AMENDMENT NO._____ Calendar No._____

Purpose: In the nature of a substitute.

IN THE SENATE OF THE UNITED STATES—116th Cong., 1st Sess.

S. 1201

To amend the fossil energy research and development provisions of the Energy Policy Act of 2005 to enhance fossil fuel technology, and for other purposes.

Referred to the Committee on _____ and ordered to be printed

Ordered to lie on the table and to be printed

AMENDMENT IN THE NATURE OF A SUBSTITUTE intended to be proposed by Mr. MANCHIN (for himself and Ms. MURKOWSKI)

Viz:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Enhancing Fossil Fuel Energy Carbon Technology Act of 2019'' or the ''EFFECT Act of 2019''.

SEC. 2. ESTABLISHMENT OF COAL AND NATURAL GAS TECHNOLOGY PROGRAM.

(a) IN GENERAL.—The Energy Policy Act of 2005 is amended by striking section 962 (42 U.S.C. 16292) and inserting the following:

"SEC. 962. COAL AND NATURAL GAS TECHNOLOGY PROGRAM.

''(a) DEFINITIONS.—In this section:

''(1) LARGE-SCALE PILOT PROJECT.—The term 'large-scale pilot project' means a pilot project that—

''(A) represents the scale of technology development beyond laboratory development and bench scale testing, but not yet advanced to the point of being tested under real operational conditions at commercial scale;

''(B) represents 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 that technology at commercial scale or in commercial-scale demonstration; and

''(C) is large enough—

''(i) to validate scaling factors; and

''(ii) to demonstrate the interaction between major components so that control philosophies for a new process can be developed and enable the technology to advance from large-scale pilot plant application to commercial-scale demonstration or application.

''(2) NET-NEGATIVE CARBON DIOXIDE EMISSIONS TECHNOLOGY.—The term 'net-negative carbon dioxide emissions technology' means technology—

''(A) for thermochemical co-conversion of coal and biomass fuels that—

''(i) uses a carbon capture system; and

''(ii) with carbon dioxide removal, the Secretary determines can provide electricity, fuels, or chemicals with net-negative carbon dioxide emissions from production and consumption of the end products, while removing atmospheric carbon dioxide; and

''(B) through which each use of coal will be combined with the use of biomass energy, provided on a renewable basis, that is sufficient in quantity to allow for net-negative emissions of carbon dioxide (in combination with a carbon capture system), while avoiding impacts on food production activities.

''(3) PROGRAM.—The term 'program' means the program established under subsection (b)(1).

''(4) TRANSFORMATIONAL TECHNOLOGY.—

''(A) IN GENERAL.—The term 'transformational technology' means a power generation technology that represents a significant change in the methods used to convert energy that will enable a step change in performance, efficiency, and cost of electricity as compared to the technology in existence on the date of enactment of the Enhancing Fossil Fuel Energy Carbon Technology Act of 2019.

''(B) INCLUSIONS.—The term 'transformational technology' includes a broad range of technology improvements, including—

''(i) thermodynamic improvements in energy conversion and heat transfer, including—

''(I) advanced combustion systems, including oxygen combustion systems and chemical looping; and

''(II) the replacement of steam cycles with supercritical carbon dioxide cycles;

''(ii) improvements in steam or carbon dioxide turbine technology;

''(iii) improvements in carbon capture, utilization, and storage systems technology;

"(iv) improvements in small-scale and modular coal-fired technologies with reduced carbon output or carbon capture that can support incremental power generation capacity additions;

"(v) fuel cell technologies for low-cost, high-efficiency modular power systems;

"(vi) advanced gasification systems;

"(vii) thermal cycling technologies; and

"(viii) any other technology the Secretary recognizes as transformational technology.

"(b) COAL AND NATURAL GAS TECHNOLOGY PROGRAM.—

"(1) IN GENERAL.—The Secretary shall establish a coal and natural gas technology program to ensure the continued use of the abundant domestic coal and natural gas resources of the United States through the development of transformational technologies that will significantly improve the efficiency, effectiveness, costs, and environmental performance of coal and natural gas use.

