitate and develop partnerships among government, industrial enterprises, and institutions of higher education to research, identify, assess, and explore methane hydrate resources;
 - (2) undertake programs to develop basic information necessary for promoting long-term interest in methane hydrate resources as an energy source;
 - (3) ensure that the data and information developed through the program are accessible and widely disseminated as needed and appropriate;
 - (4) promote cooperation among agencies that are developing technologies that may hold promise for methane hydrate resource development;
 - (5) report annually to Congress on the results of actions taken to carry out this Act; and

(6) ensure, to the maximum extent practicable, greater participation by the Department of Energy in international cooperative efforts.

* * * * *

[SEC. 7. AUTHORIZATION OF APPROPRIATIONS.

【There are authorized to be appropriated to the Secretary to carry out this Act, to remain available until expended—

- 【(1) \$15,000,000 for fiscal year 2006;
- 【(2) \$20,000,000 for fiscal year 2007;
- 【(3) \$30,000,000 for fiscal year 2008;
- 【(4) \$40,000,000 for fiscal year 2009; and
- 【(5) \$50,000,000 for fiscal year 2010.】

SEC. 7. AUTHORIZATION OF APPROPRIATIONS.

Of the amounts made available under section 961 of the Energy Policy Act of 2005 (42 U.S.C. 16291), there are authorized to be appropriated to the Secretary to carry out this Act \$15,000,000, to remain available until expended, for each of fiscal years 2020 through 2024.

XX. MINORITY VIEWS

It is the view of the minority that the use of domestic fossil energy resources is indispensable to the stability of critical U.S. infrastructure, and to the overall economic growth and national security of the United States. Basic and early-stage research and development are needed to improve and modernize fossil fuels' performance and reduce their environmental impact. Federal research agencies like the Department of Energy (DOE) should make targeted investments in innovative fossil energy technologies to develop a balanced portfolio of next-generation clean energy sources.

It is the view of the minority that this legislation would unnecessarily narrow DOE's fossil energy research activities to focus on emissions control technologies. While the minority acknowledges the importance of this research as one component of the DOE fossil energy portfolio, transformational technologies in other areas are needed to meet long-term, mission-critical needs of future fossil-based power systems. Fossil fuels remain our most depended on energy source, and new approaches to find and develop these, like advanced analysis of complex subsurface dynamics, will help ensure the long-term stability of our clean energy future.

It is the view of the minority that H.R. 3607 includes an unnecessary increase in authorization of appropriations for DOE work that is narrowly focused on emissions control, rather than a more balanced portfolio of research. The minority opposes the micromanaging of DOE's work in fossil energy research in H.R. 3607, and believes more emphasis should be placed on the development of novel technologies, rather than emission controls.

FRANK D. LUCAS,
Ranking Member.
RANDY K. WEBER, SR.,
Ranking Member Sub-
committee on Energy.

XXI. EXCHANGE OF COMMITTEE CORRESPONDENCE

EDDIE BERNICE JOHNSON, Texas
CHAIRWOMAN

FRANK D. LUCAS, Oklahoma
RANKING MEMBER

Congress of the United States
House of Representatives

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

2321 RAYBURN HOUSE OFFICE BUILDING

WASHINGTON, DC 20515-6301

(202) 225-6375
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September 15, 2020

The Honorable Frank Pallone, Jr.
Chairman
Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Pallone,

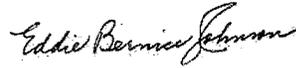
I am writing to you concerning H.R. 3607, the "Fossil Energy Research Development Act of 2019," which was referred to the Committee on Science, Space, and Technology on July 2, 2019.

I appreciate you not seeking a sequential referral of H.R. 3607 so that the bill may be considered expeditiously. I acknowledge that forgoing your referral claim does not waive, reduce, or otherwise affect the jurisdiction of the Committee on Energy and Commerce over this legislation, or any similar legislation. I will appropriately consult and involve the Committee on Energy and Commerce as this bill progresses.

Furthermore, I will make sure to include a copy of our exchange of letters in the bill report as well as inserted in the *Congressional Record*.

Thank you for your cooperation on this legislation.

Sincerely,



Eddie Bernice Johnson
Chairwoman
Committee on Science, Space, and Technology

cc: The Honorable Nancy Pelosi, Speaker of the House
Ranking Member Frank D. Lucas, Committee on Science, Space, and Technology
Ranking Member Greg Walden, Committee on Energy and Commerce
Tom Wickham, Parliamentarian

XXII. PROCEEDINGS OF SUBCOMMITTEE MARKUP

MARKUPS:
**H.R. 3597, SOLAR ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;**
**H.R. 3607, FOSSIL ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019; AND**
**H.R. 3609, WIND ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019**

MARKUP
BEFORE THE
SUBCOMMITTEE ON ENERGY
OF THE
COMMITTEE ON SCIENCE, SPACE, AND
TECHNOLOGY
HOUSE OF REPRESENTATIVES
ONE HUNDRED SIXTEENTH CONGRESS
FIRST SESSION

JULY 10, 2019

Serial No. CP: 116-5

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C O N T E N T S

July 10, 2019

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H.R. 3609— <i>Wind Energy Research and Development Act of 2019</i>	88

**MARKUPS:
H.R. 3597, SOLAR ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;
H.R. 3607, FOSSIL ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019; AND
H.R. 3609, WIND ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019**

WEDNESDAY, JULY 10, 2019

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Subcommittee met, pursuant to notice, at 2:02 p.m., in room 2318 of the Rayburn House Office Building, Hon. Conor Lamb [Chairman of the Subcommittee] presiding.

Chairman LAMB. Good afternoon. The Subcommittee will come to order. Without objection, the Chair is authorized to declare recess at any time. Pursuant to Committee Rule 2(e) and House Rule 11, the Chair announces that he may postpone roll call votes. Pursuant to notice, the Subcommittee on Energy meets to consider the following measures: H.R. 3597, *Solar Energy Research and Development Act of 2019*; H.R. 3607, *Fossil Energy Research and Development Act of 2019*; and H.R. 3609, *Wind Energy Research and Development Act of 2019*.

Today we're marking up three bipartisan bills that will strengthen our country's research and development (R&D) across a broad array of energy, and ensure that we are improving our energy systems, our economy, and our climate. This Subcommittee has held two hearings related to these bills, which brought together experts representing industry, our national labs, policy development institutions, and environmental advocates to discuss the R&D needs of solar, wind, and fossil energy technologies. We are fortunate to have many world-leading companies, labs, universities, researchers, and scientists right here in our own country working on, and advancing and discovering energy technologies that can lower the cost for consumers, and limit carbon emissions at the same time. These types of advancements can play a key role in mitigating climate change, producing breakthroughs, and providing good jobs.

According to the EPA (Environmental Protection Agency), the electricity, industrial, and transportation sectors account for roughly 79 percent of the United States' greenhouse gas emissions. Energy innovation is a critical step to reducing those emissions, while

also improving our economy, and the affordability of energy. One of today's bills, which I am proud to be a co-sponsor of, the *Fossil Energy Research and Development Act of 2019*, embodies this dual opportunity. It supports carbon capture, utilization, and storage technologies, and this will help us de-carbonize fossil fuels, and preserve American jobs in some of our most important industries.

The Federal Government's research, development, and demonstration activities have already led us to significant advancements in these areas. As we've discussed before this Subcommittee, the growth of natural gas production, which we have seen, and are continuing to see, in western Pennsylvania, and the surge in residential and utility scale photovoltaic solar panels across the country have a very direct link back to the Department of Energy's (DOE's) research and development. We need to build on these achievements, and accordingly Congress must provide the direction, tools, and resources that DOE needs to meet these challenges. Unfortunately, much of the existing law authorizing DOE's work in solar, wind, and fossil energy is insufficient and outdated. These bills will change that. They will reauthorize DOE's existing work, and provide updated guidance and tools that reflect the immense changes each industry has experienced over the past 15 years.

Specifically, H.R. 3597, the *Solar Research and Development Act of 2019*, reauthorizes and expands research, development, and demonstration on a range of solar energy technologies, including photovoltaic and concentrating solar power systems. The bill authorizes research on emerging technologies and market mechanisms to improve solar energy's efficiency and affordability, like new materials that could allow solar panels to be integrated into windows, and other types of infrastructure.

H.R. 3607, the *Fossil Energy Research and Development Act of 2019*, reauthorizes and expands research, development, and demonstration of carbon capture technologies for power plants and industrial sources. It would also authorize R&D activities in carbon storage, carbon utilization, improvements in efficiency in rare Earth elements, launch new initiatives in carbon dioxide removal, waste gas utilization, and also help us prevent significant leaks of methane from natural gas infrastructure.

Finally, H.R. 3609, the *Wind Energy Research and Development Act of 2019*, reauthorizes and expands research, development, testing, and evaluation of wind energy technologies, including onshore and offshore turbines, as well as airborne technologies. The bill specifically authorizes research on technologies that can enable next-generation, very large scale wind turbines and floating offshore wind farms.

The energy industry is critical to our economy. Passing these bills will ensure that our Nation leads in energy innovation, allows us to mitigate climate change, and continue creating American jobs. I look forward to advancing these important bills out of our Subcommittee today, and I now recognize the Ranking Member, Mr. Weber, to present his opening remarks.

[The prepared statement of Chairman Lamb follows:]

Today, we are marking up three bipartisan bills that will bolster our country's research and development across a broad array of the energy sector and ensure we are improving our energy systems, our economy, and our climate. This Sub-

committee has held two hearings related to these bills, which brought together experts representing industry, our National Labs, well-respected policy development institutions, and environmental advocacy organizations to discuss the R&D needs of solar, wind, and fossil energy technologies.

We're fortunate to have many world-leading companies, labs, universities, researchers and scientists right here in our country working on advancing and discovering energy technologies that can decrease energy costs for consumers and limit carbon emissions. These types of advancements can play a key role in mitigating climate change, producing scientific breakthroughs, and providing good jobs for American workers. According to the Environmental Protection Agency, the electricity, industrial, and transportation sectors account for roughly 79% of the United States' greenhouse gas emissions. Energy innovation is a critical step in reducing these emissions while improving our economy and energy affordability. One of today's bills which I am a proud cosponsor of, the *Fossil Energy Research and Development Act of 2019*, embodies this dual opportunity. Supporting carbon capture, utilization, and storage technologies will simultaneously help decarbonize fossil fuels and preserve American jobs in those important industries.

The Federal Government's research, development, and demonstration activities have already led to significant energy advancements. As we have discussed before this Subcommittee, the growth of natural gas production, which we are certainly seeing in western Pennsylvania, and the surge in residential and utility-scale photovoltaic solar panels across the country have clear ties back to Department of Energy R&D. We need to build on these achievements and accordingly, Congress must provide the direction, tools, and resources that DOE needs to meet the challenges of today.

Unfortunately, much of the existing law authorizing DOE's work through its Solar, Wind, and Fossil Energy Technology Offices is insufficient and outdated. These bills reauthorize DOE's existing work and provide updated guidance and tools that reflect the immense changes each industry has experienced over the past 15 years. Specifically:

H.R. 3597, the *Solar Research and Development Act of 2019*, reauthorizes and expands research, development, and demonstration on a range of solar energy technologies, including photovoltaic and concentrating solar power systems. The bill authorizes research on emerging technologies and market mechanisms to improve solar energy's efficiency and affordability, like new materials that could allow solar panels to be integrated into windows and other types of infrastructure.

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Finally, H.R. 3609, the *Wind Energy Research and Development Act of 2019*, reauthorizes and expands research, development, testing, and evaluation of wind energy technologies, including onshore and offshore turbines as well as airborne technologies. The bill specifically authorizes research on technologies that can enable next-generation, very large-scale wind turbines and floating offshore wind farms.

It's clear—the energy industry is critical to the American economy. Passing these bills would help ensure that our nation leads in energy innovation, allowing us to mitigate climate change, continue creating American jobs in the energy industry, and improve the air we breathe. I look forward to advancing these important bills out of our Subcommittee today.

Mr. WEBER. Thank you, Mr. Chairman—and good afternoon to all—for the opportunity to speak on H.R. 3597, I thank you. It is the *Solar Energy Research and Development Act of 2019*. Also H.R. 3609, the *Wind Energy Research and Development Act of 2019*, and H.R. 3607, the *Fossil Energy Research and Development Act of 2019*.

On the Science Committee, as my friends on both sides of the aisle here can attest, we pride ourselves on our ability to do great bipartisan work to support the research and development activities that will grow our economy, strengthen our national security, protect our environment, and help maintain U.S. leadership in science and technology. That's why it's unfortunate that we cannot come

to an agreement on this legislation today. The three bills we will consider this afternoon are focused on demonstrating energy technologies, many of which are already currently available in the commercial marketplace, and they propose unrealistic budget increases to a number of DOE applied programs. If enacted, these bills could further limit Federal investment available for truly innovative early-stage research that industry cannot undertake.

The *Solar Energy Research and Development Act* authorizes solar energy research conducted by the DOE's Office of Energy Efficiency and Renewable Energy, or EERE. EERE is the largest applied program at the DOE by far, and received almost \$2.4 billion in funding in 2019. This legislation before us today would authorize approximately \$1.5 billion for this work, reaching a 33 percent total increase in funding from enacted levels by 2024. And while this legislation makes references to "next generation" solar technologies, and does include authorizations for some critical basic research priorities that I support like innovative energy storage, and advanced computing capabilities, it focuses heavily on expanding the deployment of today's solar technologies. Similarly, the *Wind Energy Research and Development Act* authorizes wind energy research conducted under EERE, and would provide over \$570 million for this work. This amounts to a 37 percent increase from enacted levels by 2024.

And while this legislation addresses some shared priorities, like basic research in material science and hybrid energy systems, its primary focus is on reducing "market barriers" for existing wind technologies. I think I can safely say we all support the incredible growth we've seen in the wind and solar industries in the past decade—Texas leads the Nation in wind energy—but American industry is already leading the way on deploying these wind energy technologies, and we won't discover the next game-changing technology by duplicating those efforts.

Finally, the *Fossil Energy Research and Development Act* reauthorizes DOE's fossil energy research and development, FER&D programs, and brings total spending in this area to over \$1 billion by Fiscal Year 2024, a 36 percent increase from enacted levels. And while I'm supportive of funding research to help us better capture, store, and utilize carbon, this can't be our only goal when it comes to fossil energy technology. This bill's singular focus on emissions control technology ignores the reality of our Nation's continued reliance on fossil fuel resources, and their role in our clean energy future.

Now, let me be clear, I'm supportive of DOE funding for innovative research that will lead to new solar, wind, and fossil energy technologies. But, as stewards of taxpayers' resources, we must focus funding on projects that are truly cutting-edge, like basic research in advanced computing, advanced manufacturing, and the development of new materials. The fact is fundamental research often leads to improvements in all forms of energy technologies, and not just ones that get attention from Members of Congress. With our national debt at \$22 trillion and rising, we simply can't afford to increase spending for every program. So, instead of trying to pick and choose, or just setting aspirational spending goals, let's take the common sense approach, and let's work together to invest

in the basic research that we all support. Mr. Chairman, I yield back.

[The prepared statement of Mr. Weber follows:]

Good afternoon. Thank you, Chairman Lamb, for the opportunity to speak on H.R. 3597, the *Solar Energy Research and Development Act of 2019*, H.R. 3609, the *Wind Energy Research and Development Act of 2019*, H.R. 3607, the *Fossil Energy Research and Development Act of 2019*.

On the Science Committee—as my friends on both sides of the aisle here can attest—we pride ourselves on our ability to do great, bipartisan work to support the research and development activities that will grow our economy, strengthen our national security, protect our environment, and help maintain U.S. leadership in science and technology.

That's why it's unfortunate that we could not come to an agreement on this legislation today. The three bills we will consider this afternoon are focused on demonstrating energy technologies—many of which are already currently available in the commercial marketplace—and they propose unrealistic budget increases to a number of Department of Energy applied programs. If enacted, these bills could further limit federal investment available for truly innovative, early-stage research that industry cannot undertake.

The *Solar Energy Research and Development Act* authorizes solar energy research conducted by the Department of Energy (DOE)'s Office of Energy Efficiency and Renewable Energy (or E-E-R-E). EERE is the largest applied program at DOE by far—and received almost \$2.4 billion dollars in funding in 2019.

This legislation would authorize approximately one and a half billion dollars for this work, reaching a 33% total increase in funding from enacted levels by 2024.

And while this legislation makes references to “next generation” solar technologies, and does include authorizations for some critical basic research priorities that I support like innovative energy storage and advanced computing capabilities, it focuses heavily on expanding the deployment of today's solar technologies. Similarly, the *Wind Energy Research and Development Act* authorizes wind energy research conducted under E-E-R-E and would provide over \$570 million for this work. This amounts to a 37% increase from enacted levels by 2024.

And while this legislation addresses some shared priorities, like basic research in materials science and hybrid energy systems, its primary focus is on reducing “market barriers” for existing wind technologies.

I think I can safely say we all support the incredible growth we've seen in the wind and solar industries in the past decade. But American industry is already leading the way on deploying these technologies—and we won't discover the next game changing technology by duplicating their efforts.

Finally, the *Fossil Energy Research and Development Act* reauthorizes DOE's Fossil Energy Research and Development programs and brings total spending in this area to over \$1 billion by FY 2024, a 36% increase from enacted levels. And while I'm supportive of funding research to help us better capture, storage, and utilize carbon, this can't be our only goal when it comes fossil to energy technology.

This bill's singular focus on emissions control technologies ignores the reality of our nation's continued reliance on fossil fuel resources, and their role in our clean energy future.

Now, I want to be clear—I'm supportive of DOE funding for innovative research that will lead to new solar, wind, and fossil energy technologies. But, as stewards of taxpayer resources, we must focus funding on projects that are truly cutting edge—like basic research in advanced computing, advanced manufacturing, and the development of new materials. The fact is, fundamental research often leads to improvements in all forms of energy technologies—not just the ones that get attention from Members of Congress.

With our national debt at \$22 trillion and rising, we simply can't afford to increase spending for every program.

So instead of trying to pick and choose, or just setting aspirational spending goals, let's take the common-sense approach, and work together to invest in the basic research we all support.

Chairman LAMB. Thank you, Mr. Weber. Now I recognize the Chair of the Full Committee to present her opening remarks.

Chairwoman JOHNSON. Thank you very much, and good afternoon, and thank you, Chairman Lamb, for holding this markup to advance bipartisan legislation that focuses on several of our Nation's most important energy resources: Solar, wind, and fossil en-

ergy. We're in a moment of transformation in this Nation. Both Democrats and Republicans recognize the importance of prioritizing a clean energy future for America. The research paths we set forth today, such as those laid out in these bills, will be essential to helping us achieve our climate change mitigation and adaptation goals, while ensuring that every American has access to low-cost, reliable electricity.

First we have H.R. 3597, the *Solar Research and Development Act of 2019*, led by Congressman McAdams. This legislation lays out a thoughtful research agenda for solar energy; prioritizing technologies that are efficient, reliable, and affordable. This bill also supports a new solar technology manufacturing initiative that instructs the Department of Energy to develop and implement a plan for re-establishing a domestic solar energy manufacturing base.

Next we have H.R. 3607, the *Fossil Energy Research and Development Act of 2019*, led by Congressman Veasey, which I was very happy to co-sponsor, along with my colleagues Mr. Lamb, the Environment Subcommittee Chairwoman Fletcher, and Congressman Schweikert. We know how important it is to invest in research to address the environmental impacts of fossil fuels, and this legislation does exactly that. This bill sets forth a research agenda for important topics like carbon capture, storage, and utilization, carbon renewal; and methane leak detection and mitigation. And by doing so, this bill establishes a strong foundation for our Nation's research priorities on fossil energy.

And last, we have H.R. 3609, the *Wind Energy Research and Development Act of 2019*, led by Congressman Tonko. This legislation directs the Department of Energy to focus on a robust wind energy research agenda that includes new materials and system designs that promote sustainability and ease of manufacturing. This bill also supports a robust research agenda for offshore wind, which has significant potential for leveraging untapped energy resources near our Nation's coasts.

I thank my fellow Members of Congress on both sides of the aisle who worked hard on these bills, and for their leadership in advancing these important energy technologies. They're each strong examples of the kind of non-partisan constructive efforts that move us forward as a Nation. I yield back.

[The prepared statement of Chairwoman Johnson follows:]

Good afternoon and thank you, Chairman Lamb, for holding this markup to advance bipartisan legislation that focuses on several of our nation's most important energy resources: solar, wind, and fossil energy.

We are in a moment of transformation in this nation. Both Democrats and Republicans recognize the importance of prioritizing a clean energy future for America. The research paths we set forth today, such as those laid out in these bills, will be essential to helping us achieve our climate change mitigation and adaptation goals while ensuring that every American has access to low-cost, reliable electricity.

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research to address the environmental impacts of fossil fuels, and this legislation does exactly that. This bill sets forth a research agenda for important topics like carbon capture, storage, and utilization; carbon removal; and methane leak detection and mitigation. And by doing so, this bill establishes a strong foundation for our nation's research priorities on fossil energy.

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I thank my fellow Members of Congress on both sides of the aisle who have worked hard on these bills for their leadership in advancing these important energy technologies. They are each strong examples of the kind of nonpartisan, constructive efforts that move us forward as a nation.

With that, I yield back.

65

36

H.R. 3607

Chairman LAMB. We will now consider H.R. 3607, the *Fossil Energy Research and Development Act of 2019*. Clerk will report the bill.

The CLERK. H.R. 3607, a bill to amend the *Energy Policy Act of 2005*—

[The bill follows:]

.....
(Original Signature of Member)

116TH CONGRESS
1ST SESSION

H. R. _____

To amend the Energy Policy Act of 2005 to direct Federal research in fossil energy and to promote the development and demonstration of environmentally responsible coal and natural gas technologies, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

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

A BILL

To amend the Energy Policy Act of 2005 to direct Federal research in fossil energy and to promote the development and demonstration of environmentally responsible coal and natural gas technologies, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

4 (a) **SHORT TITLE.**—This Act may be cited as the
5 “Fossil Energy Research and Development Act of 2019”.

1 (b) TABLE OF CONTENTS.—The table of contents for
2 this Act is as follows:

- Sec. 1. Short title; table of contents.
- Sec. 2. Definitions.
- Sec. 3. Fossil energy objectives.
- Sec. 4. Carbon capture technologies.
- Sec. 5. Carbon storage validation and testing.
- Sec. 6. Carbon utilization.
- Sec. 7. Advanced energy systems.
- Sec. 8. Rare earth elements.
- Sec. 9. Methane hydrate research amendments.
- Sec. 10. Carbon removal.
- Sec. 11. Methane leak detection and mitigation.
- Sec. 12. Waste gas utilization.
- Sec. 13. National energy technology laboratory reforms.

3 **SEC. 2. DEFINITIONS.**

4 For purposes of this Act:

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

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

9 **SEC. 3. FOSSIL ENERGY OBJECTIVES.**

10 Section 961 of the Energy Policy Act of 2005 (42
11 U.S.C. 16291) is amended—

12 (1) in subsection (a)—

13 (A) by striking paragraph (2) and insert-
14 ing the following:

15 “(2) Decreasing the cost of emissions control
16 technologies for fossil energy production, generation,
17 and delivery.”;

18 (B) by striking paragraph (7) and insert-
19 ing the following:

1 “(7) Increasing the export of emissions control
2 technologies from the United States for fossil en-
3 ergy-related equipment, technology, and services.”;
4 and

5 (C) by adding at the end the following:

6 “(8) Improving the conversion, use, and storage
7 of carbon oxides.

8 “(9) Lowering greenhouse gas emissions for all
9 fossil fuel production, generation, delivery, and utili-
10 zation, to the maximum extent possible.

11 “(10) Preventing, predicting, monitoring, and
12 mitigating the unintended leaking of methane, car-
13 bon dioxide, or other fossil fuel-related emissions
14 into the atmosphere.

15 “(11) Reducing water use, improving water
16 reuse, and minimizing the surface and subsurface
17 environmental impact in the development of uncon-
18 ventional domestic oil and natural gas resources.

19 “(12) Developing carbon removal and utiliza-
20 tion technologies, products, and methods that result
21 in net reductions in greenhouse gas emissions, in-
22 cluding direct air capture and storage and carbon
23 use and reuse for commercial application.”;

24 (2) in subsection (b), by striking paragraphs
25 (1) through (3) and inserting the following:

1 “(1) \$825,000,000 for fiscal year 2020;
2 “(2) \$866,250,000 for fiscal year 2021;
3 “(3) \$909,563,000 for fiscal year 2022;
4 “(4) \$955,041,000 for fiscal year 2023; and
5 “(5) \$1,002,793,000 for fiscal year 2024.”; and
6 (3) by striking subsections (c) through (e) and
7 inserting the following:

8 “(c) **PRIORITIZATION.**—In carrying out this section,
9 the Secretary shall prioritize technologies and strategies
10 that have the potential to meet emissions reduction goals
11 in the agreement of the twenty-first session of the Con-
12 ference of the Parties to the United Nations Framework
13 Convention on Climate Change.

14 “(d) **LIMITATION.**—None of the funds authorized
15 under this section may be used for Fossil Energy Environ-
16 mental Restoration or Import/Export Authorization.”.

17 **SEC. 4. CARBON CAPTURE TECHNOLOGIES.**

18 (a) **CARBON CAPTURE PROGRAM.**—Section 962 of
19 the Energy Policy Act of 2005 (42 U.S.C. 16292) is
20 amended to read as follows:

21 **“SEC. 962. CARBON CAPTURE TECHNOLOGIES.**

22 “(a) **IN GENERAL.**—The Secretary shall conduct a
23 program of research, development, demonstration, and
24 commercial application of carbon capture technologies,

1 which shall include facilitation of the development and use
2 of—

3 “(1) carbon capture technologies for coal and
4 natural gas;

5 “(2) innovations to significantly decrease emis-
6 sions at existing power plants; and

7 “(3) advanced separation technologies.

8 “(b) INVESTMENT.—As a part of the program under
9 subsection (a), the Secretary shall maintain robust invest-
10 ments in carbon capture technologies for coal and natural
11 gas applications.

12 “(c) LARGE-SCALE PILOTS.—In carrying out this
13 section, the Secretary is encouraged to support pilot
14 projects that test carbon capture technologies on coal and
15 natural gas power and industrial systems below the 100
16 megawatt scale, consistent with section 988(b).

17 “(d) COST AND PERFORMANCE GOALS.—In carrying
18 out the program under subsection (a), the Secretary shall
19 establish cost and performance goals to assist in the tran-
20 sition of carbon capture research to commercially viable
21 technologies.

22 “(e) CARBON CAPTURE PILOT TEST CENTERS.—

23 “(1) IN GENERAL.—As a part of the program
24 under subsection (a), not later than 1 year after the
25 date of the enactment of the Fossil Energy Research

1 and Development Act of 2019, the Secretary shall
2 award grants to eligible entities for the operation of
3 not less than three Carbon Capture Test Centers (in
4 this subsection, known as the ‘Centers’) to provide
5 unique testing capabilities for innovative carbon cap-
6 ture technologies for power and industrial systems.

7 “(2) PURPOSE.—Each Center shall—

8 “(A) advance research, development, dem-
9 onstration, and commercial application of car-
10 bon capture technologies for power and indus-
11 trial systems; and

12 “(B) test technologies that represent the
13 scale of technology development beyond labora-
14 tory testing, but not yet advanced to testing
15 under operational conditions at commercial
16 scale.

17 “(3) APPLICATION.—An entity seeking to oper-
18 ate a Center under this subsection shall submit to
19 the Secretary an application at such time and in
20 such manner as the Secretary may require.

21 “(4) PRIORITY CRITERIA.—In selecting applica-
22 tions to operate a Center under this subsection, the
23 Secretary shall prioritize applicants that—

1 “(A) have access to existing or planned re-
2 search facilities with modular technology capa-
3 bilities;

4 “(B) are institutions of higher education
5 with established expertise in engineering and
6 design for carbon capture technologies, or part-
7 nerships with such institutions;

8 “(C) have access to existing research and
9 test facilities for pre-combustion, post-combus-
10 tion, or oxy-combustion technologies; or

11 “(D) have test capabilities to address scal-
12 ing challenges of integrating carbon capture
13 technologies with utility scale power plants.

14 “(5) CONSIDERATIONS.—In awarding grants
15 for the operation of the Centers under this sub-
16 section, the Secretary shall ensure that—

17 “(A) the portfolio of Centers includes a di-
18 verse representation of regional and resource
19 characteristics; and

20 “(B) each new Center demonstrates unique
21 research capabilities, unique regional benefits,
22 or new technology development opportunities.

23 “(6) SCHEDULE.—Each grant to operate a
24 Center under this subsection shall be awarded for a
25 term of not more than 5 years, subject to the avail-

1 ability of appropriations. The Secretary may renew
2 such 5-year term without limit, subject to a rigorous
3 merit review.

4 “(7) TERMINATION.—To the extent otherwise
5 authorized by law, the Secretary may eliminate a
6 Center during any 5-year term described in para-
7 graph (6) if such Center is underperforming.

8 “(f) DEMONSTRATIONS.—

9 “(1) IN GENERAL.—As a part of the program
10 under subsection (a), the Secretary may provide
11 grants for large-scale demonstration projects for
12 power and industrial systems that test the scale of
13 technology necessary to gain the operational data
14 needed to understand the technical and performance
15 risks of the technology before the application of the
16 technology at commercial scale, in accordance with
17 this subsection.

