

116TH CONGRESS
1ST SESSION

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.

IN THE SENATE OF THE UNITED STATES

APRIL 11, 2019

Mr. MANCHIN (for himself, Ms. MURKOWSKI, Mrs. CAPITO, Mr. CRAMER, and Mr. DAINES) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

A BILL

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.

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.**

4 This Act may be cited as the “Enhancing Fossil Fuel
5 Energy Carbon Technology Act of 2019”.

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

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

6 **“SEC. 962. COAL AND NATURAL GAS TECHNOLOGY PRO-**
7 **GRAM.**

8 “(a) DEFINITIONS.—In this section:

9 “(1) LARGE-SCALE PILOT PROJECT.—The term
10 ‘large-scale pilot project’ means a pilot project
11 that—

12 “(A) represents the scale of technology de-
13 velopment beyond laboratory development and
14 bench scale testing, but not yet advanced to the
15 point of being tested under real operational con-
16 ditions at commercial scale;

17 “(B) represents the scale of technology
18 necessary to gain the operational data needed
19 to understand the technical and performance
20 risks of the technology before the application of
21 that technology at commercial scale or in com-
22 mercial-scale demonstration; and

23 “(C) is large enough—

24 “(i) to validate scaling factors; and

25 “(ii) to demonstrate the interaction
26 between major components so that control

1 philosophies for a new process can be de-
2 veloped and enable the technology to ad-
3 vance from large-scale pilot plant applica-
4 tion to commercial-scale demonstration or
5 application.

6 “(2) NET-NEGATIVE CARBON DIOXIDE EMIS-
7 SIONS TECHNOLOGY.—The term ‘net-negative car-
8 bon dioxide emissions technology’ means tech-
9 nology—

10 “(A) for thermochemical co-conversion of
11 coal and biomass fuels that—

12 “(i) uses a carbon capture system;
13 and

14 “(ii) with carbon dioxide removal, the
15 Secretary determines can provide elec-
16 tricity, fuels, or chemicals with net-nega-
17 tive carbon dioxide emissions from produc-
18 tion and consumption of the end products,
19 while removing atmospheric carbon dioxide;
20 and

21 “(B) through which each use of coal will
22 be combined with the use of a regionally indige-
23 nous form of biomass energy, provided on a re-
24 newable basis, that is sufficient in quantity to
25 allow for net-negative emissions of carbon diox-

1 ide (in combination with a carbon capture sys-
2 tem), while avoiding impacts on food production
3 activities.

4 “(3) PROGRAM.—The term ‘program’ means
5 the program established under subsection (b)(1).

6 “(4) TRANSFORMATIONAL TECHNOLOGY.—

7 “(A) IN GENERAL.—The term ‘trans-
8 formational technology’ means a power genera-
9 tion technology that represents a significant
10 change in the methods used to convert energy
11 that will enable a step change in performance,
12 efficiency, and cost of electricity as compared to
13 the technology in existence on the date of enact-
14 ment of the Enhancing Fossil Fuel Energy Car-
15 bon Technology Act of 2019.

16 “(B) INCLUSIONS.—The term ‘trans-
17 formational technology’ includes a broad range
18 of technology improvements, including—

19 “(i) thermodynamic improvements in
20 energy conversion and heat transfer, in-
21 cluding—

22 “(I) advanced combustion sys-
23 tems, including oxygen combustion
24 systems and chemical looping; and

1 “(II) the replacement of steam
2 cycles with supercritical carbon diox-
3 ide cycles;

4 “(ii) improvements in steam or carbon
5 dioxide turbine technology;

6 “(iii) improvements in carbon capture,
7 utilization, and storage systems technology;

8 “(iv) improvements in small-scale and
9 modular coal-fired technologies with re-
10 duced carbon output or carbon capture
11 that can support incremental power gen-
12 eration capacity additions;

13 “(v) fuel cell technologies for low-cost,
14 high-efficiency, fuel-flexible modular power
15 systems;

16 “(vi) advanced gasification systems;

17 “(vii) thermal cycling technologies;

18 and

19 “(viii) any other technology the Sec-
20 retary recognizes as transformational tech-
21 nology.

22 “(b) COAL AND NATURAL GAS TECHNOLOGY PRO-
23 GRAM.—

24 “(1) IN GENERAL.—The Secretary shall estab-
25 lish a coal and natural gas technology program to

1 ensure the continued use of the abundant domestic
2 coal and natural gas resources of the United States
3 through the development of technologies that will
4 significantly improve the efficiency, effectiveness,
5 costs, and environmental performance of coal and
6 natural gas use.