"(2) REQUIREMENTS.—The program shall include—

''(A) a research and development program;

''(B) large-scale pilot projects;

''(C) demonstration projects; and

''(D) a front-end engineering and design program.

''(3) PROGRAM GOALS AND OBJECTIVES.—In consultation with the interested entities described in paragraph (5)(C), the Secretary shall develop goals and objectives for the program to be applied to the transformational technologies developed within the program, taking into consideration the following:

''(A) Increasing the performance of coal and natural gas plants, including by—

''(i) ensuring reliable, low-cost power from new and existing coal and natural gas plants;

''(ii) achieving high conversion efficiencies;

''(iii) addressing emissions of carbon dioxide through high-efficiency platforms;

''(iv) developing small-scale and modular technologies to support incremental capacity additions and load following generation, in addition to large-scale generation technologies;

"(v) supporting dispatchable operations for new and existing applications of coal and natural gas generation; and

"(vi) accelerating the development of technologies that have transformational energy conversion characteristics.

"(B) Using carbon capture, utilization, and sequestration technologies to decrease the carbon dioxide emissions, and the environmental impact from carbon dioxide emissions, from new and existing coal and natural gas plants, including by—

"(i) accelerating the development, deployment, and commercialization of technologies to capture and sequester carbon dioxide emissions from new and existing coal and natural gas plants;

"(ii) supporting sites for safe geological storage of large volumes of anthropogenic sources of carbon dioxide and the development of the infrastructure needed to support a carbon dioxide utilization and storage industry;

"(iii) improving the conversion, utilization, and storage of carbon dioxide pro-

duced from fossil fuels and other anthropogenic sources of carbon dioxide;

''(iv) lowering greenhouse gas emissions for all fossil fuel production, generation, delivery, and use, to the maximum extent practicable;

''(v) developing carbon utilization technologies, products, and methods, including carbon use and reuse for commercial application; and

''(vi) developing net-negative carbon dioxide emissions technologies.

''(C) Decreasing the non-carbon dioxide relevant environmental impacts of coal and natural gas production, including by—

''(i) further reducing non-carbon dioxide air emissions; and

''(ii) reducing the use, and managing the discharge, of water in power plant operations.

''(D) Accelerating the development of technologies to capture carbon dioxide emissions from industrial facilities, including—

''(i) nontraditional fuel manufacturing facilities, including ethanol or other biofuel

production plants or hydrogen production plants; and

''(ii) energy-intensive manufacturing facilities that produce carbon dioxide as a byproduct of operations.

''(E) Examining methods of converting coal and natural gas to other valuable products and commodities in addition to electricity, including hydrogen.

''(4) CROSS-CUTTING DIRECTION FOR CARBON CAPTURE, UTILIZATION, AND SEQUESTRATION ACTIVITIES.—The carbon capture, utilization, and sequestration activities described in paragraph (3)(B) shall be—

''(A) cross-cutting in nature; and

''(B) carried out by the Assistant Secretary for Fossil Energy, in coordination with the heads of other relevant offices of the Department, including the Director of the Office of Science and the Assistant Secretary for Energy Efficiency and Renewable Energy.

''(5) CONSULTATIONS REQUIRED.—In carrying out the program, the Secretary shall—

''(A) undertake international collaborations, taking into consideration the recommendations of the National Coal Council;

''(B) use existing authorities to encourage international cooperation; and

''(C) consult with interested entities, including—

''(i) coal and natural gas producers;

''(ii) industries that use coal and natural gas;

''(iii) organizations that promote coal, advanced coal, and natural gas technologies;

''(iv) environmental organizations;

''(v) organizations representing workers; and

''(vi) organizations representing consumers.

''(c) REPORT.—

''(1) IN GENERAL.—Not later than 18 months after the date of enactment of the Enhancing Fossil Fuel Energy Carbon Technology Act of 2019, the Secretary shall submit to Congress a report describing the program goals and objectives adopted under subsection (b)(3).

''(2) UPDATE.—Not less frequently than once every 2 years after the initial report is submitted under paragraph (1), the Secretary shall submit to Congress a report describing the progress made towards achieving the program goals and objectives adopted under subsection (b)(3).