18 “(2) ENGINEERING AND DESIGN STUDIES.—
19 The Secretary is authorized to fund front-end engi-
20 neering and design studies in addition to, or in ad-
21 vance of, issuing an award for a demonstration
22 project under this subsection.

23 “(3) APPLICATION.—An entity seeking an
24 award to conduct a demonstration project under this
25 subsection shall submit to the Secretary an applica-

1 tion at such time and in such manner as the Sec-
2 retary may require.

3 “(4) LIMITATIONS.—The Secretary shall only
4 provide an award under this subsection after review-
5 ing each applicant and application regarding—

6 “(A) financial strength;

7 “(B) construction schedule;

8 “(C) market risk; and

9 “(D) contractor history.

10 “(5) REQUIREMENTS.—A demonstration project
11 funded under this subsection shall—

12 “(A) utilize technologies that have com-
13 pleted pilot-scale testing or the equivalent, as
14 determined by the Secretary;

15 “(B) secure and maintain agreements for
16 the utilization or sequestration of captured car-
17 bon dioxide; and

18 “(C) upon completion, demonstrate carbon
19 capture technologies on a power or industrial
20 system capable of capturing not less than
21 100,000 tons of carbon dioxide annually.

22 “(g) DEFINITION OF POWER SYSTEM.—In this sec-
23 tion, the term ‘power system’ means any electricity gener-
24 ating unit that utilizes fossil fuels to generate electricity
25 provided to the electric grid or directly to a consumer.

1 “(h) AUTHORIZATION OF APPROPRIATIONS.—For ac-
2 tivities under this section, there are authorized to be ap-
3 propriated to the Secretary—

4 “(1) \$300,000,000 for fiscal year 2020;

5 “(2) \$315,000,000 for fiscal year 2021;

6 “(3) \$330,750,000 for fiscal year 2022;

7 “(4) \$347,288,000 for fiscal year 2023; and

8 “(5) \$364,652,000 for fiscal year 2024.”.

9 (b) GAO STUDY.—

10 (1) IN GENERAL.—Not later than 1 year after
11 the date of enactment of this Act, the Comptroller
12 General of the United States shall submit to the
13 Committee on Science, Space, and Technology of the
14 House of Representatives and the Committee on En-
15 ergy and Natural Resources of the Senate a report
16 on the results of a study of the Department’s suc-
17 cesses, failures, practices, and improvements in car-
18 rying out demonstration projects for carbon capture
19 technologies for power and industrial systems. In
20 conducting the study, the Comptroller General shall
21 consider—

22 (A) applicant and contractor qualifications;

23 (B) project management practices at the
24 Department;

1 (C) economic or market changes and other
2 factors impacting project viability;

3 (D) completion of third-party agreements,
4 including power purchase agreements and car-
5 bon dioxide offtake agreements;

6 (E) regulatory challenges; and

7 (F) construction challenges.

8 (2) CONSIDERATION.—The Secretary shall con-
9 sider any relevant recommendations, as determined
10 by the Secretary, provided in the report required
11 under paragraph (1), and shall adopt such rec-
12 ommendations as the Secretary considers appro-
13 priate.

14 (3) POWER SYSTEM DEFINED.—In this section,
15 the term “power system” means any electricity gen-
16 erating unit that utilizes fossil fuels to generate elec-
17 tricity provided to the electric grid or directly to a
18 consumer.

19 **SEC. 5. CARBON STORAGE VALIDATION AND TESTING.**

20 Section 963 of the Energy Policy Act of 2005 (42
21 U.S.C. 16293) is amended to read as follows:

22 **“SEC. 963. CARBON STORAGE VALIDATION AND TESTING.**

23 “(a) CARBON STORAGE.—The Secretary, in consulta-
24 tion with the Administrator of the Environmental Protec-
25 tion Agency, shall carry out a program of research, devel-

1 opment, and demonstration for carbon storage. The pro-
2 gram shall—

3 “(1) in coordination with relevant Federal agen-
4 cies, develop and maintain mapping tools and re-
5 sources that assess the capacity of geologic storage
6 formations in the United States;

7 “(2) develop monitoring tools, modeling of geo-
8 logic formations, and analyses to predict and verify
9 carbon dioxide containment and account for seques-
10 tered carbon dioxide in geologic storage sites;

11 “(3) research potential environmental, safety,
12 and health impacts in the event of a leak to the at-
13 mosphere or to an aquifer, and any corresponding
14 mitigation actions or responses to limit harmful con-
15 sequences;

16 “(4) evaluate the interactions of carbon dioxide
17 with formation solids and fluids, including the pro-
18 pensity of injections to induce seismic activity;

19 “(5) assess and ensure the safety of operations
20 related to geologic sequestration of carbon dioxide;

21 “(6) determine the fate of carbon dioxide con-
22 current with and following injection into geologic
23 formations;

24 “(7) support cost and business model assess-
25 ments to examine the economic viability of tech-

1 nologies and systems developed under this program;
2 and

3 “(8) provide information to State, local, and
4 Tribal governments, the Environmental Protection
5 Agency, and other appropriate entities, to support
6 development of a regulatory framework for commer-
7 cial-scale sequestration operations that ensure the
8 protection of human health and the environment.

9 “(b) GEOLOGIC SETTINGS.—In carrying out research
10 activities under this section, the Secretary shall consider
11 a variety of candidate geologic settings, both onshore and
12 offshore, including—

13 “(1) operating oil and gas fields;

14 “(2) depleted oil and gas fields;

15 “(3) residual oil zones;

16 “(4) unconventional reservoirs and rock types;

17 “(5) unmineable coal seams;

18 “(6) saline formations in both sedimentary and
19 basaltic geologies;

20 “(7) geologic systems that may be used as engi-
21 neered reservoirs to extract economical quantities of
22 brine from geothermal resources of low permeability
23 or porosity; and

24 “(8) geologic systems containing in situ carbon
25 dioxide mineralization formations.

1 “(c) REGIONAL CARBON SEQUESTRATION PARTNER-
2 SHIPS.—

3 “(1) IN GENERAL.—The Secretary shall carry
4 out large-scale carbon sequestration demonstrations
5 for geologic containment of carbon dioxide to collect
6 and validate information on the cost and feasibility
7 of commercial deployment of technologies for the
8 geologic containment of carbon dioxide. The Sec-
9 retary may fund new demonstrations or expand the
10 work completed at one or more of the existing re-
11 gional carbon sequestration partnerships.

12 “(2) DEMONSTRATION COMPONENTS.—Each
13 demonstration described in paragraph (1) shall in-
14 clude longitudinal tests involving carbon dioxide in-
15 jection and monitoring, mitigation, and verification
16 operations.

17 “(3) CLEARINGHOUSE.—The National Energy
18 Technology Laboratory shall act as a clearinghouse
19 of shared information and resources for the regional
20 carbon sequestration partnerships and any new dem-
21 onstrations funded under this section.

22 “(4) REPORT.—Not later than 1 year after the
23 date of enactment of the Fossil Energy Research
24 and Development Act of 2019, the Secretary shall
25 provide to the Committee on Science, Space, and

1 Technology of the House of Representatives and the
2 Committee on Energy and Natural Resources of the
3 Senate a report that—

4 “(A) assesses the progress of all regional
5 carbon sequestration partnerships;

6 “(B) identifies the remaining challenges in
7 achieving carbon sequestration that is reliable
8 and safe for the environment and public health;
9 and

10 “(C) creates a roadmap for Department of
11 Energy carbon storage research and develop-
12 ment activities through 2030 with the goal of
13 reducing economic and policy barriers to com-
14 mercial carbon sequestration.

15 “(5) LARGE-SCALE CARBON SEQUESTRATION.—
16 For purposes of this subsection, ‘large-scale carbon
17 sequestration’ means a scale that demonstrates the
18 ability to inject and sequester several million metric
19 tons carbon dioxide for at least 10 years.

20 “(d) INTEGRATED STORAGE PROJECTS.—The Sec-
21 retary may carry out a program for the purpose of
22 transitioning the large-scale carbon sequestration dem-
23 onstration projects under subsection (c) into integrated,
24 commercial storage complexes. The program shall focus
25 on—

1 “(1) qualifying geologic storage sites in order to
2 accept large volumes of carbon dioxide acceptable for
3 commercial contracts;

4 “(2) understanding the technical and commer-
5 cial viability of storage sites;

6 “(3) developing the qualification processes that
7 will be necessary for a diverse range of geologic stor-
8 age sites to commercially accept carbon dioxide; and

9 “(4) any other activities the Secretary deter-
10 mines necessary to transition the large scale dem-
11 onstration storage projects into commercial ventures.

12 “(e) COST SHARING.—The Secretary shall require
13 cost sharing under this section in accordance with section
14 988.

15 “(f) AUTHORIZATION OF APPROPRIATIONS.—For ac-
16 tivities under this section, there are authorized to be ap-
17 propriated to the Secretary—

18 “(1) \$120,000,000 for fiscal year 2020;

19 “(2) \$126,000,000 for fiscal year 2021;

20 “(3) \$132,300,000 for fiscal year 2022;

21 “(4) \$138,915,000 for fiscal year 2023; and

22 “(5) \$145,860,750 for fiscal year 2024.”

1 **SEC. 6. CARBON UTILIZATION.**

2 (a) PROGRAM.—Subtitle F of title IX of the Energy
3 Policy Act of 2005 (42 U.S.C. 16291 et seq.) is amended
4 by adding at the end the following:

5 **“SEC. 969. CARBON UTILIZATION.**

6 “(a) IN GENERAL.—The Secretary shall carry out a
7 program of research, development, and demonstration for
8 carbon utilization. The program shall—

9 “(1) assess and monitor potential changes in
10 life cycle carbon dioxide and other greenhouse gas
11 emissions, and other environmental safety indicators
12 of new technologies, practices, processes, or meth-
13 ods, used in enhanced hydrocarbon recovery as part
14 of the activities authorized in section 963 of the En-
15 ergy Policy Act of 2005 (42 U.S.C. 16293);

16 “(2) identify and evaluate novel uses for car-
17 bon, including the conversion of carbon dioxide, in a
18 manner that, on a full life-cycle basis, achieves a
19 permanent reduction in, or avoidance of a net in-
20 crease in carbon dioxide in the atmosphere, for use
21 in commercial and industrial products, such as—

22 “(A) chemicals;

23 “(B) plastics;

24 “(C) building materials;

25 “(D) fuels;

26 “(E) cement;

1 “(F) products of coal utilization in power
2 systems (as such term is defined in section
3 962(e)), or other applications; or

4 “(G) other products with demonstrated
5 market value;

6 “(3) carbon capture technologies for industrial
7 systems;

8 “(4) identify and assess alternative uses for
9 coal that result in no net emissions of carbon dioxide
10 or other pollutants, including products derived from
11 carbon engineering, carbon fiber, and coal conversion
12 methods.

13 “(b) AUTHORIZATION OF APPROPRIATIONS.—For ac-
14 tivities under this section, there are authorized to be ap-
15 propriated to the Secretary—

16 “(1) \$25,000,000 for fiscal year 2020;

17 “(2) \$26,250,000 for fiscal year 2021;

18 “(3) \$27,562,500 for fiscal year 2022;

19 “(4) \$28,940,625 for fiscal year 2023; and

20 “(5) \$30,387,656 for fiscal year 2024.”.

21 (b) STUDY.—The Secretary shall enter into an agree-
22 ment with the National Academies to conduct a study as-
23 sessing the barriers, and opportunities related to the com-
24 mercial application of carbon dioxide in the United States.
25 Such study shall—

- 1 (1) analyze the technical feasibility, related
2 challenges, and impacts to commercializing carbon
3 dioxide, including—
 - 4 (A) creating a national system of carbon
5 dioxide pipelines and geologic sequestration
6 sites;
 - 7 (B) mitigating environmental and land-
8 owner impacts; and
 - 9 (C) regional economic challenges and op-
10 portunities;
- 11 (2) identify potential markets, industries, or
12 sectors that may benefit from greater access to com-
13 mercial carbon dioxide;
- 14 (3) assess the current state of infrastructure
15 and any necessary updates to allow for the integra-
16 tion of safe and reliable carbon dioxide transpor-
17 tation, utilization, and storage;
- 18 (4) estimate the economic, climate, and environ-
19 mental impacts of any well-integrated national car-
20 bon dioxide pipeline system, including suggestions
21 for policies that could improve the economic impact
22 of the system;
- 23 (5) assess the global status and progress of car-
24 bon utilization technologies (both chemical and bio-
25 logical) in practice today that utilize waste carbon

1 (including carbon dioxide, carbon monoxide, meth-
2 ane, and biogas) from power generation, biofuels
3 production, and other industrial processes;

4 (6) identify emerging technologies and ap-
5 proaches for carbon utilization that show promise
6 for scale-up, demonstration, deployment, and com-
7 mercialization;

8 (7) analyze the factors associated with making
9 carbon utilization technologies viable at a commer-
10 cial scale, including carbon waste stream availability,
11 economics, market capacity, energy and lifecycle re-
12 quirements;

13 (8) assess the major technical challenges associ-
14 ated with increasing the commercial viability of car-
15 bon reuse technologies, and identify the research and
16 development questions that will address those chal-
17 lenges;

18 (9) assess current research efforts, including
19 engineering and computational, that are addressing
20 these challenges and identify gaps in the current re-
21 search portfolio; and

22 (10) develop a comprehensive research agenda
23 that addresses both long- and short-term research
24 needs and opportunities.

1 **SEC. 7. ADVANCED ENERGY SYSTEMS.**

2 Subtitle F of title IX of the Energy Policy Act of
3 2005 (42 U.S.C. 16291 et seq.) is further amended by
4 adding at the end the following:

5 **"SEC. 969A. ADVANCED ENERGY SYSTEMS.**

6 "(a) IN GENERAL.—The Secretary shall conduct a
7 program, with the purpose of reducing emissions from fos-
8 sil fuel power generation by not less than 50 percent, of
9 research, development, demonstration, and commercial ap-
10 plication with respect to the following:

11 "(1) High-efficiency turbines for any advanced
12 power system that will lead to natural gas turbine
13 combined cycle efficiency of 67 percent or combus-
14 tion turbine efficiency of 50 percent.

15 "(2) Supercritical and ultrasupercritical carbon
16 dioxide, with an emphasis on developing directly-
17 fired and indirectly fired cycles in the next 10 years.

18 "(3) Advanced combustion systems, including
19 oxy-combustion systems and chemical looping.

20 "(4) Fuel cell technologies for low-cost, high-ef-
21 ficiency, fuel-flexible, modular power systems, includ-
22 ing solid oxide fuel cell technology for commercial,
23 residential, and distributed generation systems,
24 using improved manufacturing production and pro-
25 cesses.

1 “(5) Gasification systems to enable carbon cap-
2 ture, improve efficiency, and reduce capital and op-
3 erating costs.

4 “(6) Thermal cycling with ramping or rapid
5 black start capabilities that do not compromise effi-
6 ciency or environmental performance.

7 “(7) Small-scale and modular coal-fired tech-
8 nologies with reduced carbon outputs or carbon cap-
9 ture that can support incremental power generation
10 capacity additions.

11 “(b) PRIORITY.—In carrying out the program under
12 subsection (a), the Secretary is encouraged to prioritize
13 transformational technologies that enable a step change
14 in reduction of emissions as compared to the technology
15 in existence on the date of enactment of this section.

16 “(c) AUTHORIZATION OF APPROPRIATIONS.—For ac-
17 tivities under this section, there are authorized to be ap-
18 propriated to the Secretary—

19 “(1) \$150,000,000 for fiscal year 2020;

20 “(2) \$157,500,000 for fiscal year 2021;

21 “(3) \$165,375,000 for fiscal year 2022;

22 “(4) \$173,643,750 for fiscal year 2023; and

23 “(5) \$182,325,938 for fiscal year 2024.”.

1 **SEC. 8. RARE EARTH ELEMENTS.**

2 Subtitle F of title IX of the Energy Policy Act of
3 2005 (42 U.S.C. 16291 et seq.) is further amended by
4 adding at the end the following:

5 **“SEC. 969B. RARE EARTH ELEMENTS.**

6 “(a) **IN GENERAL.**—In coordination with the relevant
7 Federal agencies, the Secretary shall conduct research to
8 develop and assess methods to separate and recover rare
9 earth elements and other strategic minerals and coprod-
10 ucts from coal and coal byproduct streams. The program
11 shall—

12 “(1) develop advanced rare earth element sepa-
13 ration and extraction processes using coal-based re-
14 sources as feedstock materials;

15 “(2) assess the technical and economic feasi-
16 bility of recovering rare earth elements from coal-
17 based resources and validate such feasibility with
18 prototype systems producing salable, high-purity
19 rare earth elements from coal-based resources; and

20 “(3) assess and mitigate any environmental and
21 public health impacts of recovering rare earth ele-
22 ments from coal-based resources.

23 **“(b) AUTHORIZATION OF APPROPRIATIONS.**—For ac-
24 tivities under this section, there are authorized to be ap-
25 propriated to the Secretary—

26 “(1) \$23,000,000 for fiscal year 2020;

1 “(2) \$24,150,000 for fiscal year 2021;

2 “(3) \$25,357,500 for fiscal year 2022;

3 “(4) \$26,625,375 for fiscal year 2023; and

4 “(5) \$27,956,644 for fiscal year 2024.”.

5 **SEC. 9. METHANE HYDRATE RESEARCH AMENDMENTS.**

6 (a) IN GENERAL.—Section 4(b) of the Methane Hy-
7 drate Research and Development Act of 2000 (30 U.S.C.
8 2003(b)) is amended to read as follows:

9 “(b) GRANTS, CONTRACTS, COOPERATIVE AGREE-
10 MENTS, INTERAGENCY FUNDS TRANSFER AGREEMENTS,
11 AND FIELD WORK PROPOSALS.—

12 “(1) ASSISTANCE AND COORDINATION.—In car-
13 rying out the program of methane hydrate research
14 and development authorized by this section, the Sec-
15 retary may award grants, or enter into contracts or
16 cooperative agreements to—

17 “(A) conduct research to identify the envi-
18 ronmental, health, and safety impacts of meth-
19 ane hydrate development;

20 “(B) assess and develop technologies to
21 mitigate environmental impacts of the explo-
22 ration and commercial development of methane
23 hydrates as an energy resource, including the
24 use of seismic testing, and to reduce the public

1 health and safety risks of drilling through
2 methane hydrates;

3 “(C) conduct research to assess and miti-
4 gate the environmental impact of hydrate
5 degassing (including natural degassing and
6 degassing associated with commercial develop-
7 ment); or

8 “(D) expand education and training pro-
9 grams in methane hydrate resource research
10 and resource development through fellowships
11 or other means for graduate education and
12 training.

13 “(2) ENVIRONMENTAL MONITORING AND RE-
14 SEARCH.—The Secretary shall conduct a long-term
15 environmental monitoring and research program to
16 study the effects of production from methane hy-
17 drate reservoirs.

18 “(3) COMPETITIVE PEER REVIEW.—Funds
19 made available to carry out paragraphs (1) and (2)
20 shall be made available based on a competitive proc-
21 ess using external scientific peer review of proposed
22 research.”.

23 (b) CONFORMING AMENDMENT.—Section 4(e) of
24 such Act (30 U.S.C. 2003(e)) is amended in the matter

1 preceding paragraph (1) by striking “subsection (b)(1)”
2 and inserting “paragraphs (1) and (2) of subsection (b)”.

3 (c) AUTHORIZATION OF APPROPRIATIONS.—Section
4 7 of such Act (30 U.S.C. 2006) is amended to read as
5 follows:

6 **“SEC. 7. AUTHORIZATION OF APPROPRIATIONS.**

7 “There are authorized to be appropriated to the Sec-
8 retary to carry out this Act \$15,000,000, to remain avail-
9 able until expended, for each of fiscal years 2020 through
10 2024.”.

11 **SEC. 10. CARBON REMOVAL.**

12 Subtitle F of title IX of the Energy Policy Act of
13 2005 (42 U.S.C. 16291 et seq.) is further amended by
14 adding at the end the following:

15 **“SEC. 969C. CARBON REMOVAL.**

16 “(a) ESTABLISHMENT.—The Secretary, in coordina-
17 tion with the appropriate Federal agencies, shall establish
18 a research, development, and demonstration program to
19 remove carbon dioxide from the atmosphere on a large
20 scale. The program may include activities in—

21 “(1) direct air capture and storage technologies;

22 “(2) enhanced carbon mineralization;

23 “(3) bioenergy with carbon capture and seques-
24 tration;

25 “(4) agricultural and grazing practices;

1 “(5) forest management and afforestation; and

2 “(6) planned or managed carbon sinks, includ-
3 ing natural and artificial.

4 “(b) PRIORITIZATION.—In carrying out the program
5 established in subsection (a), the Secretary shall
6 prioritize—

7 “(1) the activities described in paragraphs (1)
8 and (2) of subsection (a), acting through the Assist-
9 ant Secretary for Fossil Energy; and

10 “(2) the activities described in subsection
11 (a)(3), acting through the Assistant Secretary for
12 Energy Efficiency and Renewable Energy and the
13 Assistant Secretary for Fossil Energy.

14 “(c) CONSIDERATIONS.—The program under this
15 section shall identify and develop carbon removal tech-
16 nologies and strategies that consider the following:

17 “(1) Land use changes, including impacts on
18 natural and managed ecosystems.

19 “(2) Ocean acidification.

20 “(3) Net greenhouse gas emissions.

21 “(4) Commercial viability.

22 “(5) Potential for near-term impact.

23 “(6) Potential for carbon reductions on a
24 gigaton scale.

25 “(7) Economic co-benefits.

1 “(d) ACCOUNTING.—The Department shall collabo-
2 rate with the Environmental Protection Agency and other
3 relevant agencies to develop and improve accounting
4 frameworks and tools to accurately measure carbon re-
5 moval and sequestration methods and technologies across
6 the Federal Government.

7 “(e) AIR CAPTURE TECHNOLOGY PRIZE.—Not later
8 than 1 year after the date of enactment of this Act, as
9 part of the program carried out under this section, the
10 Secretary shall carry out a program to award competitive
11 technology prizes for carbon dioxide capture from ambient
12 air or water. In carrying out this subsection, the Secretary
13 shall—

14 “(1) in accordance with section 24 of the Ste-
15 venson-Wydler Technology Innovation Act of 1980
16 (15 U.S.C. 3719), develop requirements for—

17 “(A) the prize competition process;

18 “(B) minimum performance standards for
19 projects eligible to participate in the prize com-
20 petition; and

21 “(C) monitoring and verification proce-
22 dures for projects selected to receive a prize
23 award;

1 “(2) establish minimum levels for the capture of
2 carbon dioxide from ambient air or water that are
3 required to qualify for a prize award; and

4 “(3) offer prize awards for any of the following:

5 “(A) A design for a promising capture
6 technology that will—

7 “(i) be operated on a demonstration
8 scale; and

9 “(ii) have the potential to achieve sig-
10 nificant reduction in the level of carbon di-
11 oxide in the atmosphere.

12 “(B) A successful bench-scale demonstra-
13 tion of a capture technology.

14 “(C) An operational capture technology on
15 a commercial scale.

16 “(f) DIRECT AIR CAPTURE TEST CENTER.—

17 “(1) IN GENERAL.—Not later than 1 year after
18 the date of enactment of the Fossil Energy Research
19 and Development Act of 2019, the Secretary shall
20 award grants to one or more eligible entities for the
21 operation of one or more test centers (in this sub-
22 section, known as ‘Centers’) to provide unique test-
23 ing capabilities for innovative direct air capture and
24 storage technologies.

25 “(2) PURPOSE.—Each Center shall—

1 “(A) advance research, development, dem-
2 onstration, and commercial application of direct
3 air capture and storage technologies;

4 “(B) support pilot plant and full-scale
5 demonstration projects and test technologies
6 that represent the scale of technology develop-
7 ment beyond laboratory testing but not yet ad-
8 vanced to test under operational conditions at
9 commercial scale;

10 “(C) develop front-end engineering design
11 and economic analysis; and

12 “(D) maintain a public record of pilot and
13 full-scale plant performance.

14 “(3) PRIORITY CRITERIA.—In selecting applica-
15 tions to operate a Center under this subsection, the
16 Secretary shall prioritize applicants that—

17 “(A) have access to existing or planned re-
18 search facilities;

19 “(B) are institutions of higher education
20 with established expertise in engineering for di-
21 rect air capture technologies, or partnerships
22 with such institutions; or

23 “(C) have access to existing research and
24 test facilities for bulk materials design and test-

1 ing, component design and testing, or profes-
2 sional engineering design.

3 “(4) SCHEDULE.—Each grant to operate a
4 Center under this subsection shall be awarded for a
5 term of not more than 5 years, subject to the avail-
6 ability of appropriations. The Secretary may renew
7 such 5-year term without limit, subject to a rigorous
8 merit review.

9 “(5) TERMINATION.—To the extent otherwise
10 authorized by law, the Secretary may eliminate the
11 center during any 5-year term described in the last
12 paragraph if it is underperforming.

13 “(g) LARGE-SCALE PILOTS AND DEMONSTRA-
14 TIONS.—In supporting the technology development activi-
15 ties under this section, the Secretary is encouraged to sup-
16 port carbon removal pilot and demonstration projects, in-
17 cluding—

18 “(1) pilot projects that test direct air capture
19 systems capable of capturing 10 to 100 tonnes of
20 carbon oxides per year to provide data for dem-
21 onstration-scale projects; and

22 “(2) direct air capture demonstration projects
23 capable of capturing greater than 1,000 tonnes of
24 carbon oxides per year.

1 “(h) INTRA-AGENCY RESEARCH.—In carrying out
2 the program established in (a), the Secretary shall encour-
3 age and promote collaborations among relevant offices and
4 agencies within the Department.

5 “(i) AUTHORIZATION OF APPROPRIATIONS.—For ac-
6 tivities under this section, there are authorized to be ap-
7 propriated to the Secretary—

8 “(1) \$75,000,000 for fiscal year 2020,
9 \$15,000,000 of which are authorized to carry out
10 subsection (e);

11 “(2) \$63,000,000 for fiscal year 2021;

12 “(3) \$66,150,000 for fiscal year 2022;

13 “(4) \$69,458,000 for fiscal year 2023; and

14 “(5) \$72,930,000 for fiscal year 2024.”.

15 **SEC. 11. METHANE LEAK DETECTION AND MITIGATION.**

16 Subtitle F of title IX of the Energy Policy Act of
17 2005 (42 U.S.C. 16291 et seq.) is further amended by
18 adding at the end the following:

19 **“SEC. 969D. METHANE LEAK DETECTION AND MITIGATION.**

20 “(a) IN GENERAL.—The Secretary, in consultation
21 with the Administrator of the Environmental Protection
22 Agency and other appropriate Federal agencies, shall
23 carry out a program of methane leak detection and mitiga-
24 tion research, development, demonstration, and commer-
25 cial application for technologies and methods that signifi-

1 cantly reduce emissions. In carrying out the program, the

2 Secretary shall—

3 “(1) develop cooperative agreements with State
4 or local governments or private entities to provide
5 technical assistance to—

6 “(A) prevent or respond to methane leaks,
7 including detection, mitigation, and identifica-
8 tion of leaks throughout the natural gas infra-
9 structure (which includes natural gas storage,
10 pipelines, and natural gas production sites); and

11 “(B) protect public health in the event of
12 a major methane leak;

13 “(2) promote demonstration and adoption of ef-
14 fective methane emissions-reduction technologies in
15 the private sector;

16 “(3) in coordination with representatives from
17 private industry, State and local governments, and
18 institutions of higher education, create a publicly ac-
19 cessible resource for best practices in the design,
20 construction, maintenance, performance, monitoring,
21 and incident response for—

22 “(A) pipeline systems;

23 “(B) wells;

24 “(C) compressor stations;

25 “(D) storage facilities; and

1 “(E) other vulnerable infrastructure;

2 “(4) identify high-risk characteristics of pipe-
3 lines, wells, and materials, geologic risk factors, or
4 other key factors that increase the likelihood of
5 methane leaks; and

6 “(5) in collaboration with private entities and
7 institutions of higher education, quantify and map
8 significant geologic methane seeps across the United
9 States.

10 “(b) CONSIDERATIONS.—In carrying out the pro-
11 gram under this section, the Secretary shall consider the
12 following:

13 “(1) Historical data of methane leaks.

14 “(2) Public health consequences.

15 “(3) Public safety.

16 “(4) Novel materials and designs for pipelines,
17 compressor stations, components, and wells (includ-
18 ing casing, cement, wellhead).

19 “(5) Regional geologic traits.

20 “(6) Induced and natural seismicity.

21 “(c) AUTHORIZATION OF APPROPRIATIONS.—For ac-
22 tivities under this section, there are authorized to be ap-
23 propriated to the Secretary—

24 “(1) \$22,000,000 for fiscal years 2020;

25 “(2) \$23,100,000 for fiscal years 2021;

1 “(3) \$24,255,000 for fiscal years 2022;

2 “(4) \$25,467,750 for fiscal years 2023; and

3 “(5) \$26,741,138 for fiscal years 2024.”.