''(d) FUNDING.—

''(1) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out this section, to remain available until expended—

''(A) for activities under the research and development program component described in subsection (b)(2)(A)—

''(i) $230,000,000 for each of fiscal years 2020 and 2021; and

''(ii) $150,000,000 for each of fiscal years 2022 through 2024;

''(B) subject to paragraph (2), for activities under the large-scale pilot projects program component described in subsection (b)(2)(B)—

''(i) $347,000,000 for each of fiscal years 2020 and 2021;

''(ii) $272,000,000 for each of fiscal years 2022 and 2023; and

"(iii) $250,000,000 for fiscal year 2024;

"(C) for activities under the demonstration projects program component described in subsection (b)(2)(C)—

"(i) $100,000,000 for each of fiscal years 2020 and 2021; and

"(ii) $500,000,000 for each of fiscal years 2022 through 2024; and

"(D) for activities under the front-end engineering and design program described in subsection (b)(2)(D), $50,000,000 for each of fiscal years 2020 through 2023.

"(2) COST SHARING FOR LARGE-SCALE PILOT PROJECTS.—Activities under subsection (b)(2)(B) shall be subject to the cost-sharing requirements of section 988(b).".

(b) TECHNICAL AMENDMENT.—The table of contents for the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 600) is amended by striking the item relating to section 962 and inserting the following:

"Sec. 962. Coal and natural gas technology program.".

SEC. 3. CARBON STORAGE VALIDATION AND TESTING.

(a) IN GENERAL.—The Energy Policy Act of 2005 is amended by striking section 963 (42 U.S. C. 16293) and inserting the following:

"SEC. 963. CARBON STORAGE VALIDATION AND TESTING.

''(a) DEFINITIONS.—In this section:

''(1) ELECTRIC GENERATION UNIT.—The term 'electric generation unit' means an electric generation unit that—

''(A) uses coal- or natural gas-based generation technology; and

''(B) is capable of capturing carbon dioxide emissions from the unit.

''(2) LARGE-SCALE CARBON SEQUESTRATION.—The term 'large-scale carbon sequestration' means a scale that demonstrates the ability to inject into geologic formations and sequester several million metric tons of carbon dioxide for not less than a 10-year period.

''(3) PROGRAM.—The term 'program' means the program established under subsection (b)(1).

''(b) CARBON STORAGE PROGRAM.—

''(1) IN GENERAL.—The Secretary shall establish a program of research, development, and demonstration for carbon storage.

''(2) PROGRAM ACTIVITIES.—Activities under the program shall include—

''(A) in coordination with relevant Federal agencies, developing and maintaining mapping

tools and resources that assess the capacity of geologic storage formation in the United States;

"(B) developing monitoring tools, modeling of geologic formations, and analyses—

"(i) to predict carbon dioxide containment; and

"(ii) to account for sequestered carbon dioxide in geologic storage sites;

"(C) researching—

"(i) potential environmental, safety, and health impacts in the event of a leak into the atmosphere or to an aquifer; and

"(ii) any corresponding mitigation actions or responses to limit harmful consequences of such a leak;

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

"(E) assessing and ensuring the safety of operations relating to geologic sequestration of carbon dioxide;

"(F) determining the fate of carbon dioxide concurrent with and following injection into geologic formations; and

"(G) supporting cost and business model assessments to examine the economic viability of technologies and systems developed under the program.

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

"(A) operating oil and gas fields;

"(B) depleted oil and gas fields;

"(C) residual oil zones;

"(D) unconventional reservoirs and rock types;

"(E) unmineable coal seams;

"(F) saline formations in both sedimentary and basaltic geologies;

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

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

"(c) LARGE-SCALE CARBON SEQUESTRATION DEMONSTRATION PROGRAM.—

''(1) IN GENERAL.—The Secretary shall establish a demonstration program under which the Secretary shall provide funding for demonstration projects to collect and validate information on the cost and feasibility of commercial deployment of large-scale carbon sequestration technologies.