4 **SEC. 12. WASTE GAS UTILIZATION.**

5 Subtitle F of title IX of the Energy Policy Act of
6 2005 (42 U.S.C. 16291 et seq.) is further amended by
7 adding at the end the following:

8 **“SEC. 969E. WASTE GAS UTILIZATION.**

9 “The Secretary shall carry out a program of research,
10 development, and demonstration for waste gas utilization.

11 The program shall—

12 “(1) identify and evaluate novel uses for light
13 hydrocarbons, such as methane, ethane, propane,
14 butane, pentane and hexane, produced during oil
15 and shale gas production, including the production
16 of chemicals or transportation fuels;

17 “(2) develop advanced gas conversion tech-
18 nologies that are modular and compact, and may le-
19 verage advanced manufacturing technologies;

20 “(3) support demonstration activities at oper-
21 ating oil and gas facilities to test the performance
22 and cost-effectiveness of new gas conversion tech-
23 nologies; and

24 “(4) assess and monitor potential changes in
25 life cycle greenhouse gas emissions that may result

1 from the use of technologies developed under this
2 program.”.

3 **SEC. 13. NATIONAL ENERGY TECHNOLOGY LABORATORY**
4 **REFORMS.**

5 (a) SPECIAL HIRING AUTHORITY FOR SCIENTIFIC,
6 ENGINEERING, AND PROJECT MANAGEMENT PER-
7 SONNEL.—

8 (1) IN GENERAL.—The Director of the National
9 Energy Technology Laboratory shall have the au-
10 thority to—

11 (A) make appointments to positions in the
12 Laboratory to assist in meeting a specific
13 project or research need, without regard to civil
14 service laws, of individuals who—

15 (i) have an advanced scientific or en-
16 gineering background; or

17 (ii) have a business background and
18 can assist in specific technology-to-market
19 needs;

20 (B) fix the basic pay of any employee ap-
21 pointed under this section at a rate not to ex-
22 ceed level II of the Executive Schedule; and

23 (C) pay any employee appointed under this
24 section payments in addition to basic pay, ex-
25 cept that the total amount of additional pay-

1 ments paid to an employee under this sub-
2 section for any 12-month period shall not ex-
3 ceed the least of—

4 (i) \$25,000;

5 (ii) the amount equal to 25 percent of
6 the annual rate of basic pay of that em-
7 ployee; and

8 (iii) the amount of the limitation that
9 is applicable for a calendar year under sec-
10 tion 5307(a)(1) of title 5, United States
11 Code.

12 (2) LIMITATIONS.—

13 (A) IN GENERAL.—The term of any em-
14 ployee appointed under this section shall not ex-
15 ceed 3 years.

16 (B) FULL-TIME EMPLOYEES.—Not more
17 than 10 full-time employees appointed under
18 this subsection may be employed at the Na-
19 tional Energy Technology Laboratory at any
20 given time.

21 (b) DISCRETIONARY RESEARCH AND DEVELOP-
22 MENT.—

23 (1) IN GENERAL.—The Secretary shall establish
24 mechanisms under which the Director of the Na-
25 tional Energy Technology Laboratory may use an

1 amount that is, in total, not less than 2 percent and
2 not more than 4 percent of all funds available to the
3 Laboratory for the following purposes:

4 (A) To fund innovative research that is
5 conducted at the Laboratory and supports the
6 mission of the Department.

7 (B) To fund technology development pro-
8 grams that support the transition of tech-
9 nologies developed by the Laboratory into the
10 commercial market.

11 (C) To fund workforce development activi-
12 ties to strengthen external engineering and
13 manufacturing partnerships to ensure safe, effi-
14 cient, productive, and useful fossil energy tech-
15 nology production.

16 (D) To fund the revitalization, recapitaliza-
17 tion, or minor construction of the Laboratory
18 infrastructure.

19 (2) PRIORITIZATION.—The Director shall
20 prioritize innovative experiments and proposals pro-
21 posed by scientists and researchers at the National
22 Energy Technology Laboratory.

23 (3) ANNUAL REPORT ON USE OF AUTHORITY.—
24 Not later than March 1 of each year, the Secretary
25 shall submit to the Committee on Science, Space,

1 and Technology of the House of Representatives and
2 the Committee on Energy and Natural Resources of
3 the Senate a report on the use of the authority
4 under this subsection during the preceding fiscal
5 year.

6 (c) LABORATORY OPERATIONS.—The Secretary shall
7 delegate human resources operations of the National En-
8 ergy Technology Laboratory to the Director of the Na-
9 tional Energy Technology Laboratory.

10 (d) REVIEW.—Not later than 2 years after the date
11 of enactment of this Act, the Secretary shall submit to
12 the Committee on Science, Space, and Technology of the
13 House of Representatives and the Committee on Energy
14 and Natural Resources of the Senate a report assessing
15 the National Energy Technology Laboratory's manage-
16 ment and research. The report shall include—

17 (1) an assessment of the quality of science and
18 research at the National Energy Technology Labora-
19 tory relative to similar work at other national lab-
20 oratories;

21 (2) a review of the effectiveness of authorities
22 provided in subsections (a) and (b); and

23 (3) recommendations for policy changes within
24 the Department and legislative changes to provide
25 the National Energy Technology Laboratory the nec-

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- 1 essary tools and resources to advance its research
- 2 mission.

Chairman LAMB. Without objection, the bill is considered as read, and open to amendment at any point. I recognize myself to briefly comment on the bill.

H.R. 3607, the *Fossil Energy Research and Development Act of 2019*, provides critical guidance to ensure that our fossil energy resources are developed and used in an environmentally responsible way. This bipartisan bill, which I'm proud to co-sponsor, was introduced by my colleague Mr. Veasey, and also is co-sponsored by Mr. Schweikert, Chairwoman Fletcher, and Chairwoman Johnson. The legislation is also endorsed by the Carbon Utilization Research Council, the Carbon Capture Coalition, the Natural Resources Defense Council, the Environmental Defense Fund, ClearPath, and Carbon 180.

Does anyone else wish to be recognized?

We will now proceed with the amendments in the order of the roster. The first amendment on the roster is an amendment offered by the Chair, and the Clerk will report the amendment.

The CLERK. Amendment No. 1, amendment to H.R. 3607 offered by Mr. Lamb.

[The amendment of Chairman Lamb follows:]

AMENDMENT TO H.R. 3607**OFFERED BY Mr . Lamb**

Page 10, beginning on line 1, strike "For activities" and all that follows through "Secretary" on line 3 and insert "Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section".

Page 16, beginning on line 15, strike "For activities" and all that follows through "Secretary" on line 17 and insert "Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section".

Page 18, beginning on line 13, strike "For activities" and all that follows through "Secretary" on line 15 and insert "Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section".

Page 22, beginning on line 16, strike "For activities" and all that follows through "Secretary" on line 18 and insert "Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section".

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Page 23, beginning on line 23, strike “For activities” and all that follows through “Secretary” on line 25 and insert “Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section”.

Page 26, line 7, strike “There are authorized” and insert “Of the amounts made available under section 961 of the Energy Policy Act of 2005 (42 U.S.C. 16291), there are authorized”.

Page 32, beginning on line 5, strike “For activities” and all that follows through “Secretary” on line 7 and insert “Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section”.

Page 34, beginning on line 21, strike “For activities” and all that follows through “Secretary” on line 23 and insert “Of the amounts made available under section 961, there are authorized to be appropriated to the Secretary for activities under this section”.

⊗

Chairman LAMB. I ask unanimous consent to dispense with the reading. Without objection, so ordered. I recognize myself to briefly explain this amendment.

This amendment makes technical and conforming changes, made in consultation with the Department of Energy, expert stakeholders, and our minority Committee staff.

Is there any further discussion on this amendment?

Mr. WEBER. Mr. Chairman?

Chairman LAMB. Mr. Weber.

Mr. WEBER. Thank you, Chairman Lamb. This amendment makes technical changes to H.R. 3607, the *Fossil Energy Research and Development Act of 2019*, in order to correct a critical funding error which was identified by staff this week. And I want to take the opportunity to thank the staff, and to extend my gratitude to the Chairman for working with us to make those important changes, and I want to encourage all of my colleagues to support this amendment. And, Mr. Chairman, I yield back.

Chairman LAMB. Thank you. We will move to vote on the amendment.

All in favor say aye.

Those opposed, say no.

The ayes have it, and the amendment is agreed to.

The next amendment on the roster is an amendment offered by the gentleman from Illinois. He is recognized to offer an amendment.

Mr. LIPINSKI. Mr. Chairman, I have an amendment at the desk.

Chairman LAMB. The Clerk will report the amendment.

The CLERK. Amendment No. 2, amendment to H.R. 3607—

[The amendment of Mr. Lipinski follows:]

AMENDMENT TO H.R. 3607
OFFERED BY MR. LIPINSKI OF ILLINOIS

Page 40, after line 2, insert the following:

1 SEC. 14. CLIMATE SOLUTIONS CHALLENGES.

2 (a) **AUTHORITY.**—Not later than 180 days after the
3 date of enactment of this Act, the Secretary of Energy
4 shall establish a program to be known as “Fossil Energy
5 Climate Solutions Challenges” for carrying out prize com-
6 petitions described under subsection (d) pursuant to sec-
7 tion 24 of the Stevenson-Wydler Technology Innovation
8 Act of 1980 (15 U.S.C. 3719) relating to the climate and
9 energy.

10 (b) **PRIZE COMMITTEES.**—

11 (1) **IN GENERAL.**—The Secretary shall assem-
12 ble a prize committee that shall define the scope and
13 detail of, and provide the requirements for, the prize
14 competitions under this section. Such committee
15 may be composed of—

16 (A) members from the Office of Fossil En-
17 ergy, Advanced Research Projects Energy, Of-
18 fice of Technology Transitions, or other offices
19 that most appropriately corresponds with the
20 topic of the prize competition; and

1 (B) representatives of any other entities,
2 as determined appropriate by the Secretary, in-
3 cluding other Federal agencies, State and local
4 governments, and the private sector.

5 (2) DEFINING TOPIC AREAS.—The prize com-
6 mittee may modify and define the scope of the prize
7 areas described under subsection (c), so long as such
8 modification is in accordance with descriptions in
9 such subsection.

10 (3) INCENTIVE FOR PRIZE COMPETITION.—The
11 prize committee for each prize competition shall de-
12 termine the incentive for the prize competition. In
13 determining the incentive, the committee shall con-
14 sider—

15 (A) a cash prize;

16 (B) access to Government facilities, such
17 as through a lab-embedded entrepreneurship
18 program of the Department of Energy, a coop-
19 erative research and development agreement, or
20 other method;

21 (C) advance market commitments for tech-
22 nologies of use or promise to the Federal Gov-
23 ernment; and

24 (D) any other incentive provided for by
25 law.

1 (4) JUDGING CRITERIA.—The prize committee
2 for each prize competition shall establish judging cri-
3 teria for the competition that shall include, at a min-
4 imum—

5 (A) potential for the solution to become a
6 commercial product or service or advance
7 knowledge to further the public good;

8 (B) consideration of how likely the solution
9 is to lead to subsequent research, development,
10 deployment, or manufacturing in the United
11 States;

12 (C) the degree to which the solution will
13 lower the climate footprint of the United States;
14 and

15 (D) the degree to which the solution will
16 lower the global climate footprint.

17 (5) CONSIDERATION.—In carrying out this sec-
18 tion, the committee shall take into consideration the
19 best practices provided for in the challenges and
20 prizes toolkit made publicly available on December
21 15, 2016, by the General Services Administration.

22 (c) PRIZE COMPETITIONS.—In carrying out the pro-
23 gram, the Secretary shall offer prize awards for any of
24 the following:

1 (1) Solutions to capture carbon emissions from
2 sources that would otherwise be emitted to the at-
3 mosphere.

4 (2) Solutions to convert carbon emissions to a
5 beneficial use that does not result in near-term re-
6 lease into the atmosphere, unless such re-release
7 offsets the emission of additional carbon into the at-
8 mosphere, such that the net effect of the solution is
9 to reduce the overall amount of carbon being emitted
10 to the atmosphere.

11 (3) Other solutions that have potential to
12 achieve reduction in greenhouse gas emissions asso-
13 ciated with fossil-based energy production.

14 (d) ACCEPTANCE OF FUNDS.—In addition to such
15 sums as may be appropriated or otherwise made available
16 to the Secretary to award prizes under this section, the
17 Secretary may accept funds from other Federal agencies,
18 private sector entities, and State and local governments
19 to award prizes under this section. The Secretary may not
20 give any special consideration relating to the selection of
21 awards under the prize competition to any private sector
22 entity or individual in return for a donation to the Sec-
23 retary or prize committee.

24 (e) ELIGIBILITY.—Notwithstanding section 24(g)(3)
25 of the Stevenson-Wydler Technology Innovation Act of

1 1980 (15 U.S.C. 3719(g)(3)), a group may be eligible for
2 an award under this section if one or more members of
3 such group is a citizen or permanent resident of the
4 United States.

5 (f) COMPLETION OF PRIZE COMPETITIONS.—The
6 prize competitions carried out under this section shall be
7 completed not later than the date that is 5 years after
8 the program is established under subsection (a).

9 (g) AUTHORIZATION OF APPROPRIATIONS.—There is
10 authorized to be appropriated \$15,000,000 to carry out
11 this section, to remain available until expended.



Chairman LAMB. I ask unanimous consent to dispense with the reading. Without objection, so ordered, and I recognize the gentleman for 5 minutes to explain the amendment.

Mr. LIPINSKI. Thank you, Mr. Chairman. My amendment directs the Secretary of Energy to administer a prize challenge competition as an innovative way to spur the development of technologies to decrease greenhouse gas emissions associated with fossil fuel energy production.

Federal prize challenges create low cost to taxpayer incentives that have unleashed American ingenuity, helping solve significant problems. The Department of Energy has administered a variety of successful prize challenges in the past. In 2007, I was able to get the *H-Prize Act* passed to spur the development of hydrogen as a clean transportation fuel. One H-Prize challenge led to a quantum leap in hydrogen fuel cell car refueling technology, and paved the way for widespread cleaner transportation vehicles. DOE's L-Prize revolutionized LED light bulb technology, and resulted in low-cost, high-quality bulbs that are ubiquitous today. The Wave Energy Prize issued a challenge asking teams to double the performance of then state-of-the-art wave energy converters. Four teams surpassed that goal. Lynn Orr, then DOE's Undersecretary for Science and Energy, indicated that the technology leap incentivized by the Energy Department demonstrates how rapid innovation can be achieved in a public prize challenge.

In recognition of the demonstrated success of prize challenges to incentivize private sector development, a bipartisan group of colleagues joined me in introducing H.R. 3100, the *Challenges and Prizes for Climate Act of 2019*. Provisions of that legislation have been incorporated into this amendment, with a focus on innovation to mitigate emissions related to fossil energy production. The underlying legislation already includes a prize challenge provision for carbon capture from the air or water, but not directly from fossil energy production sources. My amendment authorizes a prize challenge for capture directly from the source, as well as a prize competition for technologies that demonstrate beneficial uses of recovered CO₂. These are two challenges that I think that we can all agree would be very helpful to put out there.

I've been very much in favor of prize challenges. I know it's been a really bipartisan issue to offer prize challenges. As I said, it's a low cost to taxpayer way of putting out these challenges there that really incentivize Americans to use their ingenuity to come up with really new ways of attacking and solving problems, so—and I thank the Committee considering this amendment, and I encourage my colleagues to support the amendment, and I yield back the balance of my time.

Chairman LAMB. Thank you, Mr. Lipinski. Is there any further discussion on the amendment?

A vote will occur on the amendment. All in favor say aye.

Those opposed say no.

The ayes have it, and the amendment is agreed to.

The next amendment on the roster is offered by the gentleman from Texas, Mr. Cloud, who is recognized to offer the amendment.

Mr. CLOUD. Mr. Chair, withdraw my amendment.

Chairman LAMB. Does the gentleman wish to be recognized?

Mr. CLOUD. No. We can just withdraw it.

Chairman LAMB. OK. The amendment is withdrawn. Are there any more amendments on this bill? A reporting quorum being present, I move that the Energy Subcommittee of the Science, Space, and Technology Committee report H.R. 3607 to the Full Committee, with the recommendation that the bill be approved.

Those in favor of the motion will signify by saying aye.

Those opposed, no.

The ayes have it, and the bill is favorably reported.

Mr. WEBER. Mr. Chairman?

Chairman LAMB. Ranking Member?

Mr. WEBER. I request a recorded vote.

Chairman LAMB. OK. Further proceedings on this amendment will be postponed.

H.R. 3609

Chairman LAMB. We will now consider H.R. 3609, the *Wind Energy Research and Development Act of 2019*. The Clerk will report the bill.

The CLERK. H.R. 3609, a bill—

[The bill follows.]

The question is on the motion to favorably report H.R. 3607, and the Clerk will call the roll.

The CLERK. Chairman Lamb?
Chairman LAMB. Aye.
The CLERK. Chairman Lamb, aye.
Mr. Lipinski?
Mr. LIPINSKI. Aye.
The CLERK. Mr. Lipinski, aye.
Mrs. Fletcher?
Mrs. FLETCHER. Aye.
The CLERK. Mrs. Fletcher, aye.
Ms. Stevens?
Ms. STEVENS. Aye.
The CLERK. Ms. Stevens, aye.
Ms. Horn?
[No response.]
The CLERK. Mr. McNerney?
[No response.]
The CLERK. Mr. Foster?
Mr. FOSTER. Aye.
The CLERK. Mr. Foster, aye.
Mr. Casten?
Mr. CASTEN. Aye.
The CLERK. Mr. Casten, aye.
Ms. Johnson?
Chairwoman JOHNSON. Aye.
The CLERK. Ms. Johnson, aye.
Mr. Weber?
Mr. WEBER. No.
The CLERK. Mr. Weber, no.
Mr. Biggs?
Mr. BIGGS. No.
The CLERK. Mr. Biggs, no.
Mr. Norman?
Mr. NORMAN. No.
The CLERK. Mr. Norman, no.
Mr. Cloud?
Mr. CLOUD. No.
The CLERK. Mr. Cloud, no.
Mr. Lucas?

Mr. LUCAS. No.

The CLERK. Mr. Lucas, no.

Chairman LAMB. Are there any Members who haven't voted, or would like to change their vote? The Clerk will report.

The CLERK. Chairman Lamb, the ayes are seven, and the noes are five.

Chairman LAMB. The bill is favorably reported. Without objection, the motion to reconsider is laid upon the table. I ask unanimous consent that the staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered. Members will have 2 subsequent calendar days in which to submit supplemental, minority, or additional views on the measure.

XXIII. PROCEEDINGS OF FULL COMMITTEE MARKUP

MARKUPS:

**H.R. 3597, SOLAR ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;
H.R. 3607, FOSSIL ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;
H.R. 3609, WIND ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019; AND
H.R. 335, SOUTH FLORIDA CLEAN
COASTAL WATERS ACT OF 2019**

MARKUP

BEFORE THE

**COMMITTEE ON SCIENCE, SPACE, AND
TECHNOLOGY**

HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

JULY 24, 2019

Serial No. CP: 116-6

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COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

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 VACANCY

C O N T E N T S

July 24, 2019

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MARKUPS:

**H.R. 3597, SOLAR ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;
H.R. 3607, FOSSIL ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;
H.R. 3609, WIND ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019; AND
H.R. 335, SOUTH FLORIDA CLEAN
COASTAL WATERS ACT OF 2019**

WEDNESDAY, JULY 24, 2019

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Committee met, pursuant to notice, at 10:07 a.m., in room 2318 of the Rayburn House Office Building, Hon. Eddie Bernice Johnson [Chairwoman of the Committee] presiding.

Chairwoman JOHNSON. Good morning. The Committee will come to order. And without objection, the Chair is authorized to declare recess at any time. Pursuant to Committee rule 2(e) and House rule XI, the Chair announces that she may postpone roll call votes.

Pursuant to the notice, the Committee meets to consider the following measures: H.R. 3597, the *Solar Energy Research and Development Act of 2019*; H.R. 3607, the *Fossil Energy Research and Development Act of 2019*; H.R. 3609, the *Wind Energy Research and Development Act of 2019*; and H.R. 335, the *South Florida Clean Coastal Waters Act of 2019*.

Welcome to today's markup of four bipartisan bills. The first three bills, H.R. 3597 and 3607, as well as 3609, all deal with various aspects of research, development, and demonstration of advanced energy technology. All of these bills directly address the growing issue of climate change by focusing the Federal Government's energy research efforts toward cutting greenhouse gas emissions.

Our Committee has held five hearings this Congress on various topics related to climate change. We've heard firsthand of the dangers to our society from increases in extreme heat, extreme weather, droughts, rising oceans, and the many other dangers associated with climate change. These climate change impacts are not just problems in the future. Our communities are already being affected by climate change. If we don't take serious steps to address this problem, our people are going to needlessly suffer as the effects of

climate get worse. I say “needlessly suffer” because we have the power to address climate change before worse impacts occur.

Supporting the three energy research bills today is part of that effort. These bills support continuous investment in these critical areas of energy research: Solar power, wind power, and fossil fuel power. It is abundantly clear that we will need more renewable energy connected to our grid if we are going to reduce carbon emissions in America. H.R. 3597 and H.R. 3609 provide for sustained investments in solar and wind research and development (R&D) to help drive down the costs of these technologies, and to help get them into the market. I want to recognize the bills’ sponsors, Mr. McAdams and Mr. Tonko, for their hard work on these bills.

It is also abundantly clear that fossil energy will continue to be a part of our electric grid for some time to come. Without real and sustained investments in research and development to more cleanly utilize fossil fuels, it would be extremely difficult to meaningfully cut carbon dioxide emissions from our power sector.

H.R. 3607 calls for these investments, and I want to recognize my colleague from Texas, Mr. Veasey, for his efforts in moving this legislation forward.

These three bills are all endorsed by industry trade groups like the Chamber of Commerce, the Solar Industry Association, the Wind Energy Association, and the Carbon Utilization Research Council. And they’re also endorsed by environmental organizations like the Natural Resources Defense Council (NRDC) and the Environmental Defense Fund (EDF).

Finally, scientific societies like the American Chemical Society have also endorsed these bills. I hope folks can take a moment to realize how unusual it is to have these different organizations endorse the same bills. I’ll ask that the full list of endorsements be placed into the record.

[The information referred to follows:]



External Affairs & Communications

Glenn S. Ruskin
Vice President

July 23, 2019

The Honorable Eddie Bernice Johnson
Chair, House Committee on Science,
Space, and Technology
2321 Rayburn House Office Building
Washington, DC 20515

The Honorable Frank Lucas
Ranking Member, House Committee on
Science, Space and Technology
2321 Rayburn House Office Building
Washington, DC 20515

Dear Chairwoman Johnson and Ranking Member Lucas:

On behalf of the American Chemical Society (ACS), I am writing in support of H.R. 3597, the Solar Energy Research and Development Act of 2019, H.R. 3607, the Fossil Energy Research and Development Act of 2019 and H.R. 3609, the Wind Energy Research and Development Act of 2019. As the world's largest scientific society, with over 150,000 members, the ACS is committed to using chemistry to improve everyday life.

ACS believes in long-term, coordinated support for transformative energy technologies. A key component of this support is continued research to reduce the environmental impact of energy production and improve the efficiency of all energy resources. ACS also believes it is important to take into account the full lifetime costs for new technologies and ensure that research to mitigate waste from manufacturing and disposal accompanies new technology deployment.

In order to reduce the life cycle costs of new energy technologies, we strongly endorse Representative Lipinski's amendment to H.R. 3597, calling for the incorporation of sustainable chemistry principles as research and development of solar energy technology continues. We would also highlight the importance of Representative Foster's amendment to H.R. 3607, prioritizing research to improve isolation and separation of helium from fossil fuels. Helium is critical to researchers in chemistry and physics, and has numerous industrial applications. Developing new techniques to tap into sources of helium that currently go to waste is vital in the face of supply chain challenges that researchers and industries have experienced.

We thank you for your continued support of science and federal research and look forward to working with Congress to pass these bills. Should you have any questions, feel free to contact Carl Maxwell at c_maxwell@acs.org.

Sincerely,

A handwritten signature in black ink that reads "Glenn Ruskin".

Glenn S. Ruskin

<https://bpcaction.org/2019/07/solar-energy-research-and-development-act-of-2019-important-step-for-expanding-solar-energy-generation/>

22 Jul Solar Energy Research and Development Act of 2019 Important Step for Expanding Solar Energy Generation in Energy and Environment

BPC Action commends Reps. McAdams (D-UT) and Fortenberry (R-NE) for the introduction of the **Solar Energy Research and Development Act of 2019, H.R. 3597**. We applaud the congressional support for improving and expanding solar energy generation in the United States.

U.S. investment in energy innovation is needed to continue developing greater efficiencies and improved processes to meet the global clean energy demands of tomorrow. Research and development in solar energy will improve U.S. technological capabilities and support widescale economic growth. The Solar Energy Research and Development Act directs the Secretary of Energy to carry out a research, design, and development (RD&D) program that improves the capacity, efficiency, reliability, security, and affordability of solar energy technologies. Further, the legislation also establishes grants for solar energy technology demonstration projects that have the greatest potential to reduce energy costs and improve U.S. manufacturing capabilities, grid integration, and resilience.

BPC Action looks forward to working with Congress to pass this important bill.

<https://bpcaction.org/2019/07/bpc-action-applauds-fossil-energy-research-and-development-act/>

02 JUL BPC ACTION APPLAUDS FOSSIL ENERGY RESEARCH AND DEVELOPMENT ACT IN Energy and Environment

BPC Action applauds Reps. Veasey (D-TX) and Schweikert (R-AZ) for introducing the **Fossil Energy Research and Development Act**. The bill is an important step toward increasing carbon capture, removal, utilization and storage technology innovation to achieve economic growth and emission reductions. Its research, development and demonstration incentives will help stimulate technological advances, drive down costs, and boost efficiency. The bill also establishes a dedicated research program for carbon removal and authorizes a vital prize competition and test center for direct air capture technologies that remove carbon dioxide from ambient air.

Energy innovation in carbon capture, removal, utilization, and storage technologies is imperative for reducing carbon pollution and decarbonizing our economy. These technologies are needed since fossil fuels use is projected to retain a significant role in meeting growing global energy demand over the next several decades. To make our economy cleaner and more competitive worldwide, the U.S. must develop a portfolio of low-, zero-, and negative-carbon technologies.

<https://bpcaction.org/2019/07/bpc-action-applauds-introduction-wind-energy-research-development-act-2019/>

22 Jul BPC Action Applauds Introduction Wind Energy Research Development Act 2019 in Energy and Environment

BPC Action commends Reps. Tonko (D-NY), Bacon (R-NE), Kennedy (D-MA), and Fortenberry (R-NE) for the introduction of the **Wind Energy Research and Development Act of 2019, H.R. 3609**. We commend the Congressional support for improving and expanding wind energy generation in the United States.

As we look to increase the incorporation of clean energy in the grid, innovation is key to greater technical efficiency and economic growth. Wind power plays an important part in protecting our environment and producing economic benefits. The legislation authorizes the Department of Energy's (DOE) Office of Wind Energy for five years. Further, it directs the Secretary of Energy to improve the energy efficiency, reliability, and capacity of wind energy generation; optimize the design and control of wind energy systems; reduce the costs of permitting, construction, operation, and maintenance; improve the manufacturing and engineering of wind turbines; and better integrate wind power into hybrid energy systems. This legislation would also address grid integration challenges and permitting issues that stifle widespread adoption of wind power.

BPC Action looks forward to working with Congress to pass this important bill.

CHAMBER OF COMMERCE
OF THE
UNITED STATES OF AMERICA

NEIL L. BRADLEY
EXECUTIVE VICE PRESIDENT &
CHIEF POLICY OFFICER

1615 H STREET, NW
WASHINGTON, DC 20062
(202) 463-5310

July 23, 2019

The Honorable Eddie Bernice Johnson
Chairwoman
Committee on Science, Space, and
Technology
U.S. House of Representatives
Washington, DC 20515

The Honorable Frank Lucas
Ranking Member
Committee on Science, Space, and
Technology
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Johnson and Ranking Member Lucas:

The U.S. Chamber of Commerce applauds your bipartisan leadership on energy issues and writes in support of tomorrow's markup of bills that would drive innovation that enhances America's global competitiveness while reducing greenhouse gas emissions from the energy sector. Specifically, the Chamber strongly supports the consideration of the following bills that would facilitate innovation, as part of the committee's markup:

- **H.R. 3597, the Solar Energy Research and Development Act of 2019**, would help accelerate the next generation of solar energy technologies by expanding Department of Energy (DOE) efforts to improve the capacity, efficiency, manufacturing, reliability, and affordability of solar energy.
- **H.R. 3609, the Wind Energy Research and Development Act of 2019**, would extend and expand the wind energy technology, research, development and testing program at DOE.
- **H.R. 3607, the Fossil Energy Research and Development Act of 2019**, would reauthorize and expand the research, development, and demonstration of fossil energy technologies, including carbon capture technologies for both power plants and industrial sources, and establish an innovative new "Climate Solutions Challenges" prize competition at DOE.

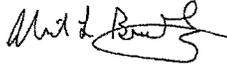
In addition, we encourage the Committee to move forward with efforts to reauthorize the Advanced Research Projects Agency – Energy (ARPA-E). ARPA-E aims to enhance the economic and energy security of the United States through high-potential, high-impact energy projects that are too early-stage for private investment. The Chamber urges Congress to advance legislation that would expand ARPA-E's efforts to reduce the cost and improve the performance of lower-emitting and more efficient technologies.

Collectively, these bills directly support the Chamber's ongoing priority to identify and advance policies that continue to make American energy cleaner and stronger. We commend the Committee for its important work, and urge it to favorably report the above bills to the full House.

130

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Sincerely,

A handwritten signature in black ink, appearing to read "Neil L. Bradley". The signature is written in a cursive style with a prominent loop at the end.

Neil L. Bradley

cc: Members of the Committee on Science, Space, and Technology



July 25, 2019

The Honorable Eddie Bernice Johnson
Chairwoman, Committee on Science, Space, and Technology
2321 Rayburn House Office Building Washington, DC 20515

Dear Chairwoman Johnson:

On behalf of ConservAmerica, I write in support legislation to reauthorize and update programs at the U.S. Department of Energy (DOE) related to the responsible use of fossil energy and renewable energy research and development. We are generally supportive of programs that support renewable energy and promote the creation and improvement of markets that provide consumers greater energy freedom. We support the following legislation to advance cleaner processes for using conventional energy resources, develop the next-generation of renewable energy technologies and hasten our transition to a lower-carbon economy.

H.R. 3597, the Solar Energy Research and Development Act of 2019, which authorizes basic research programs for the development and demonstration of next-generation solar energy technologies. We are especially supportive of the legislation's emphasis on requirements for disclosure and transparency of information for all market participants to make it easier for consumers to understand their energy choices.

H.R. 3607, the Fossil Energy Research and Development Act of 2019 will drive DOE's ongoing work on the reduction of carbon dioxide emissions through the advancement of carbon capture and storage technology.

H.R. 3609, the Wind Energy Research and Development Act of 2019 updates DOE's existing wind programs and authorizes funding for technology research incubators to advance the leading edge of wind research while reducing regulatory barriers to the renewable energy market.

Thank you for your continued leadership on these important issues and we look forward to House passage of these bills.

Sincerely,
Nan Hayworth
Chairwoman, ConservAmerica.

1455 Pennsylvania Avenue NW, Suite 400, Washington, D.C. 20004(202) 285 6783 info@conservamerica.org



July 22, 2019

The Honorable Eddie Bernice Johnson
Chairwoman
Committee on Science, Space, and Technology
2321 Rayburn House Office Building
Washington, DC 20515

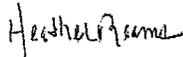
Dear Chairwoman Johnson:

On behalf of Citizens for Responsible Energy Solutions (CRES) I am writing in support of your legislation to reauthorize and update the solar, wind, and fossil energy research and development at the U.S. Department of Energy (DOE). CRES is a strong supporter of federal investment in renewable energy and the reduction of carbon emissions and is proud to support this package of bipartisan bills.

H.R. 3597, the Solar Energy Research and Development Act of 2019, would update the research and development agenda of the solar programs at the DOE, including a Next Generation Solar Energy Manufacturing Initiative. H.R. 3607, the Fossil Energy Research and Development Act of 2019 would drive DOE's work on the reduction of carbon emissions through carbon capture, direct air capture, and other technologies. Finally, H.R. 3609, the Wind Energy Research and Development Act of 2019, in addition to updating the wind programs at DOE, would also authorize funding for incubators on the leading edge of new wind technologies.

Thank you for your leadership on these issues, and we look forward to House passage of these bills.

Sincerely,



Heather Reams
Executive Director

For Immediate Release
July 2, 2019

Contact: Mike Weiner, 202-298-1848
mrw@vnf.com

CURC Applauds Introduction of the Fossil Energy Research and Development Act of 2019

The Carbon Utilization Research Council (CURC) commends Representatives Marc Veasey (D-TX), David Schweikert (R-AZ), Conor Lamb (D-PA), Lizzie Fletcher (D-TX), and Eddie Bernice Johnson (D-TX) on the introduction of the Fossil Energy Research and Development Act of 2019 (H.R. 3607). Similar legislation was introduced during the last Congress, and CURC appreciates the continued leadership in the House in support of the public-private partnerships needed to accelerate innovative technology solutions for the responsible use of our domestic energy resources.

The Fossil Energy Research and Development Act of 2019 authorizes a new research, development and demonstration program at the Department of Energy (DOE) that would accelerate deployment of carbon capture, utilization, and storage and transformational advanced power cycles for coal and natural gas applications. The bill also encourages federal support of large-scale pilot and commercial demonstration testing, which is critical for private sector adoption of these new technologies. Each of these provisions align with the recommendations of the *2018 CURC-EPRI Advanced Fossil Energy Technology Roadmap*.

“The landscape for technologies like carbon capture has changed substantially in the time since DOE’s Fossil Energy program was last authorized,” said CURC-Co Chair Holly Krutka, Vice President of Coal Generation and Emission Technologies at Peabody. “The Fossil Energy Research and Development Act would provide a much-needed update to the program by aligning it with the current needs for technology development as projected in the *CURC-EPRI Roadmap* and authorizing funding to set these important technologies further on the path towards commercialization.”

CURC is pleased to support provisions in the bill that align with the technology recommendations of the *2018 CURC-EPRI Roadmap* and we look forward to working further with the House Science, Space and Technology Committee to incorporate additional language that will address the effect of implementation of new technologies funded through this program for purposes of setting emission standards.

“The Fossil Energy Research and Development Act provides necessary direction and robust investment in RD&D for technologies like carbon capture that will ensure dispatchable sources of generation are developed, which are necessary to support the growth of renewables and maintain a diverse portfolio of electricity generation sources in the fleet of the future,” said CURC Executive Director Shannon Angielski. “However, to ensure private sector adoption, it is important that these new technologies not serve as a basis for regulating emissions standards until they can be demonstrated to be economic and technically viable. CURC looks forward to continued dialogue with the Committee and other stakeholders to ensure the original intent of Congress is maintained in the newly authorized program.”

https://www.edf.org/media/house-committee-moves-three-bills-supporting-clean-energy-technology-rd?utm_source=edf-press-release&utm_campaign=edf_none_upd_marcomm&utm_medium=email&utm_id=1562790354

House Committee Moves Three Bills Supporting Clean Energy Technology R&D

EDF Praises Action to Advance Diverse Clean Energy Solutions

July 10, 2019

(Washington, D.C. - July 10, 2019) Today, the House Committee on Science, Space and Technology (HSST)'s Energy Subcommittee held a markup on three bills reauthorizing funding for Solar, Wind and Fossil Energy Research and Development (R&D) in the Federal government through Fiscal Year 2024. Taken together, these bills – all of which have bipartisan support – outline an R&D agenda that will lead to significant carbon reductions in the power and industrial sectors, while recognizing the need for a diverse set of clean energy technologies.

“EDF applauds the House Science Committee for demonstrating support for clean energy innovation that will be essential to meet our climate goals,” said Elgie Holstein, EDF Senior Director, Strategic Planning. “While we know that innovation alone will be insufficient without an enforceable economy wide limit on carbon emissions, continued improvements in technology costs and performance – in zero emission technologies like wind and solar, and nascent negative emissions technologies like direct air capture – will help us reduce emissions as quickly and as cheaply as possible.”

The solar and wind energy R&D bills (H.R. 3597 and H.R. 3609 respectively) would authorize increased funding for the Department of Energy (DOE)'s successful solar and wind research and development programs, including for issues like resilience, grid integration, workforce development, and alternative materials and designs. Among other provisions, they would also direct DOE to award grants for advanced solar technology demonstration projects, and for improved materials, engineering and manufacturing processes for wind turbines, including supersized turbines that are at least 140 meters tall.

EDF recently testified before HSST in support of the Fossil Energy R&D (H.R. 3607) bill that would create and authorize funding for research, development, and demonstration of technologies that capture carbon at power plants and industrial facilities, including large-scale pilot projects. It also authorizes R&D activities in carbon storage and utilization and would establish programs to advance carbon dioxide removal technologies as well as methane leak detection and mitigation technologies and practices.



July 09, 2019

The Honorable Eddie Bernice Johnson
Chair
Committee on Science, Space and Technology
U.S. House of Representatives
2321 Rayburn House Office Building
Washington, DC 20515

The Honorable Frank Lucas
Ranking Member
Committee on Science, Space and Technology
U.S. House of Representatives
2321 Rayburn House Office Building
Washington, DC 20515

Chairwoman Johnson and Ranking Member Lucas:

On behalf of the Natural Resources Defense Council and its more than three million members and activists, we write to offer general support for H.R. 3607, the Fossil Energy Research and Development Act of 2019. If paired with strong reauthorizations of clean energy research and development programs, this bill could create a responsible approach to researching, developing and demonstrating technologies to reduce and reverse emissions from fossil fuel use and contribute to meeting our greenhouse gas emission reduction goals.

Last fall's Intergovernmental Panel on Climate Change's (IPCC) Special Report has made clear that to avoid the worst effects of climate change the world must limit warming to no greater than 1.5° Celsius, and that requires shifting without delay to a trajectory to reach net-zero greenhouse gas emissions by 2050.

The build-up of carbon dioxide concentrations in the atmosphere has already caused about 1 °C warming. The human suffering and economic harms we are experiencing today from past emissions are already unacceptably high. The IPCC Special Report highlights the fact that we will need to remove carbon dioxide from the atmosphere in order to reduce current harms and human suffering and reach our climate goals. The Fossil Energy Research and Development Act of 2019 would, for the first time, fund much needed RD&D into carbon dioxide removal.

To meet the goal of achieving net-zero emissions by 2050, we need to prioritize a wide range of investments that will lower emissions, particularly energy efficiency, renewable energy, clean vehicles, and a stronger electricity grid. It is also essential to accelerate the decarbonization of remaining fossil fuel use. To this end, RD&D for technologies to reduce fossil emissions must align with our climate and environmental goals. Compared to current law, the Fossil Energy Research and Development Act of 2019 would create a better pathway for developing these technologies and is a step in the right direction toward a net-zero emissions trajectory.

NATURAL RESOURCES DEFENSE COUNCIL

1152 ISTR STREET NW | WASHINGTON, DC | 20005 | T 202.289.8868 | F 202.289.1050 | NRDC.ORG

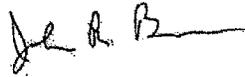
The Fossil Energy Research and Development Act would update several Department of Energy Office of Fossil Energy programs last authorized in 2005 to better align with the environmental and energy priorities of 2019 and beyond. It updates the office's objectives and programs to focus on environmental mitigation. Critically, it directs the Secretary to prioritize technologies and strategies with potential for meeting the emission reduction goals laid out in Paris Climate agreement.

The bill would update and expand RD&D of carbon capture technologies for power plants and industrial sources, reflecting the need to develop decarbonization solutions for applications beyond coal-fired power. The bill also authorizes research into carbon storage, carbon utilization, improvements in efficiency, and rare earth elements and for the first time, carbon dioxide removal from the atmosphere and methane leak detection and mitigation, as well as atmospheric carbon dioxide removal, as mentioned above. These are important areas in which to develop and demonstrate solutions for decarbonization. The bill wisely includes considerations of environmental and landowner impacts, in order to minimize conflicts and reach better outcomes. These provisions are critical to ensuring that the Fossil Energy office's programs reduce environmental harms, not lock them in for decades to come.

Fossil energy research and development will not produce real world results unless paired with pathways to market adoption. The bill should correct provisions in EFACT 2005 that could limit consideration of publicly funded technologies when setting emission standards under the Clean Air Act. Millions of taxpayer dollars have already been spent developing decarbonization technologies, yet without a successful post RD&D policy framework we have not seen the needed level of deployment. New frameworks could be created, but existing ones should not be closed off.

To achieve the levels of emissions reductions needed to stave off the worst effects of climate change, Congress must make dramatic changes to its approach to energy spending. Clean energy investments must come first and foremost. A reoriented fossil energy RD&D program can play an important role both in reducing fossil fuel impacts in the near term and preparing to reach net-zero carbon emissions by mid-century. This bill is an important step in that direction, and we look forward to working with the committee to implement further improvements.

Sincerely,



John Bowman

Managing Director of Government Affairs
Natural Resources Defense Council

NATURAL RESOURCES DEFENSE COUNCIL

1152 15TH STREET NW | WASHINGTON, DC | 20005 | T 202.295.6969 | F 202.295.1060 | NRDC.ORG

July 10, 2019



The Honorable Ben McAdams
U.S. House of Representatives
130 Cannon House Office Building
Washington, DC 20515

The Honorable Jeff Fortenberry
U.S. House of Representatives
1514 Longworth House Office Building
Washington, DC 20515

Dear Representative McAdams and Representative Fortenberry,

On behalf of the Solar Energy Industries Association (SEIA), I am writing to express our strong support for your legislation, H.R. 3597, the Solar Energy Research and Development Act of 2019. This legislation would drive critical research and development in the solar energy industry and help the solar industry achieve its goals for deployment over the next 10 years, what we are calling the Solar+ Decade. If we achieve our 20 percent goal for solar by 2030, our industry will add more than \$345 billion to the U.S. economy over the next 10 years, reaching \$53 billion annually. Continued federal funding and investment in solar technologies and research is crucial to both present and future deployment of this most viable, cost-effective, and clean energy source.

As I stated in my testimony before the House Science, Space and Technology Committee on May 15, federal investment in solar research and development has long paved the way for commercialization of technologies and has made the United States a global leader in solar energy development. Through competitions and aggressive milestones built into each project, federally supported research programs can bring together diverse partners while encouraging efficient and effective research.

We appreciate that your legislation targets short, mid, and long-term goals by bolstering research and development across a wide array of solar technologies by:

- Appropriating funds to advance security, reliability, efficiency, and scalability of solar technologies.
- Prioritizing projects that will improve advanced domestic manufacturing, storage and dispatch processes while ultimately optimizing the costs, reliability, and efficiency of solar energy across the supply chain.
- Emphasizing innovation in American solar manufacturing through the *"Next Generation Solar Initiative"* enabling the manufacturing sector with the opportunity to make strides towards a greater dominance within the global market by reducing costs and streamlining manufacturing processes.
- Providing extensive workforce development and industry training that would allow for the expansion of jobs within the solar industry.
- Recognizing the importance of the recycling photovoltaic materials that would ensure that the solar industry is able to take advantage of opportunities to lower costs while eliminating environmental impacts.

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16

July 10, 2019



Your legislation recognizes the growth in the solar industry nationwide and highlights the long-term benefits the solar industry can have on national security, the economy, and the environment. We look forward to working with you on this effort.

Sincerely,

A handwritten signature in black ink, appearing to read "Abigail Ross Hopper", is placed over a rectangular, textured grey background.

Abigail Ross Hopper, Esq.
President & CEO
Solar Energy Industries Association

Chairwoman JOHNSON. And finally, we are considering H.R. 335, which is sponsored by Mr. Mast from Florida. This bill addresses harmful algal blooms, and I support Mr. Mast's efforts to address the problem.

[The prepared statement of Chairwoman Johnson follows:]

Welcome to today's markup of four good bipartisan bills. The first three bills: H.R. 3597, H.R. 3607, and H.R. 3609, all deal with various aspects of research, development, and demonstration of advanced energy technology. All of these bills directly address the growing issue of climate change by focusing the Federal Government's energy research efforts toward cutting greenhouse gas emissions.

Our Committee has held five hearings this Congress on various topics related to climate change. We have heard first-hand of the dangers to our society from increases in extreme heat, extreme weather, droughts, rising oceans, and the many other dangers associated with climate change. These climate change impacts are not just problems in the future. Our communities are already being affected by climate change. If we don't take serious steps to address this problem, our people are going to needlessly suffer as the effects of climate get worse.

I say "needlessly suffer" because we have the power to address climate change before the worst impacts occur. Supporting the three energy research bills before us today is part of that effort. These bills support continued investment in three critical areas of energy research: solar power, wind power, and fossil fuel power.

It is abundantly clear that we will need more renewable energy connected to our grid if we are going to reduce carbon emissions in America. H.R. 3597 and H.R. 3609 provide for sustained investments in solar and wind research and development to help drive down the costs of these technologies, and help get them into the market. I want to recognize the bill sponsors, Mr. McAdams and Mr. Tonko for their hard work on these bills.

It is also abundantly clear that fossil energy will continue to be a part of our electric grid for some time to come. Without real and sustained investments in research and development to more cleanly utilize fossil fuels, it will be extremely difficult to meaningfully cut carbon dioxide emissions from our power sector. H.R. 3607 calls for these investments, and I want to recognize my colleague from Texas, Mr. Veasey, for his efforts in moving this legislation forward. These three bills are all endorsed by industry trade groups like the Chamber of Commerce, the Solar Industry Association, the Wind Energy Association, and the Carbon Utilization Research Council. They are also endorsed by environmental organizations like the Natural Resources Defense Council and the Environmental Defense Fund. Finally scientific societies like the American Chemical Society have also endorsed these bills. I hope folks can take a moment to realize how unusual it is to have those different organizations endorse the same bills. I'll ask that the full list of endorsements be placed into the record.

Finally, we are considering H.R. 335, which is sponsored by Mr. Mast from Florida. This bill addresses harmful algal blooms, and I support Mr. Mast's efforts to address the problem.

Chairwoman JOHNSON. I now recognize our Ranking Member for his opening statements.

Mr. LUCAS. Thank you, Chairwoman Johnson, for holding this markup.

Today, we consider four pieces of legislation, three of which are bills the Committee is, as of this moment, unable to reach a bipartisan agreement on. I'm disappointed that we haven't made more progress in reaching a bipartisan consensus, especially since this Committee has one of the best track records in Congress of passing productive, bipartisan legislation.

Now, I want to be clear. These three bills are well-intentioned. I believe there is still a chance for bipartisanship in the future. Matter of fact, I expect it. But the fact is, our job in Congress is to set priorities and focus our limited Federal funds where we can see the best return on investment. Unfortunately, the bills we'll consider today don't meet that standard. Instead, they offer aspirational funding levels that we simply cannot afford.

The first bill we'll consider today is H.R. 3597, the *Solar Energy Research and Development Act of 2019*. This legislation authorizes solar energy research conducted by the Department of Energy's (DOE's) Office of Energy Efficiency and Renewable Energy (EERE). EERE received almost \$2.4 billion in funding in 2019 and is DOE's largest applied research program. This legislation would authorize approximately \$1.5 billion for this work, reaching a 33 percent total increase in funding from enacted levels by 2024.

And while this legislation includes authorizations for some critical research priorities that I support like innovative energy storage, next-generation solar technologies, and advanced computer capacities, it focuses heavily on expanding the deployment of technology that already exists.

Our second bill this morning is H.R. 3607, the *Fossil Energy Research and Development Act of 2019*. This bill reauthorizes DOE's fossil energy research and development programs and brings total funding in this area to over \$1 billion by Fiscal Year 2024, a 36 percent increase from enacted levels. The bill is also singularly focused on emissions control technologies. While those technologies are certainly part of a balanced fossil energy portfolio, there's a lot more work to be done to maximize our Nation's fossil fuel resources.

Next, we'll consider H.R. 3609, the *Wind Energy Research and Development Act of 2019*. This authorizes wind energy research conducted under EERE and would provide over \$570 million more for this work. This amounts to a 37 percent increase from levels enacted in 2024. And while I support some elements of this legislation, like basic research in materials science and hybrid energy systems, its primary focus is again on reducing so-called market barriers for existing wind technologies.

I'm thrilled at the growth I've seen in wind and solar industries in the past decade. But American industry is already leading the way in developing these technologies, and we won't discover the next game-changing technology by duplicating their efforts.

Finally, the Committee will consider H.R. 335, the *South Florida Clean Coastal Waters Act of 2019*. The legislation requires the Interagency Task Force on Harmful Algal Blooms (HABs) and Hypoxia to produce an integrated assessment on the causes, consequences, and potential mitigation options to reduce HABs and hypoxia in south Florida. The legislation also calls for the task force to identify the current status and gaps in research, monitoring, and management efforts; and develop an action plan for reducing, mitigating, and controlling HABs and hypoxia in this same region. I'm supportive of this legislation, and I want to thank the Chairwoman for including it in today's markup.

Before I close, I want to make it clear I'm supportive of DOE funding for innovative research that will lead to new solar, wind, and fossil energy technologies. But as stewards of the taxpayers' resources, we must focus funding on projects that are truly cutting-edge; those that can't be undertaken by private industry like basic research in advanced computing, advanced manufacturing, and the development of new materials.

Our national debt is \$22 trillion and rising. We simply can't afford to increase spending on every program, and we'll have to make choices about where we invest.

I'd like to take this opportunity to extend an invitation to my good friends across the aisle. There is so much we agree on. I hope that in the future we can take the commonsense approach and work together to invest in the basic research we all support.

And I would offer one final observation to my friends on both sides of the dais. Having been a Ranking Member and a Chairman before on another standing committee, I always reminded all of my friends that the majority has the right and the responsibility to govern, but by the same token, the minority has the right and the responsibility to be heard. And today, we are going to offer suggestions on how to improve these bills.

And with that, I yield back the balance of my time, Chairwoman.
[The prepared statement of Mr. Lucas follows:]

Thank you, Chairwoman Johnson, for holding this markup.

Today we will consider four pieces of legislation - three of which are bills that this Committee was unable to reach a bipartisan agreement on. I'm disappointed that we haven't made more progress in reaching a bipartisan consensus, especially since this committee has one of the best track records in Congress for passing productive, bipartisan legislation.

Now, I want to be clear, these three bills are well-intentioned, and I believe there is still a chance for bipartisanship in the future. But the fact is, our job in Congress is to set priorities and focus our limited federal funds where we can see the best return on investment.

Unfortunately, the bills we will consider today don't meet that standard. Instead, they offer aspirational funding levels that we simply cannot afford.

The first bill we will consider today is H.R. 3597, the *Solar Energy Research and Development Act of 2019*.

This legislation authorizes solar energy research conducted by the Department of Energy (DOE)'s Office of Energy Efficiency and Renewable Energy (EERE). EERE received almost \$2.4 billion dollars in funding in 2019 and is DOE's largest applied research program. This legislation would authorize approximately one and a half billion dollars for this work, reaching a 33% total increase in funding from enacted levels by 2024.

And while this legislation includes authorizations for some critical research priorities that I support like innovative energy storage, next generation solar technologies, and advanced computing capabilities, it focuses heavily on expanding the deployment of technology that already exists.

Our second bill this morning is H.R. 3607, the *Fossil Energy Research and Development Act of 2019*.

This bill reauthorizes DOE's Fossil Energy Research and Development programs and brings total spending in this area to over \$1 billion by FY 2024, a 36% increase from enacted levels. The bill is also singularly focused on emissions control technologies. While those technologies are certainly part of a balanced fossil energy portfolio, there's a lot more work to be done to maximize our nation's fossil fuel resources.

Next we will consider H.R. 3609, the *Wind Energy Research and Development Act of 2019* which authorizes wind energy research conducted under EERE and would provide over \$570 million for this work. This amounts to a 37% increase from enacted levels by 2024.

And while I support some elements of this legislation, like basic research in materials science and hybrid energy systems, its primary focus is again on reducing so-called "market barriers" for existing wind technologies.

I'm thrilled at the growth we've seen in the wind and solar industries in the past decade. But American industry is already leading the way on deploying these technologies - and we won't discover the next game changing technology by duplicating their efforts.

Finally, the Committee will consider H.R. 335, the *South Florida Clean Coastal Waters Act of 2019*.

The legislation requires the Interagency Task Force on Harmful Algal Blooms (HABs) and Hypoxia to produce an integrated assessment on the causes, con-

sequences, and potential mitigation options to reduce HABs and hypoxia in South Florida. The legislation also calls for the Task Force to identify the current status and gaps in research, monitoring, and management efforts, develop an action plan for reducing, mitigating, and controlling HABs and hypoxia in this same region.

I'm supportive of this legislation and I want to thank the Chairwoman for including it in today's markup.

Before I close, I want to be clear - I'm supportive of DOE funding for innovative research that will lead to new solar, wind, and fossil energy technologies. But as stewards of taxpayer resources, we must focus funding on projects that are truly cutting-edge - those that can't be undertaken by private industry, like basic research in advanced computing, advanced manufacturing, and the development of new materials.

With our national debt at \$22 trillion and rising, we simply can't afford to increase spending for every program - and we will have to make choices about where we invest.

I'd like to take this opportunity to extend an invitation to my good friends across the aisle. There is so much we agree on. So I hope that in the future we can take the commonsense approach, and work together to invest in the basic research we all support. I yield back the balance of my time.

Chairwoman JOHNSON. Thank you very much.

H.R. 3597

Chairwoman JOHNSON. We now will consider H.R. 3597, the *Solar Energy Research and Development Act of 2019*. The clerk will report the bill.

The CLERK. Committee print of H.R. 3597, a bill.

[The bill follows:]

Committee Print116TH CONGRESS
1ST SESSION**H. R. 3607**

To amend the Energy Policy Act of, 2005 to direct Federal research in fossil energy and to promote the development and demonstration of environmentally responsible coal and natural gas technologies, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

Mr. VEASEY (for himself, Mr. SCHWEIKERT, Mr. LAMB, Mrs. FLETCHER, and Ms. JOHNSON of Texas) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

A BILL

To amend the Energy Policy Act of 2005 to direct Federal research in fossil energy and to promote the development and demonstration of environmentally responsible coal and natural gas technologies, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

4 (a) **SHORT TITLE.**—This Act may be cited as the
5 “Fossil Energy Research and Development Act of 2019”.

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1 (b) TABLE OF CONTENTS.—The table of contents for
2 this Act is as follows:

Sec. 1. Short title; table of contents.
Sec. 2. Definitions.
Sec. 3. Fossil energy objectives.
Sec. 4. Carbon capture technologies.
Sec. 5. Carbon storage validation and testing.
Sec. 6. Carbon utilization.
Sec. 7. Advanced energy systems.
Sec. 8. Rare earth elements.
Sec. 9. Methane hydrate research amendments.
Sec. 10. Carbon removal.
Sec. 11. Methane leak detection and mitigation.
Sec. 12. Waste gas utilization.
Sec. 13. National energy technology laboratory reforms.
Sec. 14. Climate Solutions Challenges.

3 **SEC. 2. DEFINITIONS.**

4 For purposes of this Act:

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

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

9 **SEC. 3. FOSSIL ENERGY OBJECTIVES.**

10 Section 961 of the Energy Policy Act of 2005 (42
11 U.S.C. 16291) is amended—

12 (1) in subsection (a)—

13 (A) by striking paragraph (2) and insert-
14 ing the following:

15 “(2) Decreasing the cost of emissions control
16 technologies for fossil energy production, generation,
17 and delivery.”;

18 (B) by striking paragraph (7) and insert-
19 ing the following:

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1 “(7) Increasing the export of emissions control
2 technologies from the United States for fossil en-
3 ergy-related equipment, technology, and services.”;
4 and

5 (C) by adding at the end the following:

6 “(8) Improving the conversion, use, and storage
7 of carbon oxides.

8 “(9) Lowering greenhouse gas emissions for all
9 fossil fuel production, generation, delivery, and utili-
10 zation, to the maximum extent possible.

11 “(10) Preventing, predicting, monitoring, and
12 mitigating the unintended leaking of methane, car-
13 bon dioxide, or other fossil fuel-related emissions
14 into the atmosphere.

15 “(11) Reducing water use, improving water
16 reuse, and minimizing the surface and subsurface
17 environmental impact in the development of uncon-
18 ventional domestic oil and natural gas resources.

19 “(12) Developing carbon removal and utiliza-
20 tion technologies, products, and methods that result
21 in net reductions in greenhouse gas emissions, in-
22 cluding direct air capture and storage and carbon
23 use and reuse for commercial application.”;

24 (2) in subsection (b), by striking paragraphs
25 (1) through (3) and inserting the following:

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1 “(1) \$825,000,000 for fiscal year 2020;
2 “(2) \$866,250,000 for fiscal year 2021;
3 “(3) \$909,563,000 for fiscal year 2022;
4 “(4) \$955,041,000 for fiscal year 2023; and
5 “(5) \$1,002,793,000 for fiscal year 2024.”; and
6 (3) by striking subsections (c) through (e) and
7 inserting the following:

8 “(c) **PRIORITIZATION.**—In carrying out this section,
9 the Secretary shall prioritize technologies and strategies
10 that have the potential to meet emissions reduction goals
11 in the agreement of the twenty-first session of the Con-
12 ference of the Parties to the United Nations Framework
13 Convention on Climate Change.

14 “(d) **LIMITATION.**—None of the funds authorized
15 under this section may be used for Fossil Energy Environ-
16 mental Restoration or Import/Export Authorization.”.

17 **SEC. 4. CARBON CAPTURE TECHNOLOGIES.**

18 (a) **CARBON CAPTURE PROGRAM.**—Section 962 of
19 the Energy Policy Act of 2005 (42 U.S.C. 16292) is
20 amended to read as follows:

21 **“SEC. 962. CARBON CAPTURE TECHNOLOGIES.**

22 “(a) **IN GENERAL.**—The Secretary shall conduct a
23 program of research, development, demonstration, and
24 commercial application of carbon capture technologies,

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1 which shall include facilitation of the development and use
2 of—

3 “(1) carbon capture technologies for coal and
4 natural gas;

5 “(2) innovations to significantly decrease emis-
6 sions at existing power plants; and

7 “(3) advanced separation technologies.