''(2) EXISTING REGIONAL CARBON SEQUESTRATION PARTNERSHIPS.—In carrying out paragraph (1), the Secretary may provide additional funding to regional carbon sequestration partnerships that are carrying out or have completed a large-scale carbon sequestration demonstration project under this section (as in effect on the day before the date of enactment of the Enhancing Fossil Fuel Energy Carbon Technology Act of 2019) for additional work on that project.

''(3) DEMONSTRATION COMPONENTS.—Each demonstration project carried out under this subsection shall include longitudinal tests involving carbon dioxide injection and monitoring, mitigation, and verification operations.

''(4) CLEARINGHOUSE.—The National Energy Technology Laboratory shall act as a clearinghouse of shared information and resources for—

"(A) existing or completed demonstration projects receiving additional funding under paragraph (2); and

"(B) any new demonstration projects funded under this subsection.

"(5) REPORT.—Not later than 1 year after the date of enactment of the Enhancing Fossil Fuel Energy Carbon Technology Act of 2019, the Secretary shall submit to the Committee on Energy and Natural Resources of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report that—

"(A) assesses the progress of all regional carbon sequestration partnerships carrying out a demonstration project under this subsection;

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

"(C) creates a roadmap for carbon storage research and development activities of the Department through 2025, with the goal of reducing economic and policy barriers to commercial carbon sequestration.

"(d) INTEGRATED STORAGE PROGRAM.—

''(1) IN GENERAL.—The Secretary may establish a program to transition large-scale carbon sequestration demonstration projects under subsection (c) into integrated commercial storage complexes.

''(2) GOALS AND OBJECTIVES.—The goals and objectives of the program described in paragraph (1) shall be—

''(A) to identify geologic storage sites that are able to accept large volumes of carbon dioxide acceptable for commercial contracts;

''(B) to understand the technical and commercial viability of carbon dioxide geologic storage sites; and

''(C) to carry out any other activities necessary to transition the large-scale carbon sequestration demonstration projects under subsection (c) into integrated commercial storage complexes.

''(e) COST SHARING.—Activities carried out under this section shall be subject to the cost-sharing requirements of section 988.

''(f) REPORT ON CARBON DIOXIDE CAPTURE CONTRACTING AUTHORITY.—

''(1) REPORT.—Not later than 180 days after the date of enactment of the Enhancing Fossil Fuel

Energy Carbon Technology Act of 2019, the Secretary shall submit to the Committee on Energy and Natural Resources of the Senate and the Committee on Science, Space, and Technology of the House of Representatives a report that—

''(A) describes the costs and benefits of entering into long-term binding contracts on behalf of the Federal Government with qualified parties to provide support for capturing carbon dioxide from electricity generated at an electric generation unit or carbon dioxide captured from an electric generation unit and sold to a purchaser for—

''(i) the recovery of crude oil; or

''(ii) other purposes for which a commercial market exists;

''(B) contains an analysis of how the Department would establish, implement, and maintain a contracting program described in subparagraph (A); and

''(C) outlines options for how contracts may be structured, and regulations that would be necessary, to implement a contracting program described in subparagraph (A).

''(g) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out this section—

''(1) $105,000,000 for fiscal year 2020;

''(2) $110,250,000 for fiscal year 2021;

''(3) $115,763,000 for fiscal year 2022;

''(4) $121,551,000 for fiscal year 2023; and

''(5) $127,628,000 for fiscal year 2024.''.

(b) TECHNICAL AMENDMENT.—The table of contents for the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 600; 121 Stat. 1708) is amended by striking the item relating to section 963 and inserting the following:

''Sec. 963. Carbon storage validation and testing.''.

SEC. 4. CARBON UTILIZATION PROGRAM.

(a) CARBON UTILIZATION PROGRAM.—

(1) 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. CARBON UTILIZATION PROGRAM.

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

''(1) to assess and monitor—

''(A) potential changes in lifecycle carbon dioxide and other greenhouse gas emissions; and

''(B) other environmental safety indicators of new technologies, practices, processes, or methods used in enhanced hydrocarbon recovery as part of the activities authorized under section 963;

''(2) to identify and assess novel uses for carbon, including the conversion of carbon oxides for commercial and industrial products, such as—

''(A) chemicals;

''(B) plastics;

''(C) building materials;

''(D) fuels;

''(E) cement;

''(F) products of coal use in power systems or other applications; or

''(G) other products with demonstrated market value;

''(3) to identify and assess carbon capture technologies for industrial systems; and

''(4) to identify and assess alternative uses for coal, including products derived from carbon engineering, carbon fiber, and coal conversion methods.

''(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out 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.''.

(2) TECHNICAL AMENDMENT.—The table of contents for the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 600) is amended by adding at the end of the items relating to subtitle F of title IX the following:

''Sec. 969. Carbon utilization program.''.

(b) STUDY.—

(1) IN GENERAL.—The Secretary of Energy shall enter into an agreement with the National Academies of Sciences, Engineering, and Medicine under which the National Academies of Sciences, Engineering, and Medicine shall conduct a study to assess any barriers and opportunities relating to commercializing carbon dioxide in the United States.

(2) REQUIREMENTS.—The study under paragraph (1) shall—

(A) analyze challenges to commercializing carbon dioxide, including—

(i) expanding carbon dioxide pipeline capacity;

(ii) mitigating environmental impacts;

(iii) access to capital;

(iv) geographic barriers; and

(v) regional economic challenges and opportunities;

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

(C) assess—

(i) the state of infrastructure as of the date of the study; and

(ii) any necessary updates to infrastructure to allow for the integration of safe and reliable carbon dioxide transportation, use, and storage;

(D) describe the economic, climate, and environmental impacts of any well-integrated national carbon dioxide pipeline system, including suggestions for policies that could—

(i) improve the economic impact of the system; and

(ii) mitigate impacts of the system;

(E) assess the global status and progress of chemical and biological carbon utilization technologies in practice as of the date of the study that utilize anthropogenic carbon, including carbon dioxide, carbon monoxide, methane, and biogas, from power generation, biofuels production, and other industrial processes;

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

(G) 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;

(H)(i) assess the major technical challenges associated with increasing the commercial viability of carbon reuse technologies; and

(ii) identify the research and development questions that will address the challenges described in clause (i);

(I)(i) assess research efforts being carried out as of the date of the study, including basic, applied, engineering, and computational re-

search efforts, that are addressing the challenges described in subparagraph (H)(i); and

(ii) identify gaps in the research efforts under clause (i);

(J) develop a comprehensive research agenda that addresses long- and short-term research needs and opportunities; and

(K)(i) identify appropriate Federal agencies with capabilities to support small business entities; and

(ii) determine what assistance the Federal agencies identified under clause (i) could provide to small business entities to further the development and commercial deployment of carbon dioxide-based products.

(3) DEADLINE.—Not later than 180 days after the date of enactment of this Act, the National Academies of Sciences, Engineering, and Medicine shall submit to the Secretary of Energy a report describing the results of the study under paragraph (1).

SEC. 5. CARBON REMOVAL.

(a) IN GENERAL.—Subtitle F of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16291 et seq.) (as

amended by section 4(a)(1)) is amended by adding at the end the following:

"SEC. 969A. CARBON REMOVAL.

"(a) ESTABLISHMENT.—The Secretary, in coordination with the heads of appropriate Federal agencies, including the Secretary of Agriculture, shall establish a research, development, and demonstration program (referred to in this section as the 'program') to test, validate, or improve technologies and strategies to remove carbon dioxide from the atmosphere on a large scale.

"(b) CROSS-CUTTING DIRECTION.—The Secretary shall ensure that the program—

"(1) is cross-cutting in nature; and

"(2) includes the coordinated participation of the Office of Fossil Energy, the Office of Science, and the Office of Energy Efficiency and Renewable Energy.

"(c) PROGRAM ACTIVITIES.—The program may include research, development, and demonstration activities relating to—

"(1) direct air capture and storage technologies;

"(2) bioenergy with carbon capture and sequestration;

"(3) enhanced geological weathering;

"(4) agricultural and grazing practices;

''(5) forest management and afforestation; and

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

''(d) REQUIREMENTS.—In developing and identifying carbon removal technologies and strategies under the program, the Secretary shall consider—

''(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; and

''(7) economic cobenefits.