8 “(b) INVESTMENT.—As a part of the program under
9 subsection (a), the Secretary shall maintain robust invest-
10 ments in carbon capture technologies for coal and natural
11 gas applications.

12 “(c) LARGE-SCALE PILOTS.—In carrying out this
13 section, the Secretary is encouraged to support pilot
14 projects that test carbon capture technologies on coal and
15 natural gas power and industrial systems below the 100
16 megawatt scale, consistent with section 988(b).

17 “(d) COST AND PERFORMANCE GOALS.—In carrying
18 out the program under subsection (a), the Secretary shall
19 establish cost and performance goals to assist in the tran-
20 sition of carbon capture research to commercially viable
21 technologies.

22 “(e) CARBON CAPTURE PILOT TEST CENTERS.—

23 “(1) IN GENERAL.—As a part of the program
24 under subsection (a), not later than 1 year after the
25 date of the enactment of the Fossil Energy Research

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1 and Development Act of 2019, the Secretary shall
2 award grants to eligible entities for the operation of
3 not less than three Carbon Capture Test Centers (in
4 this subsection, known as the ‘Centers’) to provide
5 unique testing capabilities for innovative carbon cap-
6 ture technologies for power and industrial systems.

7 “(2) PURPOSE.—Each Center shall—

8 “(A) advance research, development, dem-
9 onstration, and commercial application of car-
10 bon capture technologies for power and indus-
11 trial systems; and

12 “(B) test technologies that represent the
13 scale of technology development beyond labora-
14 tory testing, but not yet advanced to testing
15 under operational conditions at commercial
16 scale.

17 “(3) APPLICATION.—An entity seeking to oper-
18 ate a Center under this subsection shall submit to
19 the Secretary an application at such time and in
20 such manner as the Secretary may require.

21 “(4) PRIORITY CRITERIA.—In selecting applica-
22 tions to operate a Center under this subsection, the
23 Secretary shall prioritize applicants that—

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1 “(A) have access to existing or planned re-
2 search facilities with modular technology capa-
3 bilities;

4 “(B) are institutions of higher education
5 with established expertise in engineering and
6 design for carbon capture technologies, or part-
7 nerships with such institutions;

8 “(C) have access to existing research and
9 test facilities for pre-combustion, post-combus-
10 tion, or oxy-combustion technologies; or

11 “(D) have test capabilities to address scal-
12 ing challenges of integrating carbon capture
13 technologies with utility scale power plants.

14 “(5) CONSIDERATIONS.—In awarding grants
15 for the operation of the Centers under this sub-
16 section, the Secretary shall ensure that—

17 “(A) the portfolio of Centers includes a di-
18 verse representation of regional and resource
19 characteristics; and

20 “(B) each new Center demonstrates unique
21 research capabilities, unique regional benefits,
22 or new technology development opportunities.

23 “(6) SCHEDULE.—Each grant to operate a
24 Center under this subsection shall be awarded for a
25 term of not more than 5 years, subject to the avail-

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1 ability of appropriations. The Secretary may renew
2 such 5-year term without limit, subject to a rigorous
3 merit review.

4 “(7) TERMINATION.—To the extent otherwise
5 authorized by law, the Secretary may eliminate a
6 Center during any 5-year term described in para-
7 graph (6) if such Center is underperforming.

8 “(f) DEMONSTRATIONS.—

9 “(1) IN GENERAL.—As a part of the program
10 under subsection (a), the Secretary may provide
11 grants for large-scale demonstration projects for
12 power and industrial systems that test the scale of
13 technology necessary to gain the operational data
14 needed to understand the technical and performance
15 risks of the technology before the application of the
16 technology at commercial scale, in accordance with
17 this subsection.

18 “(2) ENGINEERING AND DESIGN STUDIES.—
19 The Secretary is authorized to fund front-end engi-
20 neering and design studies in addition to, or in ad-
21 vance of, issuing an award for a demonstration
22 project under this subsection.

23 “(3) APPLICATION.—An entity seeking an
24 award to conduct a demonstration project under this
25 subsection shall submit to the Secretary an applica-

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1 tion at such time and in such manner as the Sec-
2 retary may require.

3 “(4) LIMITATIONS.—The Secretary shall only
4 provide an award under this subsection after review-
5 ing each applicant and application regarding—

6 “(A) financial strength;

7 “(B) construction schedule;

8 “(C) market risk; and

9 “(D) contractor history.

10 “(5) REQUIREMENTS.—A demonstration project
11 funded under this subsection shall—

12 “(A) utilize technologies that have com-
13 pleted pilot-scale testing or the equivalent, as
14 determined by the Secretary;

15 “(B) secure and maintain agreements for
16 the utilization or sequestration of captured car-
17 bon dioxide; and

18 “(C) upon completion, demonstrate carbon
19 capture technologies on a power or industrial
20 system capable of capturing not less than
21 100,000 tons of carbon dioxide annually.

22 “(g) DEFINITION OF POWER SYSTEM.—In this sec-
23 tion, the term ‘power system’ means any electricity gener-
24 ating unit that utilizes fossil fuels to generate electricity
25 provided to the electric grid or directly to a consumer.

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1 “(h) AUTHORIZATION OF APPROPRIATIONS.—Of the
2 amounts made available under section 961, there are au-
3 thorized to be appropriated to the Secretary for activities
4 under this section—

5 “(1) \$300,000,000 for fiscal year 2020;

6 “(2) \$315,000,000 for fiscal year 2021;

7 “(3) \$330,750,000 for fiscal year 2022;

8 “(4) \$347,288,000 for fiscal year 2023; and

9 “(5) \$364,652,000 for fiscal year 2024.”.

10 (b) GAO STUDY.—

11 (1) IN GENERAL.—Not later than 1 year after
12 the date of enactment of this Act, the Comptroller
13 General of the United States shall submit to the
14 Committee on Science, Space, and Technology of the
15 House of Representatives and the Committee on En-
16 ergy and Natural Resources of the Senate a report
17 on the results of a study of the Department’s suc-
18 cesses, failures, practices, and improvements in car-
19 rying out demonstration projects for carbon capture
20 technologies for power and industrial systems. In
21 conducting the study, the Comptroller General shall
22 consider—

23 (A) applicant and contractor qualifications;

24 (B) project management practices at the

25 Department;

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1 (C) economic or market changes and other
2 factors impacting project viability;

3 (D) completion of third-party agreements,
4 including power purchase agreements and car-
5 bon dioxide offtake agreements;

6 (E) regulatory challenges; and

7 (F) construction challenges.

8 (2) **CONSIDERATION.**—The Secretary shall con-
9 sider any relevant recommendations, as determined
10 by the Secretary, provided in the report required
11 under paragraph (1), and shall adopt such rec-
12 ommendations as the Secretary considers appro-
13 priate.

14 (3) **POWER SYSTEM DEFINED.**—In this section,
15 the term “power system” means any electricity gen-
16 erating unit that utilizes fossil fuels to generate elec-
17 tricity provided to the electric grid or directly to a
18 consumer.

19 **SEC. 5. CARBON STORAGE VALIDATION AND TESTING.**

20 Section 963 of the Energy Policy Act of 2005 (42
21 U.S.C. 16293) is amended to read as follows:

22 **“SEC. 963. CARBON STORAGE VALIDATION AND TESTING.**

23 **“(a) CARBON STORAGE.**—The Secretary, in consulta-
24 tion with the Administrator of the Environmental Protec-
25 tion Agency, shall carry out a program of research, devel-

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1 opment, and demonstration for carbon storage. The pro-
2 gram shall—

3 “(1) in coordination with relevant Federal agen-
4 cies, develop and maintain mapping tools and re-
5 sources that assess the capacity of geologic storage
6 formations in the United States;

7 “(2) develop monitoring tools, modeling of geo-
8 logic formations, and analyses to predict and verify
9 carbon dioxide containment and account for seques-
10 tered carbon dioxide in geologic storage sites;

11 “(3) research potential environmental, safety,
12 and health impacts in the event of a leak to the at-
13 mosphere or to an aquifer, and any corresponding
14 mitigation actions or responses to limit harmful con-
15 sequences;

16 “(4) evaluate the interactions of carbon dioxide
17 with formation solids and fluids, including the pro-
18 pensity of injections to induce seismic activity;

19 “(5) assess and ensure the safety of operations
20 related to geologic sequestration of carbon dioxide;

21 “(6) determine the fate of carbon dioxide con-
22 current with and following injection into geologic
23 formations;

24 “(7) support cost and business model assess-
25 ments to examine the economic viability of tech-

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1 nologies and systems developed under this program;
2 and

3 “(8) provide information to State, local, and
4 Tribal governments, the Environmental Protection
5 Agency, and other appropriate entities, to support
6 development of a regulatory framework for commer-
7 cial-scale sequestration operations that ensure the
8 protection of human health and the environment.

9 “(b) GEOLOGIC SETTINGS.—In carrying out research
10 activities under this section, the Secretary shall consider
11 a variety of candidate geologic settings, both onshore and
12 offshore, including—

13 “(1) operating oil and gas fields;

14 “(2) depleted oil and gas fields;

15 “(3) residual oil zones;

16 “(4) unconventional reservoirs and rock types;

17 “(5) unmineable coal seams;

18 “(6) saline formations in both sedimentary and
19 basaltic geologies;

20 “(7) geologic systems that may be used as engi-
21 neered reservoirs to extract economical quantities of
22 brine from geothermal resources of low permeability
23 or porosity; and

24 “(8) geologic systems containing in situ carbon
25 dioxide mineralization formations.

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1 “(e) REGIONAL CARBON SEQUESTRATION PARTNER-
2 SHIPS.—

3 “(1) IN GENERAL.—The Secretary shall carry
4 out large-scale carbon sequestration demonstrations
5 for geologic containment of carbon dioxide to collect
6 and validate information on the cost and feasibility
7 of commercial deployment of technologies for the
8 geologic containment of carbon dioxide. The Sec-
9 retary may fund new demonstrations or expand the
10 work completed at one or more of the existing re-
11 gional carbon sequestration partnerships.

12 “(2) DEMONSTRATION COMPONENTS.—Each
13 demonstration described in paragraph (1) shall in-
14 clude longitudinal tests involving carbon dioxide in-
15 jection and monitoring, mitigation, and verification
16 operations.

17 “(3) CLEARINGHOUSE.—The National Energy
18 Technology Laboratory shall act as a clearinghouse
19 of shared information and resources for the regional
20 carbon sequestration partnerships and any new dem-
21 onstrations funded under this section.

22 “(4) REPORT.—Not later than 1 year after the
23 date of enactment of the Fossil Energy Research
24 and Development Act of 2019, the Secretary shall
25 provide to the Committee on Science, Space, and

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1 Technology of the House of Representatives and the
2 Committee on Energy and Natural Resources of the
3 Senate a report that—

4 “(A) assesses the progress of all regional
5 carbon sequestration partnerships;

6 “(B) identifies the remaining challenges in
7 achieving carbon sequestration that is reliable
8 and safe for the environment and public health;
9 and

10 “(C) creates a roadmap for Department of
11 Energy carbon storage research and develop-
12 ment activities through 2030 with the goal of
13 reducing economic and policy barriers to com-
14 mercial carbon sequestration.

15 “(5) LARGE-SCALE CARBON SEQUESTRATION.—
16 For purposes of this subsection, ‘large-scale carbon
17 sequestration’ means a scale that demonstrates the
18 ability to inject and sequester several million metric
19 tons carbon dioxide for at least 10 years.

20 “(d) INTEGRATED STORAGE PROJECTS.—The Sec-
21 retary may carry out a program for the purpose of
22 transitioning the large-scale carbon sequestration dem-
23 onstration projects under subsection (c) into integrated,
24 commercial storage complexes. The program shall focus
25 on—

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1 “(1) qualifying geologic storage sites in order to
2 accept large volumes of carbon dioxide acceptable for
3 commercial contracts;

4 “(2) understanding the technical and commer-
5 cial viability of storage sites;

6 “(3) developing the qualification processes that
7 will be necessary for a diverse range of geologic stor-
8 age sites to commercially accept carbon dioxide; and

9 “(4) any other activities the Secretary deter-
10 mines necessary to transition the large scale dem-
11 onstration storage projects into commercial ventures.

12 “(e) COST SHARING.—The Secretary shall require
13 cost sharing under this section in accordance with section
14 988.

15 “(f) AUTHORIZATION OF APPROPRIATIONS.—Of the
16 amounts made available under section 961, there are au-
17 thorized to be appropriated to the Secretary for activities
18 under this section—

19 “(1) \$120,000,000 for fiscal year 2020;

20 “(2) \$126,000,000 for fiscal year 2021;

21 “(3) \$132,300,000 for fiscal year 2022;

22 “(4) \$138,915,000 for fiscal year 2023; and

23 “(5) \$145,860,750 for fiscal year 2024.”.

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1 **SEC. 6. CARBON UTILIZATION.**

2 (a) PROGRAM.—Subtitle F of title IX of the Energy
3 Policy Act of 2005 (42 U.S.C. 16291 et seq.) is amended
4 by adding at the end the following:

5 **“SEC. 969. CARBON UTILIZATION.**

6 “(a) IN GENERAL.—The Secretary shall carry out a
7 program of research, development, and demonstration for
8 carbon utilization. The program shall—

9 “(1) assess and monitor potential changes in
10 life cycle carbon dioxide and other greenhouse gas
11 emissions, and other environmental safety indicators
12 of new technologies, practices, processes, or meth-
13 ods, used in enhanced hydrocarbon recovery as part
14 of the activities authorized in section 963 of the En-
15 ergy Policy Act of 2005 (42 U.S.C. 16293);

16 “(2) identify and evaluate novel uses for car-
17 bon, including the conversion of carbon dioxide, in a
18 manner that, on a full life-cycle basis, achieves a
19 permanent reduction in, or avoidance of a net in-
20 crease in carbon dioxide in the atmosphere, for use
21 in commercial and industrial products, such as—

22 “(A) chemicals;

23 “(B) plastics;

24 “(C) building materials;

25 “(D) fuels;

26 “(E) cement;

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1 “(F) products of coal utilization in power
2 systems (as such term is defined in section
3 962(e)), or other applications; or

4 “(G) other products with demonstrated
5 market value;

6 “(3) carbon capture technologies for industrial
7 systems;

8 “(4) identify and assess alternative uses for
9 coal that result in no net emissions of carbon dioxide
10 or other pollutants, including products derived from
11 carbon engineering, carbon fiber, and coal conversion
12 methods.

13 “(b) AUTHORIZATION OF APPROPRIATIONS.—Of the
14 amounts made available under section 961, there are au-
15 thorized to be appropriated to the Secretary for activities
16 under this section—

17 “(1) \$25,000,000 for fiscal year 2020;

18 “(2) \$26,250,000 for fiscal year 2021;

19 “(3) \$27,562,500 for fiscal year 2022;

20 “(4) \$28,940,625 for fiscal year 2023; and

21 “(5) \$30,387,656 for fiscal year 2024.”

22 (b) STUDY.—The Secretary shall enter into an agree-
23 ment with the National Academies to conduct a study as-
24 sessing the barriers, and opportunities related to the com-

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1 mercial application of carbon dioxide in the United States.

2 Such study shall—

3 (1) analyze the technical feasibility, related
4 challenges, and impacts to commercializing carbon
5 dioxide, including—

6 (A) creating a national system of carbon
7 dioxide pipelines and geologic sequestration
8 sites;

9 (B) mitigating environmental and land-
10 owner impacts; and

11 (C) regional economic challenges and op-
12 portunities;

13 (2) identify potential markets, industries, or
14 sectors that may benefit from greater access to com-
15 mercial carbon dioxide;

16 (3) assess the current state of infrastructure
17 and any necessary updates to allow for the integra-
18 tion of safe and reliable carbon dioxide transpor-
19 tation, utilization, and storage;

20 (4) estimate the economic, climate, and environ-
21 mental impacts of any well-integrated national car-
22 bon dioxide pipeline system, including suggestions
23 for policies that could improve the economic impact
24 of the system;

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1 (5) assess the global status and progress of car-
2 bon utilization technologies (both chemical and bio-
3 logical) in practice today that utilize waste carbon
4 (including carbon dioxide, carbon monoxide, meth-
5 ane, and biogas) from power generation, biofuels
6 production, and other industrial processes;

7 (6) identify emerging technologies and ap-
8 proaches for carbon utilization that show promise
9 for scale-up, demonstration, deployment, and com-
10 mercialization;

11 (7) analyze the factors associated with making
12 carbon utilization technologies viable at a commer-
13 cial scale, including carbon waste stream availability,
14 economics, market capacity, energy and lifecycle re-
15 quirements;

16 (8) assess the major technical challenges associ-
17 ated with increasing the commercial viability of car-
18 bon reuse technologies, and identify the research and
19 development questions that will address those chal-
20 lenges;

21 (9) assess current research efforts, including
22 engineering and computational, that are addressing
23 these challenges and identify gaps in the current re-
24 search portfolio; and

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1 (10) develop a comprehensive research agenda
2 that addresses both long- and short-term research
3 needs and opportunities.

4 **SEC. 7. ADVANCED ENERGY SYSTEMS.**

5 Subtitle F of title IX of the Energy Policy Act of
6 2005 (42 U.S.C. 16291 et seq.) is further amended by
7 adding at the end the following:

8 **“SEC. 969A. ADVANCED ENERGY SYSTEMS.**

9 “(a) IN GENERAL.—The Secretary shall conduct a
10 program, with the purpose of reducing emissions from fos-
11 sil fuel power generation by not less than 50 percent, of
12 research, development, demonstration, and commercial ap-
13 plication with respect to the following:

14 “(1) High-efficiency turbines for any advanced
15 power system that will lead to natural gas turbine
16 combined cycle efficiency of 67 percent or combus-
17 tion turbine efficiency of 50 percent.

18 “(2) Supercritical and ultrasupercritical carbon
19 dioxide, with an emphasis on developing directly-
20 fired and indirectly fired cycles in the next 10 years.

21 “(3) Advanced combustion systems, including
22 oxy-combustion systems and chemical looping.

23 “(4) Fuel cell technologies for low-cost, high-ef-
24 ficiency, fuel-flexible, modular power systems, includ-
25 ing solid oxide fuel cell technology for commercial,

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1 residential, and distributed generation systems,
2 using improved manufacturing production and proc-
3 esses.

4 “(5) Gasification systems to enable carbon cap-
5 ture, improve efficiency, and reduce capital and op-
6 erating costs.

7 “(6) Thermal cycling with ramping or rapid
8 black start capabilities that do not compromise effi-
9 ciency or environmental performance.

10 “(7) Small-scale and modular coal-fired tech-
11 nologies with reduced carbon outputs or carbon cap-
12 ture that can support incremental power generation
13 capacity additions.

14 “(b) PRIORITY.—In carrying out the program under
15 subsection (a), the Secretary is encouraged to prioritize
16 transformational technologies that enable a step change
17 in reduction of emissions as compared to the technology
18 in existence on the date of enactment of this section.

19 “(c) AUTHORIZATION OF APPROPRIATIONS.—Of the
20 amounts made available under section 961, there are au-
21 thorized to be appropriated to the Secretary for activities
22 under this section—

23 “(1) \$150,000,000 for fiscal year 2020;

24 “(2) \$157,500,000 for fiscal year 2021;

25 “(3) \$165,375,000 for fiscal year 2022;

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1 “(4) \$173,643,750 for fiscal year 2023; and

2 “(5) \$182,325,938 for fiscal year 2024.”.

3 **SEC. 8. RARE EARTH ELEMENTS.**

4 Subtitle F of title IX of the Energy Policy Act of
5 2005 (42 U.S.C. 16291 et seq.) is further amended by
6 adding at the end the following:

7 **“SEC. 969B. RARE EARTH ELEMENTS.**

8 “(a) IN GENERAL.—In coordination with the relevant
9 Federal agencies, the Secretary shall conduct research to
10 develop and assess methods to separate and recover rare
11 earth elements and other strategic minerals and coprod-
12 ucts from coal and coal byproduct streams. The program
13 shall—

14 “(1) develop advanced rare earth element separa-
15 tion and extraction processes using coal-based re-
16 sources as feedstock materials;

17 “(2) assess the technical and economic feasi-
18 bility of recovering rare earth elements from coal-
19 based resources and validate such feasibility with
20 prototype systems producing salable, high-purity
21 rare earth elements from coal-based resources; and

22 “(3) assess and mitigate any environmental and
23 public health impacts of recovering rare earth ele-
24 ments from coal-based resources.

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1 “(b) AUTHORIZATION OF APPROPRIATIONS.—Of the
2 amounts made available under section 961, there are au-
3 thorized to be appropriated to the Secretary for activities
4 under this section—

5 “(1) \$23,000,000 for fiscal year 2020;

6 “(2) \$24,150,000 for fiscal year 2021;

7 “(3) \$25,357,500 for fiscal year 2022;

8 “(4) \$26,625,375 for fiscal year 2023; and

9 “(5) \$27,956,644 for fiscal year 2024.”.

10 **SEC. 9. METHANE HYDRATE RESEARCH AMENDMENTS.**

11 (a) IN GENERAL.—Section 4(b) of the Methane Hy-
12 drate Research and Development Act of 2000 (30 U.S.C.
13 2003(b)) is amended to read as follows:

14 “(b) GRANTS, CONTRACTS, COOPERATIVE AGREE-
15 MENTS, INTERAGENCY FUNDS TRANSFER AGREEMENTS,
16 AND FIELD WORK PROPOSALS.—

17 “(1) ASSISTANCE AND COORDINATION.—In car-
18 rying out the program of methane hydrate research
19 and development authorized by this section, the Sec-
20 retary may award grants, or enter into contracts or
21 cooperative agreements to—

22 “(A) conduct research to identify the envi-
23 ronmental, health, and safety impacts of meth-
24 anc hydrate development;

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1 “(B) assess and develop technologies to
2 mitigate environmental impacts of the explo-
3 ration and commercial development of methane
4 hydrates as an energy resource, including the
5 use of seismic testing, and to reduce the public
6 health and safety risks of drilling through
7 methane hydrates;

8 “(C) conduct research to assess and miti-
9 gate the environmental impact of hydrate
10 degassing (including natural degassing and
11 degassing associated with commercial develop-
12 ment); or

13 “(D) expand education and training pro-
14 grams in methane hydrate resource research
15 and resource development through fellowships
16 or other means for graduate education and
17 training.

18 “(2) ENVIRONMENTAL MONITORING AND RE-
19 SEARCH.—The Secretary shall conduct a long-term
20 environmental monitoring and research program to
21 study the effects of production from methane hy-
22 drate reservoirs.

23 “(3) COMPETITIVE PEER REVIEW.—Funds
24 made available to carry out paragraphs (1) and (2)
25 shall be made available based on a competitive proc-

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1 ess using external scientific peer review of proposed
2 research.”.

3 (b) CONFORMING AMENDMENT.—Section 4(e) of
4 such Act (30 U.S.C. 2003(e)) is amended in the matter
5 preceeding paragraph (1) by striking “subsection (b)(1)”
6 and inserting “paragraphs (1) and (2) of subsection (b)”.

7 (c) AUTHORIZATION OF APPROPRIATIONS.—Section
8 7 of such Act (30 U.S.C. 2006) is amended to read as
9 follows:

10 **“SEC. 7. AUTHORIZATION OF APPROPRIATIONS.**

11 “Of the amounts made available under section 961
12 of the Energy Policy Act of 2005 (42 U.S.C. 16291), there
13 are authorized to be appropriated to the Secretary to carry
14 out this Act \$15,000,000, to remain available until ex-
15 pended; for each of fiscal years 2020 through 2024.”.

16 **SEC. 10. CARBON REMOVAL.**

17 Subtitle F of title IX of the Energy Policy Act of
18 2005 (42 U.S.C. 16291 et seq.) is further amended by
19 adding at the end the following:

20 **“SEC. 969C. CARBON REMOVAL.**

21 “(a) ESTABLISHMENT.—The Secretary, in coordina-
22 tion with the appropriate Federal agencies, shall establish
23 a research, development, and demonstration program to
24 remove carbon dioxide from the atmosphere on a large
25 scale. The program may include activities in—

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- 1 “(1) direct air capture and storage technologies;
- 2 “(2) enhanced carbon mineralization;
- 3 “(3) bioenergy with carbon capture and seques-
- 4 tration;
- 5 “(4) agricultural and grazing practices;
- 6 “(5) forest management and afforestation; and
- 7 “(6) planned or managed carbon sinks, includ-
- 8 ing natural and artificial.

9 “(b) PRIORITIZATION.—In carrying out the program
10 established in subsection (a), the Secretary shall
11 prioritize—

- 12 “(1) the activities described in paragraphs (1)
13 and (2) of subsection (a), acting through the Assist-
14 ant Secretary for Fossil Energy; and
- 15 “(2) the activities described in subsection
16 (a)(3), acting through the Assistant Secretary for
17 Energy Efficiency and Renewable Energy and the
18 Assistant Secretary for Fossil Energy.

19 “(c) CONSIDERATIONS.—The program under this
20 section shall identify and develop carbon removal tech-
21 nologies and strategies that consider the following:

- 22 “(1) Land use changes, including impacts on
23 natural and managed ecosystems.
- 24 “(2) Ocean acidification.
- 25 “(3) Net greenhouse gas emissions.

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- 1 “(4) Commercial viability.
- 2 “(5) Potential for near-term impact.
- 3 “(6) Potential for carbon reductions on a
4 gigaton scale.
- 5 “(7) Economic co-benefits.
- 6 “(d) ACCOUNTING.—The Department shall collabo-
7 rate with the Environmental Protection Agency and other
8 relevant agencies to develop and improve accounting
9 frameworks and tools to accurately measure carbon re-
10 moval and sequestration methods and technologies across
11 the Federal Government.
- 12 “(e) AIR CAPTURE TECHNOLOGY PRIZE.—Not later
13 than 1 year after the date of enactment of this Act, as
14 part of the program carried out under this section, the
15 Secretary shall carry out a program to award competitive
16 technology prizes for carbon dioxide capture from ambient
17 air or water. In carrying out this subsection, the Secretary
18 shall—
- 19 “(1) in accordance with section 24 of the Ste-
20 venson-Wylder Technology Innovation Act of 1980
21 (15 U.S.C. 3719), develop requirements for—
- 22 “(A) the prize competition process;
- 23 “(B) minimum performance standards for
24 projects eligible to participate in the prize com-
25 petition; and

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1 “(C) monitoring and verification proce-
2 dures for projects selected to receive a prize
3 award;

4 “(2) establish minimum levels for the capture of
5 carbon dioxide from ambient air or water that are
6 required to qualify for a prize award; and

7 “(3) offer prize awards for any of the following:

8 “(A) A design for a promising capture
9 technology that will—

10 “(i) be operated on a demonstration
11 scale; and

12 “(ii) have the potential to achieve sig-
13 nificant reduction in the level of carbon di-
14 oxide in the atmosphere.

15 “(B) A successful bench-scale demonstra-
16 tion of a capture technology.

17 “(C) An operational capture technology on
18 a commercial scale.

19 “(f) DIRECT AIR CAPTURE TEST CENTER.—

20 “(1) IN GENERAL.—Not later than 1 year after
21 the date of enactment of the Fossil Energy Research
22 and Development Act of 2019, the Secretary shall
23 award grants to one or more eligible entities for the
24 operation of one or more test centers (in this sub-
25 section, known as ‘Centers’) to provide unique test-

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1 ing capabilities for innovative direct air capture and
2 storage technologies.

3 “(2) PURPOSE.—Each Center shall—

4 “(A) advance research, development, dem-
5 onstration, and commercial application of direct
6 air capture and storage technologies;

7 “(B) support pilot plant and full-scale
8 demonstration projects and test technologies
9 that represent the scale of technology develop-
10 ment beyond laboratory testing but not yet ad-
11 vanced to test under operational conditions at
12 commercial scale;

13 “(C) develop front-end engineering design
14 and economic analysis; and

15 “(D) maintain a public record of pilot and
16 full-scale plant performance.

17 “(3) PRIORITY CRITERIA.—In selecting applica-
18 tions to operate a Center under this subsection, the
19 Secretary shall prioritize applicants that—

20 “(A) have access to existing or planned re-
21 search facilities;

22 “(B) are institutions of higher education
23 with established expertise in engineering for di-
24 rect air capture technologies, or partnerships
25 with such institutions; or

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1 “(C) have access to existing research and
2 test facilities for bulk materials design and test-
3 ing, component design and testing, or profes-
4 sional engineering design.

5 “(4) SCHEDULE.—Each grant to operate a
6 Center under this subsection shall be awarded for a
7 term of not more than 5 years, subject to the avail-
8 ability of appropriations. The Secretary may renew
9 such 5-year term without limit, subject to a rigorous
10 merit review.

11 “(5) TERMINATION.—To the extent otherwise
12 authorized by law, the Secretary may eliminate the
13 center during any 5-year term described in the last
14 paragraph if it is underperforming.