''(e) AIR CAPTURE TECHNOLOGY PRIZE COMPETITION.—

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

''(A) DILUTE MEDIA.—The term 'dilute media' means media in which the concentration of carbon dioxide is less than 1 percent by volume.

''(B) PRIZE COMPETITION.—The term 'prize competition' means the competitive tech-

nology prize competition established under paragraph (2).

''(2) ESTABLISHMENT.—Not later than 1 year after the date of enactment of the Enhancing Fossil Fuel Energy Carbon Technology Act of 2019, the Secretary, in consultation with the Administrator of the Environmental Protection Agency, shall establish as part of the program a competitive technology prize competition to award prizes for carbon dioxide capture from dilute media.

''(3) REQUIREMENTS.—In carrying out this subsection, the Secretary, in accordance with section 24 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3719), shall develop requirements for—

''(A) the prize competition process; and

''(B) monitoring and verification procedures for projects selected to receive a prize under the prize competition.

''(4) ELIGIBLE PROJECTS.—To be eligible to be awarded a prize under the prize competition, a project shall—

''(A) meet minimum performance standards set by the Secretary;

''(B) meet minimum levels set by the Secretary for the capture of carbon dioxide from dilute media; and

''(C) demonstrate in the application of the project for a prize—

''(i) a design for a promising carbon 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;

''(ii) a successful bench-scale demonstration of a carbon capture technology; or

''(iii) an operational carbon 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 Enhancing Fossil Fuel Energy Carbon Technology Act of 2019, the Secretary shall award grants to 1 or more entities for the operation of 1 or more test centers (referred to in this subsection as a 'Center') 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 direct air capture and storage 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) SELECTION.—

''(A) IN GENERAL.—The Secretary shall select entities to receive grants under this subsection according to such criteria as the Secretary may develop.

''(B) COMPETITIVE BASIS.—The Secretary shall select entities to receive grants under this subsection on a competitive basis.

"(C) PRIORITY CRITERIA.—In selecting entities to receive grants under this subsection, the Secretary shall prioritize applicants that—

"(i) have access to existing or planned research facilities for direct air capture and storage technologies;

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

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

"(4) FORMULA FOR AWARDING GRANTS.—The Secretary may develop a formula for awarding grants under this subsection.

"(5) SCHEDULE.—

"(A) IN GENERAL.—Each grant awarded under this subsection shall be for a term of not more than 5 years, subject to the availability of appropriations.

"(B) RENEWAL.—The Secretary may renew a grant for 1 or more additional 5-year

terms, subject to a competitive merit review and the availability of appropriations.

''(6) TERMINATION.—To the extent otherwise authorized by law, the Secretary may eliminate, and terminate grant funding under this subsection for, a Center during any 5-year term described in paragraph (5) if the Secretary determines that the Center is underperforming.

''(g) LARGE-SCALE PILOTS AND DEMONSTRATION.—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) INTRAAGENCY COORDINATION.—The direct air capture activities carried out under subsections (c)(1) and (e) shall be carried out in coordination with, and leveraging lessons learned from, the coal and natural gas technology program established under section 962(b)(1).

''(i) ACCOUNTING.—The Secretary shall collaborate with the Administrator of the Environmental Protection Agency and the heads of other relevant Federal agencies to develop and improve accounting frameworks and tools to accurately measure carbon removal and sequestration methods and technologies across the Federal Government.

''(j) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out this section—

''(1) $75,000,000 for fiscal year 2020, of which $15,000,000 shall be used to carry out subsection (e);

''(2) $63,500,000 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.''.

(b) TECHNICAL AMENDMENT.—The table of contents for the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 600) (as amended by section 4(a)(2)) is amended by adding at the end of the items relating to subtitle F of title IX the following:

''Sec. 969A. Carbon removal.''.

SEC. 6. FOSSIL ENERGY.

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

(1) in paragraph (6), by inserting ", including technology development to reduce emissions of carbon dioxide and associated emissions of heavy metals within coal combustion residues and gas streams resulting from fossil fuel use and production'' before the period at the end; and

(2) by striking paragraph (7) and inserting the following:

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

''(8) 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.

''(9) Improving the conversion, use, and storage of carbon dioxide produced from fossil fuels.''.