15 “(g) LARGE-SCALE PILOTS AND DEMONSTRA-
16 TIONS.—In supporting the technology development activi-
17 ties under this section, the Secretary is encouraged to sup-
18 port carbon removal pilot and demonstration projects, in-
19 cluding—

20 “(1) pilot projects that test direct air capture
21 systems capable of capturing 10 to 100 tonnes of
22 carbon oxides per year to provide data for dem-
23 onstration-scale projects; and

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1 “(2) direct air capture demonstration projects
2 capable of capturing greater than 1,000 tonnes of
3 carbon oxides per year.

4 “(h) INTRA-AGENCY RESEARCH.—In carrying out
5 the program established in (a), the Secretary shall encour-
6 age and promote collaborations among relevant offices and
7 agencies within the Department.

8 “(i) AUTHORIZATION OF APPROPRIATIONS.—Of the
9 amounts made available under section 961, there are au-
10 thorized to be appropriated to the Secretary for activities
11 under this section—

12 “(1) \$75,000,000 for fiscal year 2020,
13 \$15,000,000 of which are authorized to carry out
14 subsection (e);

15 “(2) \$63,000,000 for fiscal year 2021;

16 “(3) \$66,150,000 for fiscal year 2022;

17 “(4) \$69,458,000 for fiscal year 2023; and

18 “(5) \$72,930,000 for fiscal year 2024.”.

19 **SEC. 11. METHANE LEAK DETECTION AND MITIGATION.**

20 Subtitle F of title LX of the Energy Policy Act of
21 2005 (42 U.S.C. 16291 et seq.) is further amended by
22 adding at the end the following:

23 **“SEC. 969D. METHANE LEAK DETECTION AND MITIGATION.**

24 “(a) IN GENERAL.—The Secretary, in consultation
25 with the Administrator of the Environmental Protection

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1 Agency and other appropriate Federal agencies, shall
2 carry out a program of methane leak detection and mitiga-
3 tion research, development, demonstration, and commer-
4 cial application for technologies and methods that signifi-
5 cantly reduce emissions. In carrying out the program, the
6 Secretary shall—

7 “(1) develop cooperative agreements with State
8 or local governments or private entities to provide
9 technical assistance to—

10 “(A) prevent or respond to methane leaks,
11 including detection, mitigation, and identifica-
12 tion of leaks throughout the natural gas infra-
13 structure (which includes natural gas storage,
14 pipelines, and natural gas production sites); and

15 “(B) protect public health in the event of
16 a major methane leak;

17 “(2) promote demonstration and adoption of ef-
18 fective methane emissions-reduction technologies in
19 the private sector;

20 “(3) in coordination with representatives from
21 private industry, State and local governments, and
22 institutions of higher education, create a publicly ac-
23 cessible resource for best practices in the design,
24 construction, maintenance, performance, monitoring,
25 and incident response for—

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- 1 “(A) pipeline systems;
- 2 “(B) wells;
- 3 “(C) compressor stations;
- 4 “(D) storage facilities; and
- 5 “(E) other vulnerable infrastructure;
- 6 “(4) identify high-risk characteristics of pipe-
- 7 lines, wells, and materials, geologic risk factors, or
- 8 other key factors that increase the likelihood of
- 9 methane leaks; and
- 10 “(5) in collaboration with private entities and
- 11 institutions of higher education, quantify and map
- 12 significant geologic methane seeps across the United
- 13 States.
- 14 “(b) CONSIDERATIONS.—In carrying out the pro-
- 15 gram under this section, the Secretary shall consider the
- 16 following:
- 17 “(1) Historical data of methane leaks.
- 18 “(2) Public health consequences.
- 19 “(3) Public safety.
- 20 “(4) Novel materials and designs for pipelines,
- 21 compressor stations, components, and wells (includ-
- 22 ing casing, cement, wellhead).
- 23 “(5) Regional geologic traits.
- 24 “(6) Induced and natural seismicity.

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1 “(c) AUTHORIZATION OF APPROPRIATIONS.—Of the
2 amounts made available under section 961, there are au-
3 thorized to be appropriated to the Secretary for activities
4 under this section—

5 “(1) \$22,000,000 for fiscal years 2020;

6 “(2) \$23,100,000 for fiscal years 2021;

7 “(3) \$24,255,000 for fiscal years 2022;

8 “(4) \$25,467,750 for fiscal years 2023; and

9 “(5) \$26,741,138 for fiscal years 2024.”.

10 **SEC. 12. WASTE GAS UTILIZATION.**

11 Subtitle F of title IX of the Energy Policy Act of
12 2005 (42 U.S.C. 16291 et seq.) is further amended by
13 adding at the end the following:

14 **“SEC. 969E. WASTE GAS UTILIZATION.**

15 “The Secretary shall carry out a program of research,
16 development, and demonstration for waste gas utilization.

17 The program shall—

18 “(1) identify and evaluate novel uses for light
19 hydrocarbons, such as methane, ethane, propane,
20 butane, pentane and hexane, produced during oil
21 and shale gas production, including the production
22 of chemicals or transportation fuels;

23 “(2) develop advanced gas conversion tech-
24 nologies that are modular and compact, and may le-
25 verage advanced manufacturing technologies;

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1 “(3) support demonstration activities at oper-
2 ating oil and gas facilities to test the performance
3 and cost-effectiveness of new gas conversion tech-
4 nologies; and

5 “(4) assess and monitor potential changes in
6 life cycle greenhouse gas emissions that may result
7 from the use of technologies developed under this
8 program.”.

9 **SEC. 13. NATIONAL ENERGY TECHNOLOGY LABORATORY**
10 **REFORMS.**

11 (a) SPECIAL HIRING AUTHORITY FOR SCIENTIFIC,
12 ENGINEERING, AND PROJECT MANAGEMENT PER-
13 SONNEL.—

14 (1) IN GENERAL.—The Director of the National
15 Energy Technology Laboratory shall have the au-
16 thority to—

17 (Δ) make appointments to positions in the
18 Laboratory to assist in meeting a specific
19 project or research need, without regard to civil
20 service laws, of individuals who—

21 (i) have an advanced scientific or en-
22 gineering background; or

23 (ii) have a business background and
24 can assist in specific technology-to-market
25 needs;

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1 (B) fix the basic pay of any employee ap-
2 pointed under this section at a rate not to ex-
3 ceed level II of the Executive Schedule; and

4 (C) pay any employee appointed under this
5 section payments in addition to basic pay, ex-
6 cept that the total amount of additional pay-
7 ments paid to an employee under this sub-
8 section for any 12-month period shall not ex-
9 ceed the least of—

10 (i) \$25,000;

11 (ii) the amount equal to 25 percent of
12 the annual rate of basic pay of that em-
13 ployee; and

14 (iii) the amount of the limitation that
15 is applicable for a calendar year under sec-
16 tion 5307(a)(1) of title 5, United States
17 Code.

18 (2) LIMITATIONS.—

19 (A) IN GENERAL.—The term of any em-
20 ployee appointed under this section shall not ex-
21 ceed 3 years.

22 (B) FULL-TIME EMPLOYEES.—Not more
23 than 10 full-time employees appointed under
24 this subsection may be employed at the Na-

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1 tional Energy Technology Laboratory at any
2 given time.

3 (b) DISCRETIONARY RESEARCH AND DEVELOP-
4 MENT.—

5 (1) IN GENERAL.—The Secretary shall establish
6 mechanisms under which the Director of the Na-
7 tional Energy Technology Laboratory may use an
8 amount that is, in total, not less than 2 percent and
9 not more than 4 percent of all funds available to the
10 Laboratory for the following purposes:

11 (A) To fund innovative research that is
12 conducted at the Laboratory and supports the
13 mission of the Department.

14 (B) To fund technology development pro-
15 grams that support the transition of tech-
16 nologies developed by the Laboratory into the
17 commercial market.

18 (C) To fund workforce development activi-
19 ties to strengthen external engineering and
20 manufacturing partnerships to ensure safe, effi-
21 cient, productive, and useful fossil energy tech-
22 nology production.

23 (D) To fund the revitalization, recapitaliza-
24 tion, or minor construction of the Laboratory
25 infrastructure.

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1 (2) PRIORITYZATION.—The Director shall
2 prioritize innovative experiments and proposals pro-
3 posed by scientists and researchers at the National
4 Energy Technology Laboratory.

5 (3) ANNUAL REPORT ON USE OF AUTHORITY.—
6 Not later than March 1 of each year, the Secretary
7 shall submit to the Committee on Science, Space,
8 and Technology of the House of Representatives and
9 the Committee on Energy and Natural Resources of
10 the Senate a report on the use of the authority
11 under this subsection during the preceding fiscal
12 year.

13 (e) LABORATORY OPERATIONS.—The Secretary shall
14 delegate human resources operations of the National En-
15 ergy Technology Laboratory to the Director of the Na-
16 tional Energy Technology Laboratory.

17 (d) REVIEW.—Not later than 2 years after the date
18 of enactment of this Act, the Secretary shall submit to
19 the Committee on Science, Space, and Technology of the
20 House of Representatives and the Committee on Energy
21 and Natural Resources of the Senate a report assessing
22 the National Energy Technology Laboratory's manage-
23 ment and research. The report shall include—

24 (1) an assessment of the quality of science and
25 research at the National Energy Technology Labora-

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1 tory relative to similar work at other national lab-
2 oratories;

3 (2) a review of the effectiveness of authorities
4 provided in subsections (a) and (b); and

5 (3) recommendations for policy changes within
6 the Department and legislative changes to provide
7 the National Energy Technology Laboratory the nec-
8 essary tools and resources to advance its research
9 mission.

10 **SEC. 14. CLIMATE SOLUTIONS CHALLENGES.**

11 (a) **AUTHORITY.**—Not later than 180 days after the
12 date of enactment of this Act, the Secretary of Energy
13 shall establish a program to be known as “Fossil Energy
14 Climate Solutions Challenges” for carrying out prize com-
15 petitions described under subsection (d) pursuant to sec-
16 tion 24 of the Stevenson-Wydler Technology Innovation
17 Act of 1980 (15 U.S.C. 3719) relating to the climate and
18 energy.

19 (b) **PRIZE COMMITTEES.**—

20 (1) **IN GENERAL.**—The Secretary shall assem-
21 ble a prize committee that shall define the scope and
22 detail of, and provide the requirements for, the prize
23 competitions under this section. Such committee
24 may be composed of—

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1 (A) members from the Office of Fossil En-
2 ergy, Advanced Research Projects Energy, Of-
3 fice of Technology Transitions, or other offices
4 that most appropriately corresponds with the
5 topic of the prize competition; and

6 (B) representatives of any other entities,
7 as determined appropriate by the Secretary, in-
8 cluding other Federal agencies, State and local
9 governments, and the private sector.

10 (2) DEFINING TOPIC AREAS.—The prize com-
11 mittee may modify and define the scope of the prize
12 areas described under subsection (e), so long as such
13 modification is in accordance with descriptions in
14 such subsection.

15 (3) INCENTIVE FOR PRIZE COMPETITION.—The
16 prize committee for each prize competition shall de-
17 termine the incentive for the prize competition. In
18 determining the incentive, the committee shall con-
19 sider—

20 (A) a cash prize;

21 (B) access to Government facilities, such
22 as through a lab-embedded entrepreneurship
23 program of the Department of Energy, a coop-
24 erative research and development agreement, or
25 other method;

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1 (C) advance market commitments for tech-
2 nologies of use or promise to the Federal Gov-
3 ernment; and

4 (D) any other incentive provided for by
5 law.

6 (4) JUDGING CRITERIA.—The prize committee
7 for each prize competition shall establish judging cri-
8 teria for the competition that shall include, at a min-
9 imum—

10 (A) potential for the solution to become a
11 commercial product or service or advance
12 knowledge to further the public good;

13 (B) consideration of how likely the solution
14 is to lead to subsequent research, development,
15 deployment, or manufacturing in the United
16 States;

17 (C) the degree to which the solution will
18 lower the climate footprint of the United States;
19 and

20 (D) the degree to which the solution will
21 lower the global climate footprint.

22 (5) CONSIDERATION.—In carrying out this sec-
23 tion, the committee shall take into consideration the
24 best practices provided for in the challenges and

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1 prizes toolkit made publicly available on December
2 15, 2016, by the General Services Administration.

3 (c) PRIZE COMPETITIONS.—In carrying out the pro-
4 gram, the Secretary shall offer prize awards for any of
5 the following:

6 (1) Solutions to capture carbon emissions from
7 sources that would otherwise be emitted to the at-
8 mosphere.

9 (2) Solutions to convert carbon emissions to a
10 beneficial use that does not result in near-term re-
11 release into the atmosphere, unless such re-release
12 offsets the emission of additional carbon into the at-
13 mosphere, such that the net effect of the solution is
14 to reduce the overall amount of carbon being emitted
15 to the atmosphere.

16 (3) Other solutions that have potential to
17 achieve reduction in greenhouse gas emissions asso-
18 ciated with fossil-based energy production.

19 (d) ACCEPTANCE OF FUNDS.—In addition to such
20 sums as may be appropriated or otherwise made available
21 to the Secretary to award prizes under this section, the
22 Secretary may accept funds from other Federal agencies,
23 private sector entities, and State and local governments
24 to award prizes under this section. The Secretary may not
25 give any special consideration relating to the selection of

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1 awards under the prize competition to any private sector
2 entity or individual in return for a donation to the Sec-
3 retary or prize committee.

4 (e) ELIGIBILITY.—Notwithstanding section 24(g)(3)
5 of the Stevenson-Wydler Technology Innovation Act of
6 1980 (15 U.S.C. 3719(g)(3)), a group may be eligible for
7 an award under this section if one or more members of
8 such group is a citizen or permanent resident of the
9 United States.

10 (f) COMPLETION OF PRIZE COMPETITIONS.—The
11 prize competitions carried out under this section shall be
12 completed not later than the date that is 5 years after
13 the program is established under subsection (a).

14 (g) AUTHORIZATION OF APPROPRIATIONS.—There is
15 authorized to be appropriated \$15,000,000 to carry out
16 this section, to remain available until expended.

Chairwoman JOHNSON. Without objection, the bill is considered as read and open to amendment at any point.

I recognize myself to speak on the bill.

I'm pleased that we are now considering H.R. 3607, the bipartisan *Fossil Energy Research and Development Act of 2019* led by my Dallas-Fort Worth colleague, Mark Veasey, which I was very happy to cosponsor, along with my colleague on the Energy Subcommittee, Chairman Mr. Lamb, our Environmental Subcommittee Chairwoman Mrs. Fletcher, Congressman David Schweikert, and Congressman Brian Fitzpatrick.

As we all know, historically fossil fuels have served as primary source of U.S. energy as they have provided reliable power at low cost. My home State of Texas has played an important role in the fossil fuels industry as the leading producer of crude oil and natural gas in the United States.

However, as our Nation's priorities have evolved, we are now focused not only on using the energy sources that provide low-cost dispatchable energy but also ensuring that these are clean sources of energy. That's why we must strengthen our investment in the Department of Energy's Office of Fossil Energy, which supports research to address the environmental impacts of fossil fuels.

H.R. 3607 sets forth a bold research agenda for important topics like carbon capture, storage, utilization, carbon removal, and methane leak detection and mitigation.

This bill has been endorsed by a broad range of prominent stakeholders from the fossil fuel industry sector, labor, and environmental organizations, including the Carbon Utilization Research Council, the Carbon Capture Coalition, Carbon180, the Natural Resources Defense Council, the Environmental Defense Fund, the American Federation of Government Employees, ClearPath, the Bipartisan Policy Center, Third Way, the Clean Air Task Force, the American Chemical Society, and the U.S. Chamber of Commerce.

Given this broad support for this bipartisan bill, I hope that each of my colleagues on both sides of the aisle will strongly support advancing H.R. 3607 this morning.

Does anyone wish to be recognized? Mrs. Fletcher.

Mrs. FLETCHER. Thank you, Chairwoman Johnson. I move to strike the last word.

I'd like to thank you, Chairwoman Johnson and Ranking Member Lucas, for including this important bill in today's markup. H.R. 3607, the *Fossil Energy Research and Development Act of 2019*, is an important step in continuing to develop carbon capture utilization and storage technology and to increase the export of this technology, equipment, and services from the United States.

In particular, our investment in carbon capture, utilization, and storage (CCUS) research has the potential to make viable transformative solutions that go to the heart of one of our greatest challenges—carbon emissions and climate change.

The Intergovernmental Panel on Climate Change, the IPCC, has identified the impacts of global warming of 1.5° C above the preindustrial levels and related global greenhouse emission pathways. In its report, the IPCC laid out four different potential pathways to reach the goals of reducing carbon emissions, and three of

the four scenarios required the successful development and deployment of CCUS.

All three scenarios requiring CCUS were economically much cheaper than the plan without, and there are three main problems with CCUS currently: The limited pace of current deployment, the evolution of CCS technology associated with deployment, and the lack of incentives for large-scale implementation.

CCS has the greatest power for the industrial sector. While solar and wind have increased in the power sector, industrial emissions are responsible for one-third of greenhouse gases globally. Power demand in the industrial sector is also likely to increase dramatically between now and 2050. CCUS has a definitive role to play here, especially in certain high-carbon-emitting industries. The government has a role to play here in driving innovation through public-private partnerships, through funding incentives, and through this critical research.

We've already seen promising examples of the potential CCUS technology in the Houston area that I represent, along with my colleagues on this Committee, and I believe it is in everyone's interest to invest in this critical research. As the representative for the energy capital of the world in Houston, Texas, I urge my colleagues to vote in support of this bill, and I yield back.

Chairwoman JOHNSON. Thank you very much.

Any further requests for recognition?

Mr. WEBER. Madam Chair, is it in order to submit an amendment at this time?

Chairwoman JOHNSON. We're going to amendments.

Mr. WEBER. OK.

Chairwoman JOHNSON. We will proceed now with the amendments in order of the roster, and Mr. Weber has the first amendment.

Mr. WEBER. Madam Chair—

Chairwoman JOHNSON. There's an amendment at the desk.

Mr. WEBER. Yes.

The CLERK. Amendment No. 1 offered by Mr. Weber.

[The amendment of Mr. Weber follows:]

AMENDMENT TO H.R. 3607**OFFERED BY M. _____**

[Page and line numbers refer to CP_H3607 with timestamp of July 18, 2019 (3:12 p.m.) as forwarded by the Subcommittee on Energy of the Committee on Science, Space, and Technology.]

Page 2, strike line 9 and all that follows through page 4, line 16 and insert the following:

1 SEC. 3. FOSSIL ENERGY.

2 Section 961 of Energy Policy Act of 2005 (42 U.S.C.
3 16291) is amended—

4 (1) by striking subsection (a) and inserting the
5 following:

6 “(a) IN GENERAL.—The Secretary shall carry out re-
7 search, development, demonstration, and commercial ap-
8 plication programs in fossil energy, including activities
9 under this subtitle, with the goal of improving the effi-
10 ciency, effectiveness, and environmental performance of
11 fossil energy production, generation, delivery, and utiliza-
12 tion technologies. Such programs shall prioritize early-
13 stage research activities that industry by itself is not likely
14 to undertake because of technical challenges, research in-
15 frastructure, or regulatory uncertainty, and take into con-
16 sideration the following objectives:

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1 “(1) Increasing the energy efficiency of all
2 forms of fossil energy.

3 “(2) Decreasing the cost of fossil energy tech-
4 nologies.

5 “(3) Decreasing the dependence of the United
6 States on foreign energy supplies.

7 “(4) Decreasing the environmental impact of
8 fossil energy-related activities, including reducing
9 greenhouse gas emissions produced through fossil
10 fuel production, generation, delivery, and utilization.

11 “(5) Improving the conversion, utilization, and
12 storage of carbon oxides, including through the de-
13 velopment of carbon removal and utilization tech-
14 nologies, products, and methods that result in net
15 reductions in greenhouse gas emissions, and carbon
16 use and reuse technologies.

17 “(6) Preventing, predicting, monitoring, and
18 mitigating the unintended leaking of fossil fuel-re-
19 lated emissions into the atmosphere.

20 “(7) Reducing water use, improving water
21 reuse, and minimizing the surface and subsurface
22 environmental impact in the development of uncon-
23 ventional domestic oil and natural gas resources.

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1 “(8) Increasing the export of fossil energy-re-
2 lated equipment, technology, and services from the
3 United States”;

4 (2) in subsection (b), by striking paragraphs
5 (1) through (3) and inserting the following:

6 “(1) \$740,000,000 for fiscal year 2020;

7 “(2) \$749,250,000 for fiscal year 2021;

8 “(3) \$758,500,000 for fiscal year 2022;

9 “(4) \$767,750,000 for fiscal year 2023; and

10 “(5) \$777,000,000 for fiscal year 2024.”; and

11 (3) by striking subsections (c) through (e) and
12 inserting the following:

13 “(e) LIMITATION.—None of the funds authorized
14 under this section may be used for Fossil Energy Environ-
15 mental Restoration or Import/Export Authorization.”.

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Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I recognize the gentleman for 5 minutes to explain his amendment.

Mr. WEBER. Thank you, Madam Chair. I appreciate that. My amendment to H.R. 3607, the *Fossil Energy Research and Development Act of 2019*, would modify the bill to allocate more moderate funding levels and address the unnecessary narrowing of the mission of the fossil energy research programs included in the underlying bill.

Once again, like the Ranking Member, I do believe, along with the Chairwoman, we have a bipartisan bill within our reach. While H.R. 3607 includes many programs that I support like innovative research in carbon capture technologies, indeed, we have a large carbon capture sequestration plant in our district. Like carbon utilization research and natural gas production R&D, the spending authorized in the bill is simply not realistic.

This legislation would increase total spending in this area to over \$1 billion with a B by Fiscal Year 2024, which is a 36 percent increase from enacted levels. This level of funding is aspirational at best and irresponsible at worst. As has been cited earlier, our national debt is out of control, and we just cannot increase spending for every program. We have to make choices about priorities and use our limited resources in the best way we can.

This amendment also addresses another concern that I have with this legislation, and that is the narrowing of the mission goals within the fossil energy R&D program. The changes proposed to the mission goals in the majority's legislation would focus fossil R&D programs almost entirely on emissions-control technologies. And while I'm supportive of funding research to help us better capture, store, and utilize carbon—did I mention we have a facility in our district—this cannot be our only goal when it comes to energy technology.

So accordingly, my amendment would restore important provisions authorizing DOE to conduct research on a broad range of production, on consumption, and on utilization technologies for fossil fuels. We could actually achieve those lower energy costs that our good friend from Colorado, Mr. Perlmutter, talked about earlier. It's our job in Congress to focus Federal agencies on the best use of limited Federal funding and to set clear priorities for agencies to develop innovative technologies. But we cannot increase every program by 30 to 40 percent, no matter how much and how nice that sounds.

So I support aspects of the research programs authorized in this legislation, and my amendment allows for modest growth in funds authorized for fossil energy research in the years ahead. But we must be fiscally responsible and, most of all, we have to be honest and realistic about what we can truly achieve. So I believe this amendment is a commonsense, fiscally responsible proposal, and I encourage my colleagues to support the amendment.

And, Madam Chair, I yield back.

Chairwoman JOHNSON. Thank you very much.

I recognize myself in opposition to the amendment.

I oppose this amendment because it would limit support for research, development, and demonstration activities in this vital area. The funding levels authorized in this bill are consistent with testimony and recommendations that the Committee has received from major energy industry organizations.

As found in the 2018 Advanced Fossil Energy Technology Roadmap produced by the Carbon Utilization Research Council and the Electric Power Research Institute, for example, major environmental organizations, including the National Resource Defense Council and the Environmental Defense Fund, have also endorsed the need for robust Federal support to advance these technologies at a pace that would help mitigate the worst potential impacts of climate change.

The overall level for fossil energy R&D activities provided in this amendment are also inconsistent with the specific levels authorized to carry out the individual programs established in this bill. In other words, beginning in 2021 and all the way through 2024, the amounts authorized for each of the programs would add up to more than what would be authorized for fossil fuel energy R&D in total if this amendment were adopted. I'm sorry, but I just can't support legislative language that defies basic arithmetic.

Last, this amendment would eliminate several important provisions in the underlying bill that ensure that these federally supported activities focus on reducing the environmental impact of the extraction and use of fossil fuels. This is where taxpayer-funded R&D is most needed in the fossil energy sector and would have the largest public benefit.

I yield back.

Is there further discussion on this amendment? Anyone seeking recognition?

If not, the vote occurs on the amendment.

All in favor, say aye.

Those opposed, no.

The noes have it, and the amendment is not agreed to.

Mr. LUCAS. Madam Chair, could we have a recorded vote on that amendment?

Chairwoman JOHNSON. A recorded vote has been requested. It will be rolled with the rest of the votes. Thank you.

Any further amendments? Mr. Foster?

Mr. FOSTER. Yes, I have an amendment at the desk.

Chairwoman JOHNSON. He has an amendment at the desk. The clerk is to report the amendment.

The CLERK. Amendment No. 2 offered by Mr. Foster.

[The amendment of Mr. Foster follows:]

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AMENDMENT TO H.R. 3607

OFFERED BY _____

Page 3, after line 14 insert the following (and make such conforming changes as may be necessary):

- 1 “(11) Improving the separation and purification
- 2 of helium from fossil fuel resources.”.



Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

The Chair recognizes the gentleman for 5 minutes to explain his amendment.

Mr. FOSTER. Thank you, Madam Chairwoman.

I am introducing this amendment to add, quote, "improving the separation and purification of helium from fossil fuel resources as an objective of DOE's fossil fuel research activities." Helium is a critically important element to a wide range of activities, not only party balloons and blimps but quantum computers and other scientific research, magnetic resonance imaging machines for medicine, advanced nuclear reactors, pressurizing the fuel tanks of rockets prior to launch, but perhaps most importantly, of course, its use in superconducting particle accelerators, on which I spent a big part of my career.

Helium's ability—its chemical inertness and its ability to reach very low temperatures while remaining in a gaseous or fluid state attracts many commercial and institutional users. Unfortunately, our helium supply is dwindling, and a crippling shortage has been affecting university researchers, national laboratories, and a broad range of industries, including domestic manufacturing of semiconductors and fiber-optic cables.

Oil companies harvest helium trapped beneath the Earth's surface in natural gas chambers, but helium is very difficult to locate and often expensive to separate. Almost every known helium reserve was discovered by accident as a byproduct of natural gas extraction.

The United States has been the largest producer of helium since 1925 because of a massive reserve found across Texas, Oklahoma, and Kansas. Much of this is stored in the Federal Helium Reserve, but the Reserve is set to close down in 2021. This decreasing supply of helium has caused prices to double or even triple. The price uncertainty is especially difficult to accommodate for scientists who rely upon helium for its—have fixed research grants but must use those fixed grants to purchase helium.

Additional research by the fossil fuel program at DOE is likely to improve the efficiency and lower the cost of helium extraction. So I urge my colleagues to support my amendment to direct the DOE to target a fraction of the fossil fuel research toward the critical issue of the plummeting helium supply.

Thank you, and I yield back.

Chairwoman JOHNSON. Thank you.

Any further comments on the amendment?

Hearing no request, the vote then will occur on the amendment.

All those in favor, say aye.

Those opposed, no.

The ayes have it, and the amendment is adopted.

The next amendment is Mr. Lucas', the Ranking Member, and you're recognized for 5 minutes.

Mr. LUCAS. Madam Chair, I have an amendment at the desk.

Chairwoman JOHNSON. The clerk will read the amendment.

The CLERK. Amendment No. 3 offered by Mr. Lucas.

[The amendment of Mr. Lucas follows:]

AMENDMENT TO H.R. 3607**OFFERED BY M. _____**

Page and line numbers refer to CP_H3607 with timestamp of July 18, 2019 (3:12 p.m.) as forwarded by the Subcommittee on Energy of the Committee on Science, Space, and Technology.

Insert after section 4 the following (and make such conforming changes as may be necessary):

1 **SEC. 5. NATURAL GAS CARBON CAPTURE RESEARCH, DE-**
 2 **VELOPMENT, AND DEMONSTRATION PRO-**
 3 **GRAM.**

4 (a) IN GENERAL.—Subtitle F of title IX of the En-
 5 ergy Policy Act of 2005 (42 U.S.C. 16291 et seq.) is
 6 amended by adding at the end the following:

7 **“SEC. 969. NATURAL GAS CARBON CAPTURE RESEARCH,**
 8 **DEVELOPMENT, AND DEMONSTRATION PRO-**
 9 **GRAM.**

10 “(a) DEFINITIONS.—In this section:

11 “(1) NATURAL GAS.—The term ‘natural gas’
 12 includes any fuel consisting in whole or in part of—

13 “(A) natural gas;

14 “(B) liquid petroleum gas;

15 “(C) synthetic gas derived from petroleum
 16 or natural gas liquids;

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1 “(D) any mixture of natural gas and syn-
2 thetic gas; or

3 “(E) any product derived directly from
4 natural gas, including hydrogen.

5 “(2) QUALIFYING ELECTRIC GENERATION FA-
6 CILITY.—The term ‘qualifying electric generation fa-
7 cility’ means a facility that generates electric energy
8 through the use of natural gas.

9 “(3) QUALIFYING TECHNOLOGY.—The term
10 ‘qualifying technology’ means any technology to cap-
11 ture carbon dioxide produced during the generation
12 of electricity from natural gas power systems

13 “(b) ESTABLISHMENT OF RESEARCH, DEVELOP-
14 MENT, AND DEMONSTRATION PROGRAM.—

15 “(1) IN GENERAL.—The Secretary shall estab-
16 lish a program under which the Secretary shall,
17 through a competitive, merit-reviewed process, award
18 grants to eligible entities to conduct research, devel-
19 opment, and demonstration of qualifying tech-
20 nologies.

21 “(2) OBJECTIVES.—The objectives of the pro-
22 gram established under paragraph (1) shall be—

23 “(A) to conduct research to accelerate the
24 development of qualifying technologies to reduce
25 the quantity of carbon dioxide emissions re-

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1 leased from qualifying electric generation facili-
2 ties, including—

3 “(i) pre- and post-combustion capture
4 technologies; and

5 “(ii) technologies to improve the ther-
6 modynamics, kinetics, scalability, dura-
7 bility, and flexibility of carbon capture
8 technologies for use during the generation
9 of electricity from natural gas power sys-
10 tems;

11 “(B) to expedite and carry out demonstra-
12 tion projects (including pilot projects) for quali-
13 fying technologies in partnership with quali-
14 fying electric generation facilities in order to
15 demonstrate the technical feasibility and eco-
16 nomic potential for commercial deployment of
17 technologies developed pursuant to subpara-
18 graph (A); and

19 “(C) to identify any barriers to the com-
20 mercial deployment of any qualifying tech-
21 nologies under development pursuant to re-
22 search conducted pursuant to subparagraph
23 (A).

24 “(3) ELIGIBLE ENTITIES.— An entity eligible
25 to receive a grant under this subsection is—

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- 1 “(A) a National Laboratory;
- 2 “(B) an institution of higher education;
- 3 “(C) a research facility;
- 4 “(D) a multi-institutional collaboration; or
- 5 “(E) another appropriate entity or com-
- 6 bination of any of the entities specified in sub-
- 7 paragraphs (A) through (D).

8 “(c) CARBON CAPTURE FACILITIES DEMONSTRATION

9 PROGRAM.—

10 “(1) ESTABLISHMENT.—As part of the pro-

11 gram established under paragraph (1), the Secretary

12 shall establish a demonstration program under which

13 the Secretary shall, through a competitive, merit-re-

14 viewed process, enter into cooperative agreements

15 with entities that submit applications pursuant to

16 paragraph (4) for demonstration or pilot projects to

17 construct and operate, by not later than September

18 30, 2025, up to five facilities to capture carbon diox-

19 ide from qualifying electric generation facilities. The

20 Secretary shall, to the maximum extent practicable,

21 provide technical assistance to any entity seeking to

22 enter into such a cooperative agreement in obtaining

23 any necessary permits and licenses to demonstrate

24 qualifying technologies.

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1 “(2) COOPERATIVE AGREEMENTS.—The Sec-
2 retary may enter into a cooperative agreement under
3 this subsection with industry stakeholders, including
4 any such industry stakeholder operating in partner-
5 ship with National Laboratories, institutions of high-
6 er education, multi-institutional collaborations, and
7 other appropriate entities.

8 “(3) GOALS.—Each demonstration or pilot
9 project carried out pursuant to the demonstration
10 program under this subsection shall—

11 “(A) be designed to further the develop-
12 ment of qualifying technologies that may be
13 used by a qualifying electric generation facility;

14 “(B) be financed in part by the private
15 sector;

16 “(C) if necessary, secure agreements for
17 the offtake of carbon dioxide emissions captured
18 by qualifying technologies during the project;
19 and

20 “(D) support energy production in the
21 United States.

22 “(4) REQUEST FOR APPLICATIONS.—Not later
23 than 120 days after the date of enactment of this
24 Act, the Secretary shall solicit applications for coop-
25 erative agreements for projects—

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1 “(A) to demonstrate qualifying tech-
2 nologies at up to five qualifying electric genera-
3 tion facilities; and

4 “(B) to construct and operate three or
5 more facilities to capture carbon dioxide from a
6 qualifying electric generation facility.

7 “(5) REVIEW OF APPLICATIONS.—In consid-
8 ering applications submitted under paragraph (4),
9 the Secretary, to the maximum extent practicable,
10 shall—

11 “(A) ensure a broad geographic distribu-
12 tion of project sites;

13 “(B) ensure that a broad selection of
14 qualifying electric generation facilities are rep-
15 resented;

16 “(C) ensure that a broad selection of quali-
17 fying technologies are represented;

18 “(D) require information and knowledge
19 gained by each participant in the demonstration
20 program to be transferred and shared among
21 all participants in the demonstration program;
22 and

23 “(E) leverage existing—

24 “(i) public-private partnerships; and

25 “(ii) Federal resources.

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1 “(d) COST SHARING.—In carrying out this section,
2 the Secretary shall require cost sharing in accordance with
3 section 988.

4 “(e) REPORT.—Not later than 180 days after the
5 date on which the Secretary solicits applications under
6 subsection (c)(3), and annually thereafter, the Secretary
7 shall submit to the appropriate committees of jurisdiction
8 of the Senate and the House of Representatives a report
9 that includes—

10 “(1) a detailed description of how applications
11 for cooperative agreements under subsection (b) will
12 be solicited and evaluated, including—

13 “(A) a list of any activities carried out by
14 the Secretary to solicit or evaluate applications;
15 and

16 “(B) a process for ensuring that any
17 projects carried out under a cooperative agree-
18 ment are designed to result in the development
19 or demonstration of qualifying technologies;

20 “(2)(A) in the case of the first report under
21 this subsection, a detailed list of technical milestones
22 for the development and demonstration of each
23 qualifying technology pursued under subsection (b);
24 and

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1 “(B) in the case of each subsequent report
2 under this subsection, the progress made towards
3 achieving such technical milestones during the pe-
4 riod covered by the report; and

5 “(3) with respect to the demonstration program
6 established under subsection (c), includes—

7 “(A) an estimate of the cost of licensing,
8 permitting, constructing, and operating each
9 carbon capture facility expected to be con-
10 structed under that demonstration program;

11 “(B) a schedule for the planned construc-
12 tion and operation of each demonstration or
13 pilot project; and

14 “(C) an estimate of any financial assist-
15 ance, compensation, or incentives proposed to
16 be paid by the host State, Indian Tribe, or local
17 government with respect to each facility.

18 “(f) FUNDING.—For each of fiscal years 2020
19 through 2025, out of any amounts appropriated to the De-
20 partment to carry out fossil energy research and develop-
21 ment activities and not otherwise obligated, the Secretary
22 may use to carry out this section not more than
23 \$50,000,000.”.

24 (b) CLERICAL AMENDMENT.—The table of contents
25 for the Energy Policy Act of 2005 (Public Law 109–58;

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1 119 Stat. 600) is amended by inserting after the item re-
2 lating to section 968 the following:

“Sec. 969. Natural gas carbon capture research, development, and demonstra-
tion program.”.



Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

The Chair recognizes the gentleman for 5 minutes to explain his amendment.

Mr. LUCAS. Thank you, Chairwoman Johnson.

My amendment will authorize a research and development program to develop carbon capture technologies for natural gas power systems. It would amend the *Fossil Energy Research and Development Act of 2019* to add to the text of H.R. 3828, a bipartisan bill I cosponsored with Representative Dan Crenshaw of Texas by establishing a dedicated program at the Department of Energy to focus on natural gas power systems. This amendment will help make carbon capture more efficient, affordable, and accessible for American industry.

My amendment also directs the Department of Energy to partner with the industry and ensure that the technologies developed through this research program can be demonstrated in commercially feasible scales. This will bridge the gap between the lab and the market, allowing industry to take the lead in proving these innovative technologies can work in the real world.

Modernizing energy production and reducing greenhouse gas emissions requires realistic solutions that don't prohibit effective fuel sources or inhibit economic growth. Clean, efficient, affordable natural gas is a critical component of America's energy portfolio, and by establishing a program focused on developing carbon capture technology for these systems, we have the potential to dramatically reduce greenhouse emissions, making natural gas an even cleaner energy source. This is commonsense policy that can benefit our environment while using American resources and keeping our energy affordable.

I believe we can all support these goals, and I encourage my colleagues to support this amendment. And I yield back the balance of my time.

Chairwoman JOHNSON. Thank you very much.

I recognize myself to discuss the amendment.

I think this amendment is a constructive amendment and could be a good addition to the underlying bill. I'd also like to thank the gentleman for making a small change to the amendment at my request.

Natural gas carbon capture is an increasingly important topic given the recent and ongoing dramatic expansion of our natural gas power plant fleet. I think this amendment provides helpful guidance to the Department to focus more of its carbon capture efforts on natural gas plants moving forward. Unfortunately, carbon capture technology development has, in the past, been focused more on coal power, and this amendment takes us a step toward balancing the Department's portfolio in this regard.

I would note, however, that if the amendment by the gentleman from Texas, which reduces the authorization for the overall fossil program were to pass, it would be difficult to impossible for the Department to allocate the necessary funds to carry out the amendment that we are now considering.

I do think the amendment is constructive. I'm inclined to support the amendment, and it would be my sincere hope that if this

amendment is adopted, then my friend the Ranking Member would go on to support the underlying bill that he's amending. Thank you.

Now, is there any further discussion on the amendment? Yes.

Mr. CASTEN. A question for Mr. Lucas. In general, I support the amendment. The language specifies, though, that the qualifying technology is carbon dioxide produced during the generation of electricity from natural gas power systems. There is fairly significant CO₂ release from process use of natural gas—whether for thermal use or industrial processing, which, in my view, is going to be much harder to decarbonize than the electric sector. Is there a reason why this is limited to electricity generation and if not, would you be willing to consider a friendly amendment between now and when we get to the floor to incorporate all the uses of natural gas in our energy sector, not simply limited to electricity generation?

Mr. LUCAS. Well, the intent of the amendment is to focus on the particular sector. I very much appreciate the point the gentleman raises and would be willing to discuss as we move forward on this the nature of all these other issues, too.

Mr. CASTEN. OK, because the technology is essentially the same. There may be different scales and locations, but CO₂ in the air, it doesn't particularly matter how the combustion process happened. Thank you.

Chairwoman JOHNSON. Thank you. Any further requests for time?

Hearing none, then the amendment seems to be constructive. I'm inclined to support it.

And all those in favor, say aye.

Those opposed, nay.

The ayes have it, and the amendment is adopted.

The next amendment on the roster is an amendment offered by the gentleman from New York, Mr. Tonko, and he's recognized to offer his amendment.

Mr. TONKO. Thank you, Madam Chair.

Chairwoman Johnson, I want to thank you for advancing this bill, which I support, H.R. 36—

Chairwoman JOHNSON. The clerk will report the amendment.

Mr. TONKO. OK.

The CLERK. Amendment No. 4 offered by Mr. Tonko of New York.

[The amendment of Mr. Tonko follows:]

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AMENDMENT TO H.R. 3607
OFFERED BY MR. TONKO OF NEW YORK

Page 21, strike lines 14 through 17 and insert the following:

1 “(1) High-efficiency turbines in accordance with
2 the program under section 969A-1.”

Page 22, line 22, insert “and section 969A-1” after
“this section”.

Page 23, after line 2, insert the following:

3 **“SEC. 969A-1. HIGH EFFICIENCY GAS TURBINES.**

4 “(a) IN GENERAL.—The Secretary of Energy,
5 through the Office of Fossil Energy, shall carry out a
6 multiyear, multiphase program of research, development,
7 and technology demonstration to improve the efficiency of
8 gas turbines used in power generation systems and to
9 identify the technologies that ultimately will lead to gas
10 turbine combined cycle efficiency of 67 percent or simple
11 cycle efficiency of 50 percent.

12 “(b) PROGRAM ELEMENTS.—The program under this
13 section shall—

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- 1 “(1) support first-of-a-kind engineering and de-
2 tailed gas turbine design for megawatt-scale and
3 utility-scale electric power generation, including—
4 “(A) high temperature materials, including
5 superalloys, coatings, and ceramics;
6 “(B) improved heat transfer capability;
7 “(C) manufacturing technology required to
8 construct complex three-dimensional geometry
9 parts with improved aerodynamic capability;
10 “(D) combustion technology to produce
11 higher firing temperature while lowering nitro-
12 gen oxide and carbon monoxide emissions per
13 unit of output;
14 “(E) advanced controls and systems inte-
15 gration;
16 “(F) advanced high performance com-
17 pressor technology; and
18 “(G) validation facilities for the testing of
19 components and subsystems;
20 “(2) include technology demonstration through
21 component testing, subscale testing, and full-scale
22 testing in existing fleets;
23 “(3) include field demonstrations of the devel-
24 oped technology elements so as to demonstrate tech-
25 nical and economic feasibility; and

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1 “(4) assess overall combined cycle and simple
2 cycle system performance.

3 “(c) PROGRAM GOALS.—The goals of the multiphase
4 program established under subsection (a) shall be—

5 “(1) in phase I—

6 “(A) to develop the conceptual design of
7 advanced high efficiency gas turbines that can
8 achieve at least 65-percent combined cycle effi-
9 ciency or 47-percent simple cycle efficiency on
10 a lower heating value basis; and

11 “(B) to develop and demonstrate the tech-
12 nology required for advanced high efficiency gas
13 turbines that can achieve at least 65-percent
14 combined cycle efficiency or 47-percent simple
15 cycle efficiency on a lower heating value basis;
16 and

17 “(2) in phase II, to develop the conceptual de-
18 sign for advanced high efficiency gas turbines that
19 can achieve at least 67-percent combined cycle effi-
20 ciency or 50-percent simple cycle efficiency on a
21 lower heating value basis.

22 “(d) PROPOSALS.—Within 180 days after the date of
23 enactment of this Act, the Secretary shall solicit grant and
24 contract proposals from industry, small businesses, univer-
25 sities, and other appropriate parties for conducting activi-

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1 ties under this Act. In selecting proposals, the Secretary
2 shall emphasize—

3 “(1) the extent to which the proposal will stim-
4 ulate the creation or increased retention of jobs in
5 the United States; and

6 “(2) the extent to which the proposal will pro-
7 mote and enhance United States technology leader-
8 ship.

9 “(e) COMPETITIVE AWARDS.—The provision of fund-
10 ing under this section shall be on a competitive basis with
11 an emphasis on technical merit.

12 “(f) COST SHARING.—Section 988 of the Energy Pol-
13 icy Act of 2005 (42 U.S.C. 16352) shall apply to an award
14 of financial assistance made under this section.

15 “(g) LIMITS ON PARTICIPATION.—The limits on par-
16 ticipation applicable under section 999E of the Energy
17 Policy Act of 2005 (42 U.S.C. 16375) shall apply to finan-
18 cial assistance awarded under this section.”

☒

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. And without objection, so ordered.

I recognize the gentleman for 5 minutes to explain his amendment.

Mr. TONKO. Thank you. I thank you again for your support. H.R. 3607 already includes language calling for RD&D to support natural gas turbine combined cycle efficiency of 67 percent or combustion turbine efficiency of 50 percent. That is a target the gas turbine industry and I both support.

This amendment would expand upon this provision in the underlying bill. It is based upon legislation that I've introduced with Congressman McKinley of West Virginia for many years, and it has passed this House on multiple occasions in the past.

Expanded government investment in research of gas turbine technology will lead to more American jobs, increased American global competitiveness, and reduce greenhouse gas emissions. With natural gas providing the largest source of United States' electricity generation, even a 1 percent fleet efficiency improvement would be very beneficial for mitigating climate change. Right now, the most efficient new turbines are around low- to mid-60 percent efficient. The 67 percent combined cycle goal can be done, but not without technology improvements.

This amendment would outline a few of the key program elements of this research effort. It could be achieved through development of high-temperature materials, improved heat transfer capability, manufacturing technology required to construct complex parts, and advanced controls and systems integration. This amendment also puts emphasis on creation or retention of jobs in the United States and promoting U.S. technology leadership.

Without an expansion of our government funding in gas turbine R&D, U.S.-based manufacturers will lose the competitive edge that they have long held over foreign manufacturers. Other countries are making the investments in this given technology.

Efficiency must be our fuel of choice. The cleanest and cheapest kilowatt of electricity is the one that we do not use. Enabling the U.S. manufacturers to continue to design and manufacture the world's most efficient turbines will ensure that it is an American-made product that is exported around the world.

With that, I encourage Members to support this amendment. I yield back. Again, thank you, Madam Chairwoman.

Chairwoman JOHNSON. Thank you very much.

Any further discussion on the amendment?

Mr. LUCAS. Madam Chair?

Chairwoman JOHNSON. Mr. Lucas is recognized.

Mr. LUCAS. Thank you, Madam Chairwoman Johnson.

I want to thank Representative Tonko for offering this amendment. This provision would clearly authorize research and development to improve the efficiency of gas turbines. It's critical that we maintain American leadership in this technology, and DOE is the right partner to work with industry on the goals outlined in the bill. I thank you again, and I encourage my colleagues to support the gentleman's amendment and yield back.

Chairwoman JOHNSON. Thank you very much.

Any further discussion?

Mr. WEBER. Madam Chair?

Chairwoman JOHNSON. Mr. Weber.

Mr. WEBER. I want to thank Mr. Tonko also, and I appreciate the amendment. I intend to vote for it, and I hope our colleagues will. Thank you.

Chairwoman JOHNSON. Thank you very much.

Any further discussion?

Hearing none, then the vote occurs on the amendment.

All those in favor, say aye.

Those opposed, nay.

The ayes have it, and the amendment is agreed to.

We'll take a recess for 5 minutes.

[Recess.]

Chairwoman JOHNSON. The Committee will come to order.

The next amendment on the roster is an amendment offered by the gentleman from Texas, Mr. Weber. He is recognized to offer his amendment.

Mr. WEBER. Thank you, Madam Chair. I have an amendment at the desk.

Chairwoman JOHNSON. Thank you. The clerk will report the amendment.

The CLERK. Amendment No. 5 offered by Mr. Weber.

[The amendment of Mr. Weber follows:]

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AMENDMENT TO H.R. 3607

OFFERED BY _____

At the end of the bill add the following:

1 **SEC. 12. SENSE OF CONGRESS.**

2 It is the sense of Congress that power produced from
3 fossil fuels is essential for maintaining the economic
4 growth, global competitiveness, and prosperity of the
5 United States.

Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I recognize the gentleman from Texas for 5 minutes to explain his amendment.

Mr. WEBER. Thank you, ma'am. My amendment would add a sense of Congress to this legislation, which actually highlights the important role that fossil fuels play in growing the American economy. America has vast resources in fossil energy, and the incredible growth in oil and gas production is providing an affordable, reliable, cleaner source of energy to countries around the entire world. If we want our country to remain the leader of the free world, we cannot afford to leave these resources in the ground.

And regardless of what some of my colleagues on the other side of the aisle like to often say about fossil fuels, these resources are not the enemy. Fossil fuels provide power for our people, provide power for our economy, and provide power for our military, which is national security. While I believe that we need, rightfully so, we need to invest in innovation that benefits all kinds of energy, I think it would be irresponsible to forget what an important role fossil fuels play in powering our country.

I want to encourage my colleagues to support my amendment. It's the sense of Congress. And I want to yield back the balance of my time, Madam Chair.

Chairwoman JOHNSON. Thank you very much.

Mr. LAMB. Madam Chairwoman, move to strike the last word.

Chairwoman JOHNSON. The Chair recognizes Mr. Lamb.

Mr. LAMB. Thank you, Madam Chairwoman.

I agree with my colleague from the great State of Texas about the importance of fossil fuels in our economy today and tomorrow. However, I will be opposing his amendment because it is not specific enough. As the Chairman of the Subcommittee that marked up the underlying fossil bill, I can say the fossil bill itself is our statement about the importance of fossil fuels. In other words, we are willing to invest record levels in the research and development of carbon capture technology and other ways to improve and make more efficient the use of fossil fuels not only for the electrical grid but in the transportation sector and in manufacturing as well.

We can't blind ourselves to the reality that no matter how important fossil fuels are and will continue to be; we have to do things differently. And someone is going to win that race, whether it's us or China or any other competitor is going to figure out how to manufacture this carbon capture technology and change their manufacturing process and electrify more of their grid. We would like it to be those of us in the United States, which is what is driving this bill.

So there's no disagreement over the importance of fossil fuels, but we don't believe they need to be singled out with a general statement when the bill itself reflects the priority of us putting our money where our mouth is.

Thank you, Madam Chairwoman. I yield back.

Chairwoman JOHNSON. Thank you very much. And I thank the gentleman from Texas as well.

And I would like to recognize myself for a comment on this amendment.

It is unusual to see a sense-of-Congress amendment proclaiming the importance of fossil fuels submitted to a markup of a bill which proposes to significantly increase our Nation's investment in fossil fuel research and development. I suspect that my friend from Texas has submitted this amendment to soften his apparent opposition to the underlying bill.

I do not intend to support the amendment, and if you support fossil fuels, then you should support the underlying bill, which provides real support to the Department of Energy's fossil fuel programs. Supporting this amendment doesn't help the industry at all.

I also feel that providing unconditional support to fossil fuels is irresponsible given that we know about the dangers of climate change.

I support the underlying bill precisely because the Department's fossil fuel program seeks to responsibly utilize fossil fuels by researching ways to mitigate the pollution that these fuels produce. If you really support fossil fuels, then a real way to show that support isn't with a sense of Congress. It's supporting the passage of this bill.

I yield back and call for any further discussion.

Ms. Bonamici is recognized.

Ms. BONAMICI. Thank you. I move to strike the last word.

Chairwoman JOHNSON. The gentlelady is recognized.

Ms. BONAMICI. Thank you so much.

And with all due respect to my friend and colleague from Texas, I am opposed to this amendment. This is not the message we need to be sending to the American public right now. With all we know from the IPCC report, from the Fourth National Climate Assessment, when people are out there around the country with rising temperatures and more extreme weather events and ocean acidification, we need to be talking about how we can transition from fossil fuels to a clean energy economy.

So I am planning to support the underlying bill because it is better than the status quo, and I think it's going to help us answer some of the questions about existing fossil fuel sources. But to send a message now that fossil fuels are essential is not the message we need to be sending to the American public.

So with all due respect to my colleague, I am going to be opposing this amendment, and I yield back.

Chairwoman JOHNSON. Thank you very much.

Mr. Casten.

Mr. CASTEN. Thank you.

I also oppose because I think the fundamental premise here is categorically wrong. There is absolutely no argument that fossil fuels are essential for U.S. economic growth. What is essential for U.S. economic growth is access to useful energy. As my friend Amory Lovins is fond of saying, what everybody wants is a cold shower and a warm beer. They don't care how the shower got cold, they don't care—or how the shower got warm and how the beer got cold, hopefully not the other way around. At the same time, even if you like.

Mr. WEBER. Will the gentleman yield?

Mr. CASTEN. Well, not until I've had another beer.

Mr. WEBER. I can't help you with the shower, but the beer I can.

Mr. CASTEN. But my more serious point is our standard of living—and indeed, I think there are very good arguments that economic growth has been contingent on providing steadily lower costs of delivering useful energy. One of the ways we have provided lower cost is with fossil energy. Another way we've provided lower costs is by using a lot less fossil energy to deliver the same amount of useful energy. And the underlying bill does that exactly.

But saying that fossil fuels are essential for growth essentially conflates the backend of the process, which we care about, with the input, which is largely irrelevant.

Thank you. And with that, I will yield.

Chairwoman JOHNSON. Thank you very much.

The Chair now recognizes Mr. Perlmutter. You're recognized.

Mr. PERLMUTTER. So I would just say to my friend Mr. Weber, listening to this conversation, I found the discussion is about the importance, and I agree to the importance, but I don't think your amendment uses the right term. And you use the word essential, and I would see if my friend would agree to change essential to important. And I'd ask for unanimous consent to that. And if not, I've got a secondary amendment that would change essential to important.

Mr. WEBER. Does the gentleman yield?

Mr. PERLMUTTER. Yes.

Mr. WEBER. Does the gentleman agree that, as a matter of national security, fossil fuel is essential?

Mr. PERLMUTTER. I agree it's important to a whole range of things. But I also agree with Mr. Casten that we can—we've been working for decades now to find other ways to power this Nation, and we're doing a pretty good job finding those other ways. But clearly, I think it's important to the whole mix. And I think that's what the conversation here is about.

I'm just suggesting to my friend that this amendment would pass with the word important and not essential.

Mr. WEBER. Does the gentleman yield?

Mr. PERLMUTTER. Yes, I do.

Mr. WEBER. So you're asking me to concur with your amendment to my amendment to change the word from essential to important?

Mr. PERLMUTTER. Yes. I am asking my friend to agree to that.

Mr. WEBER. Well, OK. I'm hearing that you have to offer the amendment before we can amend the amendment—

Mr. PERLMUTTER. I would—so—

Mr. WEBER [continuing]. I guess. But in the spirit of bipartisanship, let me just say that I think bipartisanship is essential.

Mr. PERLMUTTER. I think it's very important, too.

Mr. WEBER. And so I yield back.

Chairwoman JOHNSON. The Chair is going to suspend this discussion until the preparation of the amendment and then recognize Mr. Beyer.

Mr. BEYER. I move to strike the last word, Madam Chair.

Chairwoman JOHNSON. Mr. Beyer is recognized. We'll get back to the amendment.

Mr. BEYER. OK. Thank you. I would like to speak out against my friend's amendment only because, while it is important and perhaps even essential today, on Wednesday, that we continue to use

fossil fuels, it's also essential that we continue—that we one day soon not use fossil fuels at all. And there are many jurisdictions, for example, my home city of Alexandria, that's committed to fossil-fuel-free electricity by 2035. Automobile manufacturers around the world are moving to fossil-fuel-free automobiles.

We recognize that, despite the enormous contributions that fossil fuels have made for economic development so far, there are also enormous costs that are already coming around the world from the use of fossil fuels in the development of greenhouse gases. In that balance, we recognize historically what fossil fuels have contributed and have to look forward to a time when we use no fossil fuels whatsoever.

So glorifying this or putting this in the law as essential is a move in the fundamentally wrong direction. And I yield back.

Chairwoman JOHNSON. Thank you very much.

Any further comments?

Mr. Babin.

Mr. BABIN. I had not intended to make a comment here, but with all the give-and-take here, and I believe that bipartisanship is definitely an essential ingredient as well to having in this Committee.

But being from the 36th District of the Lone Star State of Texas, it's interesting and curious to hear that we want to take the word essential away from fossil fuels because of the tens of thousands of jobs that are being taken and offered by companies that are in my district, as well as in Mr. Weber's district, that are totally dependent upon cheap feedstocks to continue. And that feedstock is natural gas.

And the story of cheap natural gas is a very historical, interesting story in itself. When we were supposed to have been at peak oil back in the 1980s and all fossil fuels were done, that we would need to start weaning ourselves off of them because there wasn't going to be enough left to run our economy, and it was absolutely necessary that we go to alternative types of fuels. And I'm totally in favor of alternative forms of fuel, but to say that fossil fuels are not essential, at least for the next decades, and that's plural, I think would be a very erroneous statement. In fact, if we weaned ourselves off of fossil fuels, the State of Texas might even just dry up. We have more petrochemical refining facilities than any other place, not only in the country but in the world. And, as I said, thousands and thousands of people's employment and livelihoods are dependent upon that.

And so I just wanted to put my 2 cents in, and I yield back. Thank you.

Chairwoman JOHNSON. Thank you very much.

We now will move back to the amendments. And the Chair recognizes Mr. Perlmutter.

Mr. PERLMUTTER. Yes, thank you, Madam Chair.

I first ask for unanimous consent to change the word essential to important in Mr. Weber's amendment.

Chairwoman JOHNSON. The amendment is before us.

Mr. LUCAS. I object to the unanimous consent request, Madam Chair.

Chairwoman JOHNSON. There's an objection to unanimous consent.

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Mr. PERLMUTTER. So then unanimous consent is not given, so I have a secondary amendment at the desk.

Chairwoman JOHNSON. The clerk will report the amendment.

The CLERK. Amendment to the Weber amendment offered by Mr. Perlmutter.

[The amendment of Mr. Perlmutter follows:]

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Amendment to Amendment #5 from Mr. Weber

Offered by Rep. Perlmutter of Colorado

On line 3, strike "essential" and insert "important".

Chairwoman JOHNSON. Mr. Perlmutter is recognized.

Mr. PERLMUTTER. Thank you. And we've had discussion about this. It changes Mr. Weber's—the secondary amendment changes the word essential to important so that it reads, "It is the sense of Congress the power produced from fossil fuels is important for maintaining the economic growth, global competitiveness, and prosperity of the United States," which I know some on my side might say is still too strong a term. Others, Mr. Weber, Dr. Babin, may believe that it's not strong enough, but I think it really does reflect what's in this bill and what this Committee sees on the horizon. And so I would offer my amendment.

Mr. WEBER. Parliamentary inquiry, Madam Chair?

Chairwoman JOHNSON. Yes.

Mr. WEBER. Does the gentleman need to withdraw his prior amendment before submitting a second amendment?

Chairwoman JOHNSON. No.

Mr. PERLMUTTER. I withdrew my unanimous consent request—

Chairwoman JOHNSON. Yes.

Mr. PERLMUTTER [continuing]. Because there was an objection.

Mr. WEBER. I understand. Thank you.

Mr. PERLMUTTER. So again, I offer my amendment to Mr. Weber's amendment.

Chairwoman JOHNSON. Thank you very much. Mr. Lucas.

Mr. LUCAS. Madam Chair, I move to strike the last word.

I would say to my colleague, who I am very fond of, that this is an interesting point here, the question of essential versus important. I see where Mr. Weber is coming from, and those of us who, to make light of comments made earlier, who like to be cool in the summertime and warm in the winter, those of us who come from regions that are producers of these traditional forms of fuel, we view these resources as an essential tool to move the American economy forward until all the other alternatives become available. It seems, I think, almost illogical or impractical to say that we must abandon our tradition, our present driving force of energy before we're even prepared to take those giant steps totally away from these sources of fuel.

I think that Mr. Weber is very accurate in offering this language to the bill. I think he's trying to state the obvious. And I would suggest to my colleagues on both sides of the aisle, once again, whatever your perspective may be, fossil fuel is an essential resource to maintain our economic growth at the present time. It may not always be, but it is right now. And if you ask anyone who works in the industries in a variety of States across the country who bring those hydrocarbons up out of the ground using the latest technologies, they'll absolutely tell you that it's essential to their existence and to their communities.

So, respectfully, I would advocate a "no" vote on Mr. Perlmutter's second-degree amendment. And, when it's appropriate, I'll ask for a roll call vote. And I think as a Committee, we should just move on with the rest of this legislation.

I yield back, Madam Chair.

Mr. MCADAMS. Madam Chair?

Chairwoman JOHNSON. Thank you very much. I want to take the privilege of making a statement.

The underlying legislation is for research. It is not to get rid of fossil fuels. I think in my statement I indicated earlier that for as long as we can see, fossil fuels will have a role. But because of the research we've gotten up to now, we know that we have to reduce many of the environmental contaminants as possible, which includes the research of cleaning up fossil fuels.

Now, I'd like to recognize Mrs. Fletcher.

Mrs. FLETCHER. Thank you, Chairwoman Johnson.

And I thank all of my colleagues for the discussion that we've had today, although I don't agree with all of the comments that have been made by some of my colleagues, including the comments about the future and what the future looks like with fossil fuels. I think that that's the purpose underlying this bill.

Certainly, whether you call it essential or important, fossil fuels are a part of our daily existence. It is how we turn on the lights in this building. It is how we charge our iPhones. It's how we charge our cars that run on battery technology. And so we really have to take some time on this Committee to understand the energy ecosystem from which all of these alternatives that we're talking about emerge from.

I think right now that fossil fuels are essential, and I think that they are important, and I think that is why we are discussing this underlying legislation, which I very proudly cosponsored as a Representative from the energy capital of the world, from Houston, Texas, neighbor with Mr. Babin and Mr. Weber and Mr. Olson. We understand the critical role the fossil energy produces in our country, and we also understand the role that we can have globally in leading to new technologies and to spreading more clean energy around the world.

And natural gas has been a big part of what we've done over the last decade here. We have gone from an era of energy scarcity to energy abundance, and it's thanks largely to natural gas that we have reduced carbon emissions in the United States over the last decade because we've transitioned from coal-fired plants to natural gas-fired plants.

We are looking ahead, and we need on this Committee to look ahead this year, 10 years, 20 years, and 50 years down the road, and we need to talk about what the appropriate mix is. But the underlying legislation here, which again I urge my colleagues to support, addresses this fundamental issue of being able to do the research on carbon capture to make it possible for us to produce these fuels in a cleaner way, hopefully getting to a place where we can do not only carbon capture on the industrial sector but direct air capture and other things.

And I think that whether you call it important or essential, I think we need to recognize that the underlying legislation that we're talking about is really important. And I encourage all of my colleagues on both sides of the aisle to support the research for the benefit of our economy and our ability to export these technologies around the world.

And I do think that that is important to our global competitiveness and our prosperity. And it's also important to our ability to help countries around the globe reduce carbon emissions and achieve the objectives that I think we all believe in trying to com-

bat climate change and global warming. And this is an important way to do it.

Thank you. I yield back.

Chairwoman JOHNSON. Thank you very much.

Mr. Brooks.

Mr. BROOKS. Thank you, Madam Chair.

For the people who are watching, I'm going to cover the amendment verbatim. Quote, "It is the sense of Congress that power produced from fossil fuels is essential for maintaining economic growth, global competitiveness, and prosperity of the United States."

The proposed amendment to this is to strike the word essential and instead put in the word important. And so I looked in the dictionary. What does the word essential mean? It is an adjective. Quote, "absolutely necessary, extremely important," end quote. Not merely important, just important, extremely important.

Let's look at national security and national defense. I would submit to everyone here that national security and national defense are essential, extremely important, not merely important but extremely important to our, quote, "economic growth, global competitiveness, and prosperity in the United States," end quote, because without national security that is strong, then our economic growth and global competitiveness, and prosperity are all at risk.

And so let's look at whether fossil fuels are essential to national security, which in turn is essential to economic growth, global competitiveness, and prosperity. What the gentleman in effect is saying by saying, no, it's just important, not essential, is that we don't need an Air Force because every single one of our fighter planes, every single one of our reconnaissance planes relies on fossil fuels. Now, I don't know about anybody else here on the Science, Space, and Technology Committee, but I would submit that an Air Force is essential to national security, not merely important.

Let's look at naval vessels. I don't know the numbers right off-hand, but I would submit that probably roughly 90 percent of all of our naval vessels rely on fossil fuels. That's pretty essential unless you want a naval force that is maybe 5 to 10 percent a hollow shell of what we have now.

Let's look at the Army. How many of our vehicles do not rely on fossil fuels? I would submit that almost all of our military Army vehicles, tanks and whatnot, Jeeps rely on fossil fuels.

So I would submit that the gentleman from Texas, Congressman Weber, is absolutely correct when he uses the word essential to describe the role of fossil fuels in maintaining the economic growth, global competitiveness, and prosperity of the United States of America.

And I will not concede that we do not need a United States military, because in effect that's what this amendment to the amendment states. It is far more than merely important. It is essential, and I ask that we vote against this amendment offered that would strike the word essential and instead insert the word merely important.

I yield back.

Chairwoman JOHNSON. Thank you very much.

Any further discussion or request for recognition?

Mr. WEBER. Madam Chair?

Chairwoman JOHNSON. Mr. Weber.

Mr. WEBER. I move to strike the last word.

Chairwoman JOHNSON. The gentleman is recognized.

Mr. WEBER. Thank you. I thank the gentleman from Alabama for those comments and those observations and the definitions because words are important. They mean things.

And when I speak, Madam Chair, I often say, when I speak to groups, being from Texas, and I would think that the two gentleladies from Texas and even the one from Oklahoma and the gentleman from Pennsylvania, that energy would be extremely important to them. Indeed, if I may, the gentleman from Colorado, it would be essential in their communities.

I often say to people that the things that make America great are the things that America makes. Now, how does America do that? It is with a reliable, affordable, dependable energy supply. And while we would all agree that the development of the green energy industry, the renewables, is extremely important, I want America to be in the lead of manufacturing and the technological leader of innovation and development for that renewable industry.

And let me just tell you, to be in the lead for that manufacturing and to develop the renewable industry, we are going to need fossil fuels to drive those factories. Indeed, fossil fuels are going to be essential in the development of the renewable industry.

So that's one of the reasons for my insistence on using the word essential because, as the gentleman from Alabama pointed out, it is essential not just to national security, but we're all concerned about CO₂, carbon, carbon capture, and sequestration. But to be able to develop that industry, we are going to need fossil fuels. And to think anything else, I believe, it doesn't pass muster as an argument.

And so, Madam Chair, I want to say that I hope my colleagues will vote against the word important because, as Mo Brooks pointed out, it is essential, national security and, as I point out, to the development of factories, the development of the renewable industry that we want to be in the lead of.

And so I encourage my colleagues to vote against that amendment, and I yield back.

Mr. PERLMUTTER. Would the gentleman yield?

Mr. WEBER. I will.

Mr. PERLMUTTER. And I'd just like to say to my friend from Texas and my friend from Alabama, one of the things that prompted me to use the word important is actually the military, which is looking for other ways to power itself than just fossil fuels and has described climate change as a national security risk.

So I'd say to my friends, I think I keep the essence of your amendment by using the word important. And with that, I yield back.

Mr. WEBER. Well, reclaiming my time then, to the gentleman from Colorado, would you say that because of the threat of climate change, it's essential that we focus on this problem, or is it just simply important?

Mr. PERLMUTTER. It's important and essential.

Mr. WEBER. Only important and essential. All right. Well, Madam Chair, I again urge my colleagues to vote against the amendment—and I yield back.

Chairwoman JOHNSON. Thank you very much.

Let me express my appreciation for the discourse we've had this morning on this subject, and we're going to now take action on the secondary amendment.

But before we take that vote, I simply want to say that where we are going in this bill is not impacted at all by this amendment. I hope that all of you recognize how essential it is to pass the bill to show that we are giving attention to the areas so we can research how we can improve and do it better. We are not doing away with fossil fuels. We are trying to address what the science so far has shown as one of the areas that we need to address to protect our environment going forward.

We're now going to call for the vote on the secondary amendment, changing essential to important.

All those in favor, say aye.

All those opposed, say no.

Ayes have it.

Mr. WEBER. Madam Chair—

Mr. LUCAS. Madam Chair, we need a recorded vote on that, Madam Chair.

Chairwoman JOHNSON. A recorded vote has been requested. We will take all of our votes at the end of deliberation. Thank you very much.

H.R. 3609

Chairwoman JOHNSON. Now, we will move to H.R. 3609 for consideration, the *Wind Energy Research and Development Act of 2019*. The clerk will report the bill.

The CLERK. Committee print of H.R. 3609, a bill, to provide for a program—

[The bill follows:]

The CLERK. Chairwoman Johnson, the ayes are 21 and the noes are 13.

Chairwoman JOHNSON. Thank you very much. The ayes have it, and it's a reporting quorum being present, I move that the Committee on Science, Space, and Technology move that bill with the recommendation that it be approved.

Without objection, the motion to reconsider is laid on the table, and I ask unanimous consent that the staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered.

Members will have 2 subsequent calendar days in which to submit supplementary minority or additional views on this measure.

Our next vote will occur on the Weber amendment No. 1 on H.R. 3607. The clerk will call the roll.

The CLERK. Chairwoman Johnson?

Chairwoman JOHNSON. No.

The CLERK. Chairwoman Johnson, no.

Ms. Lofgren?

Ms. LOFGREN. No.

The CLERK. Ms. Lofgren, no.

Mr. Lipinski?

Mr. LIPINSKI. No.

The CLERK. Mr. Lipinski, no.

Ms. Bonamici?

Ms. BONAMICI. No.

The CLERK. Ms. Bonamici, no.

Mr. Bera?

Mr. BERA. No.

The CLERK. Mr. Bera, no.

Mr. Lamb?

Mr. LAMB. No.

The CLERK. Mr. Lamb, no.

Mrs. Fletcher?

Mrs. FLETCHER. No.

The CLERK. Mrs. Fletcher, no.

Ms. Stevens?

Ms. STEVENS. No.

The CLERK. Ms. Stevens, no.

Ms. Horn?

Ms. HORN. No.

The CLERK. Ms. Horn, no.

Ms. Sherrill?

Ms. SHERRILL. No.

The CLERK. Ms. Sherrill, no.

Mr. Sherman?

Mr. SHERMAN. No.

The CLERK. Mr. Sherman, no.

Mr. Cohen?

[No response.]

The CLERK. Mr. McNerney?

Mr. MCNERNEY. No.

The CLERK. Mr. McNerney, no.

Mr. Perlmutter?

Mr. PERLMUTTER. No.

The CLERK. Mr. Perlmutter, no.
 Mr. Tonko?
 Mr. TONKO. No.
 The CLERK. Mr. Tonko, no.
 Mr. Foster?
 Mr. FOSTER. No.
 The CLERK. Mr. Foster, no.
 Mr. Beyer?
 Mr. BEYER. No.
 The CLERK. Mr. Beyer, no.
 Mr. Crist?
 Mr. CRIST. No.
 The CLERK. Mr. Crist, no.
 Mr. Casten?
 Mr. CASTEN. No.
 The CLERK. Mr. Casten, no.
 Ms. Hill?
 Ms. HILL. No.
 The CLERK. Ms. Hill, no.
 Mr. McAdams?
 Mr. MCADAMS. No.
 The CLERK. Mr. McAdams, no.
 Ms. Wexton?
 Ms. WEXTON. No.
 The CLERK. Ms. Wexton, no.
 Mr. Lucas?
 Mr. LUCAS. Yes.
 The CLERK. Mr. Lucas, aye.
 Mr. Brooks?
 Mr. BROOKS. Yes.
 The CLERK. Mr. Brooks, aye.
 Mr. Posey?
 Mr. POSEY. Aye.
 The CLERK. Mr. Posey, aye.
 Mr. Weber?
 Mr. WEBER. Aye.
 The CLERK. Mr. Weber, aye.
 Mr. Babin?
 Mr. BABIN. Aye.
 The CLERK. Mr. Babin, aye.
 Mr. Biggs?
 [No response.]
 The CLERK. Mr. Marshall?
 [No response.]
 The CLERK. Mr. Norman?
 [No response.]
 The CLERK. Mr. Cloud?
 Mr. CLOUD. Yes.
 The CLERK. Mr. Cloud, aye.
 Mr. Balderson?
 Mr. BALDERSON. Aye.
 The CLERK. Mr. Balderson, aye.
 Mr. Olson?
 Mr. OLSON. Aye.

The CLERK. Mr. Olson, aye.
 Mr. Gonzalez?
 Mr. GONZALEZ. Aye.
 The CLERK. Mr. Gonzalez, aye.
 Mr. Waltz?
 Mr. WALTZ. Aye.
 The CLERK. Mr. Waltz, aye.
 Mr. Baird?
 Mr. BAIRD. Aye.
 The CLERK. Mr. Baird, aye.
 Ms. Herrera Beutler?
 Ms. HERRERA BEUTLER. Yes.
 The CLERK. Ms. Herrera Beutler, aye.
 Miss González-Colón?
 Miss GONZÁLEZ-COLÓN. Yes.
 The CLERK. Miss González-Colón, aye.
 Chairwoman JOHNSON. Are there any Members present who have not voted or would like to change their vote?
 The clerk will report.
 The CLERK. Chairwoman, the noes are 21 and the ayes are 13.
 Chairwoman JOHNSON. The amendment is not adopted. We have a second amendment on H.R. 3607, Mr. Perlmutter's amendment.
 The clerk will call the roll.
 The CLERK. Chairwoman Johnson?
 Chairwoman JOHNSON. No.
 The CLERK. Chairwoman Johnson, no.
 Ms. Lofgren?
 Ms. LOFGREN. No.
 The CLERK. Ms. Lofgren, no.
 Mr. Lipinski?
 Mr. LIPINSKI. No.
 The CLERK. Mr. Lipinski, no.
 Ms. Bonamici?
 Ms. BONAMICI. No.
 The CLERK. Ms. Bonamici, no.
 Mr. Bera?
 Mr. BERA. No.
 The CLERK. Mr. Bera, no.
 Mr. Lamb?
 Mr. LAMB. No.
 The CLERK. Mr. Lamb, no.
 Mrs. Fletcher?
 Mrs. FLETCHER. No.
 The CLERK. Mrs. Fletcher, no.
 Ms. Stevens?
 Ms. STEVENS. No.
 The CLERK. Ms. Stevens, no.
 Ms. Horn?
 Ms. HORN. No.
 The CLERK. Ms. Horn, no.
 Ms. Sherrill?
 Ms. SHERRILL. No.
 The CLERK. Ms. Sherrill, no.
 Mr. Sherman? Mr. Sherman?

Mr. SHERMAN. No.
 The CLERK. Mr. Sherman, no.
 Mr. Cohen?
 [No response.]
 The CLERK. Mr. McNerney?
 Mr. MCNERNEY. Aye.
 The CLERK. Mr. McNerney, aye.
 Mr. Perlmutter?
 Mr. PERLMUTTER. Aye.
 The CLERK. Mr. Perlmutter, aye.
 Mr. Tonko?
 Mr. TONKO. No.
 The CLERK. Mr. Tonko, no.
 Mr. Foster?
 Mr. FOSTER. Aye.
 The CLERK. Mr. Foster, aye.
 Mr. Beyer?
 Mr. BEYER. No.
 The CLERK. Mr. Beyer, no.
 Mr. Crist?
 Mr. CRIST. No.
 The CLERK. Mr. Crist, no.
 Mr. Casten?
 Mr. CASTEN. No.
 The CLERK. Mr. Casten, no.
 Ms. Hill?
 Ms. HILL. No.
 The CLERK. Ms. Hill, no.
 Mr. McAdams?
 Mr. MCADAMS. No.
 The CLERK. Mr. McAdams, no.
 Ms. Wexton?
 Ms. WEXTON. No.
 The CLERK. Ms. Wexton, no.
 Mr. Lucas? Mr. Lucas?
 Mr. LUCAS. No.
 The CLERK. Mr. Lucas, no.
 Mr. Brooks?
 Mr. BROOKS. No.
 The CLERK. Mr. Brooks, no.
 Mr. Posey?
 Mr. POSEY. No.
 The CLERK. Mr. Posey, no.
 Mr. Weber?
 Mr. WEBER. No.
 The CLERK. Mr. Weber, no.
 Mr. Babin?
 Mr. BABIN. No.
 The CLERK. Mr. Babin, no.
 Mr. Biggs?
 [No response.]
 The CLERK. Mr. Marshall?
 [No response.]
 The CLERK. Mr. Norman?

[No response.]

The CLERK. Mr. Cloud?

Mr. CLOUD. No.

The CLERK. Mr. Cloud, no.

Mr. Balderson?

Mr. BALDERSON. No.

The CLERK. Mr. Balderson, no.

Mr. Olson?

Mr. OLSON. No.

The CLERK. Mr. Olson, no.

Mr. Gonzalez?

Mr. GONZALEZ. No.

The CLERK. Mr. Gonzalez, no.

Mr. Waltz?

Mr. WALTZ. No.

The CLERK. Mr. Waltz, no.

Mr. Baird?

Mr. BAIRD. No.

The CLERK. Mr. Baird, no.

Ms. Herrera Beutler?

Ms. HERRERA BEUTLER. No.

The CLERK. Ms. Herrera Beutler, no.

Miss González-Colón?

Miss GONZÁLEZ-COLÓN. No.

The CLERK. Miss González-Colón, no.

Chairwoman JOHNSON. Are there any Members who have not voted or would like to change their vote? Mr. Sherman?

Mr. SHERMAN. Please record me as a yes.

Chairwoman JOHNSON. The clerk will report.

The CLERK. Chairwoman, the ayes are 4 and the noes are 30.

Chairwoman JOHNSON. The amendment is not adopted.

The vote now will occur on the bill. Oh, there's another amendment. Oh, the underlying Weber amendment. The clerk will call the roll.

The CLERK. Chairwoman Johnson?

Chairwoman JOHNSON. No.

The CLERK. Chairwoman Johnson, no.

Ms. Lofgren?

Ms. LOFGREN. No.

The CLERK. Ms. Lofgren, no.

Mr. Lipinski?

Mr. LIPINSKI. No.

The CLERK. Mr. Lipinski, no.

Ms. Bonamici?

Ms. BONAMICI. No.

The CLERK. Ms. Bonamici, no.

Mr. Bera?

Mr. BERA. No.

The CLERK. Mr. Bera, no.

Mr. Lamb?

Mr. LAMB. No.

The CLERK. Mr. Lamb, no.

Mrs. Fletcher?

Mrs. FLETCHER. Aye.

The CLERK. Mrs. Fletcher, aye.
 Ms. Stevens?
 Ms. STEVENS. No.
 The CLERK. Ms. Stevens, no.
 Ms. Horn?
 Ms. HORN. Aye.
 The CLERK. Ms. Horn, aye.
 Ms. Sherrill?
 Ms. SHERRILL. No.
 The CLERK. Ms. Sherrill, no.
 Mr. Sherman?
 Mr. SHERMAN. No.
 The CLERK. Mr. Sherman, no.
 Mr. Cohen?
 Mr. COHEN. No.
 The CLERK. Mr. Cohen, no.
 Mr. McNerney?
 Mr. MCNERNEY. No.
 The CLERK. Mr. McNerney, no.
 Mr. Perlmutter?
 Mr. PERLMUTTER. No.
 The CLERK. Mr. Perlmutter, no.
 Mr. Tonko?
 Mr. TONKO. No.
 The CLERK. Mr. Tonko, no.
 Mr. Foster?
 Mr. FOSTER. No.
 The CLERK. Mr. Foster, no.
 Mr. Beyer?
 Mr. BEYER. No.
 The CLERK. Mr. Beyer, no.
 Mr. Crist?
 Mr. CRIST. No.
 The CLERK. Mr. Crist, no.
 Mr. Casten?
 Mr. CASTEN. No.
 The CLERK. Mr. Casten, no.
 Ms. Hill?
 Ms. HILL. No.
 The CLERK. Ms. Hill, no.
 Mr. McAdams?
 Mr. MCADAMS. Aye.
 The CLERK. Mr. McAdams, aye.
 Ms. Wexton?
 Ms. WEXTON. No.
 The CLERK. Ms. Wexton, no.
 Mr. Lucas?
 Mr. LUCAS. Aye.
 The CLERK. Mr. Lucas, aye.
 Mr. Brooks?
 Mr. BROOKS. Aye.
 The CLERK. Mr. Brooks, aye.
 Mr. Posey?
 Mr. POSEY. Aye.

The CLERK. Mr. Posey, aye.
 Mr. Weber?
 Mr. WEBER. Aye.
 The CLERK. Mr. Weber, aye.
 Mr. Babin?
 Mr. BABIN. Aye.
 The CLERK. Mr. Babin, aye.
 Mr. Biggs?
 [No response.]
 The CLERK. Mr. Marshall?
 [No response.]
 The CLERK. Mr. Norman?
 [No response.]
 The CLERK. Mr. Cloud?
 Mr. CLOUD. Aye.
 The CLERK. Mr. Cloud, aye.
 Mr. Balderson?
 Mr. BALDERSON. Aye.
 The CLERK. Mr. Balderson, aye.
 Mr. Olson?
 Mr. OLSON. Aye.
 The CLERK. Mr. Olson, aye.
 Mr. Gonzalez?
 Mr. GONZALEZ. Aye.
 The CLERK. Mr. Gonzalez, aye.
 Mr. Waltz?
 Mr. WALTZ. Aye.
 The CLERK. Mr. Waltz, aye.
 Mr. Baird?
 Mr. BAIRD. Aye.
 The CLERK. Mr. Baird, aye.
 Ms. Herrera Beutler?
 Ms. HERRERA BEUTLER. Aye.
 The CLERK. Ms. Herrera Beutler, aye.
 Miss González-Colón?
 Miss GONZÁLEZ-COLÓN. Yes.
 The CLERK. Miss González-Colón, aye.
 Chairwoman JOHNSON. Are there Members who have not voted
 or wish to change their vote?
 The clerk will report.
 The CLERK. Chairwoman, the ayes are 16 and the noes are 19.
 Chairwoman JOHNSON. The amendment is not adopted.
 A reporting quorum being present, I move the Committee on
 Science, Space, and Technology report H.R. 3607, as amended, to
 the House with the recommendation that the bill be approved.
 Those in favor of the motion will vote aye, and those opposed will
 vote no.
 The clerk will call the roll.
 The CLERK. Chairwoman Johnson?
 Chairwoman JOHNSON. Aye.
 The CLERK. Chairwoman Johnson, aye.
 Ms. Lofgren?
 Ms. LOFGREN. Aye.
 The CLERK. Ms. Lofgren, aye.

Mr. Lipinski?
Mr. LIPINSKI. Aye.
The CLERK. Mr. Lipinski, aye.
Ms. Bonamici?
Ms. BONAMICI. Aye.
The CLERK. Ms. Bonamici, aye.
Mr. Bera?
Mr. BERA. Aye.
The CLERK. Mr. Bera, aye.
Mr. Lamb?
Mr. LAMB. Aye.
The CLERK. Mr. Lamb, aye.
Mrs. Fletcher?
Mrs. FLETCHER. Aye.
The CLERK. Mrs. Fletcher, aye.
Ms. Stevens?
Ms. STEVENS. Aye.
The CLERK. Ms. Stevens, aye.
Ms. Horn?
Ms. HORN. Aye.
The CLERK. Ms. Horn, aye.
Ms. Sherrill?
Ms. SHERRILL. Aye.
The CLERK. Ms. Sherrill, aye.
Mr. Sherman?
Mr. SHERMAN. Aye.
The CLERK. Mr. Sherman, aye.
Mr. Cohen?
Mr. COHEN. Aye.
The CLERK. Mr. Cohen, aye.
Mr. McNerney?
Mr. MCNERNEY. Aye.
The CLERK. Mr. McNerney, aye.
Mr. Perlmutter?
Mr. PERLMUTTER. Aye.
The CLERK. Mr. Perlmutter, aye.
Mr. Tonko?
Mr. TONKO. Aye.
The CLERK. Mr. Tonko, aye.
Mr. Foster?
Mr. FOSTER. Aye.
The CLERK. Mr. Foster, aye.
Mr. Beyer?
Mr. BEYER. Aye.
The CLERK. Mr. Beyer, aye.
Mr. Crist?
Mr. CRIST. Aye.
The CLERK. Mr. Crist, aye.
Mr. Casten?
Mr. CASTEN. Aye.
The CLERK. Mr. Casten, aye.
Ms. Hill?
Ms. HILL. Aye.
The CLERK. Ms. Hill, aye.

Mr. McAdams?
 Mr. McADAMS. Aye.
 The CLERK. Mr. McAdams, aye.
 Ms. Wexton?
 Ms. WEXTON. Aye.
 The CLERK. Ms. Wexton, aye.
 Mr. Lucas?
 Mr. LUCAS. No.
 The CLERK. Mr. Lucas, no.
 Mr. Brooks?
 Mr. BROOKS. No.
 The CLERK. Mr. Brooks, no.
 Mr. Posey?
 Mr. POSEY. No.
 The CLERK. Mr. Posey, no.
 Mr. Weber?
 Mr. WEBER. No.
 The CLERK. Mr. Weber, no.
 Mr. Babin?
 Mr. BABIN. No.
 The CLERK. Mr. Babin, no.
 Mr. Biggs?
 [No response.]
 The CLERK. Mr. Marshall?
 [No response.]
 The CLERK. Mr. Norman?
 [No response.]
 The CLERK. Mr. Cloud?
 Mr. CLOUD. No.
 The CLERK. Mr. Cloud, no.
 Mr. Balderson?
 Mr. BALDERSON. No.
 The CLERK. Mr. Balderson, no.
 Mr. Olson?
 Mr. OLSON. No.
 The CLERK. Mr. Olson, no.
 Mr. Gonzalez?
 Mr. GONZALEZ. No.
 The CLERK. Mr. Gonzalez, no.
 Mr. Waltz?
 Mr. WALTZ. No.
 The CLERK. Mr. Waltz, no.
 Mr. Baird?
 Mr. BAIRD. No.
 The CLERK. Mr. Baird, no.
 Ms. Herrera Beutler?
 Ms. HERRERA BEUTLER. No.
 The CLERK. Ms. Herrera Beutler, no.
 Miss González-Colón?
 Miss GONZÁLEZ-COLÓN. No.
 The CLERK. Miss González-Colón, no.
 Chairwoman JOHNSON. Have all Members voted? Any Members
 wishing to change their vote?
 The clerk will report.

The CLERK. Chairwoman, the ayes are 22 and the noes are 13. Chairwoman JOHNSON. The bill is reported favorably. Without objection, the motion to reconsider is laid upon the table. I ask unanimous consent that the staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered.

Members will have 2 subsequent calendar days in which to submit supplementary minority or additional views on this measure. The bill is passed.

The next question is on the Weber amendment to 3609. The clerk will call the roll.

The CLERK. Chairwoman Johnson?

Chairwoman JOHNSON. No.

The CLERK. Chairwoman Johnson, no.

Ms. Lofgren?

Ms. LOFGREN. No.

The CLERK. Ms. Lofgren, no.

Mr. Lipinski?

Mr. LIPINSKI. No.

The CLERK. Mr. Lipinski, no.

Ms. Bonamici?

Ms. BONAMICI. No.

The CLERK. Ms. Bonamici, no.

Mr. Bera?

Mr. BERA. No.

The CLERK. Mr. Bera, no.

Mr. Lamb?

Mr. LAMB. No.

The CLERK. Mr. Lamb, no.

Mrs. Fletcher?

Mrs. FLETCHER. No.

The CLERK. Mrs. Fletcher, no.

Ms. Stevens?

Ms. STEVENS. No.

The CLERK. Ms. Stevens, no.

Ms. Horn?

Ms. HORN. No.

The CLERK. Ms. Horn, no.

Ms. Sherrill?

Ms. SHERRILL. No.

The CLERK. Ms. Sherrill, no.

Mr. Sherman?

Mr. SHERMAN. No.

The CLERK. Mr. Sherman, no.

Mr. Cohen?

[No response.]

The CLERK. Mr. McNerney?

Mr. MCNERNEY. No.

The CLERK. Mr. McNerney, no.

Mr. Perlmutter?

Mr. PERLMUTTER. No.

The CLERK. Mr. Perlmutter, no.

Mr. Tonko?

Mr. TONKO. No.