7 “(2) REQUIREMENTS.—The program shall in-
8 clude—

9 “(A) a research and development program;

10 “(B) large-scale pilot projects;

11 “(C) demonstration projects; and

12 “(D) a front-end engineering and design
13 program.

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

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

22 “(i) ensuring reliable, low-cost power
23 from new and existing coal and natural gas
24 plants;

1 “(ii) achieving high conversion effi-
2 ciencies;

3 “(iii) addressing emissions of carbon
4 dioxide through high-efficiency platforms;

5 “(iv) developing small-scale and mod-
6 ular technologies to support incremental
7 capacity additions and load following gen-
8 eration, in addition to large-scale genera-
9 tion technologies;

10 “(v) supporting dispatchable oper-
11 ations for new and existing applications of
12 coal and natural gas generation; and

13 “(vi) accelerating the development of
14 technologies that have transformational en-
15 ergy conversion characteristics.

16 “(B) Using carbon capture, utilization, and
17 sequestration technologies to decrease the car-
18 bon dioxide emissions, and the environmental
19 impact from carbon dioxide emissions, from new
20 and existing coal and natural gas plants, includ-
21 ing by—

22 “(i) accelerating the development of
23 technologies to capture carbon dioxide
24 emissions from new and existing coal and
25 natural gas plants;

1 “(ii) accelerating the development of
2 technologies to capture carbon dioxide
3 emissions from industrial facilities, includ-
4 ing—

5 “(I) nontraditional fuel manufac-
6 turing facilities, including ethanol or
7 other biofuel production plants; and

8 “(II) energy-intensive manufac-
9 turing facilities that produce carbon
10 dioxide as a byproduct of operations;

11 “(iii) supporting sites for safe geologi-
12 cal storage of large volumes of anthropo-
13 genic sources of carbon dioxide and the de-
14 velopment of the infrastructure needed to
15 support a carbon dioxide utilization and
16 storage industry;

17 “(iv) improving the conversion, utili-
18 zation, and storage of carbon dioxide pro-
19 duced from fossil fuels and other anthropo-
20 genic sources of carbon dioxide;

21 “(v) lowering greenhouse gas emis-
22 sions for all fossil fuel production, genera-
23 tion, delivery, and use, to the maximum ex-
24 tent practicable;

1 “(vi) developing carbon utilization
2 technologies, products, and methods, in-
3 cluding carbon use and reuse for commer-
4 cial application; and

5 “(vii) developing net-negative carbon
6 dioxide emissions technologies.

7 “(C) Decreasing the non-carbon dioxide
8 relevant environmental impacts of coal and nat-
9 ural gas production, including by—

10 “(i) further reducing non-carbon diox-
11 ide air emissions; and

12 “(ii) reducing the use, and managing
13 the discharge, of water in power plant op-
14 erations.

15 “(D) Examining methods of converting
16 coal and natural gas to other valuable products
17 and commodities in addition to electricity.

18 “(4) CROSS-CUTTING DIRECTION FOR CARBON
19 CAPTURE, UTILIZATION, AND SEQUESTRATION AC-
20 TIVITIES.—The carbon capture, utilization, and se-
21 questration activities described in paragraph (3)(B)
22 shall be—

23 “(A) cross-cutting in nature; and

24 “(B) carried out by the Assistant Sec-
25 retary for Fossil Energy, in coordination with

1 the heads of other relevant offices of the De-
2 partment, including the Director of the Office
3 of Science and the Assistant Secretary for En-
4 ergy Efficiency and Renewable Energy.

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

7 “(A) undertake international collabora-
8 tions, taking into consideration the rec-
9 ommendations of the National Coal Council;

10 “(B) use existing authorities to encourage
11 international cooperation; and

12 “(C) consult with interested entities, in-
13 cluding—

14 “(i) coal and natural gas producers;

15 “(ii) industries that use coal and nat-
16 ural gas;

17 “(iii) organizations that promote coal,
18 advanced coal, and natural gas tech-
19 nologies;

20 “(iv) environmental organizations;

21 “(v) organizations representing work-
22 ers; and

23 “(vi) organizations representing con-
24 sumers.

25 “(c) REPORT.—

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

7 “(2) UPDATE.—Not less frequently than once
8 every 2 years after the initial report is submitted
9 under paragraph (1), the Secretary shall submit to
10 Congress a report describing the progress made to-
11 wards achieving the program goals and objectives
12 adopted under subsection (b)(3).

13 “(d) FUNDING.—

14 “(1) AUTHORIZATION OF APPROPRIATIONS.—
15 There are authorized to be appropriated to the Sec-
16 retary to carry out this section, to remain available
17 until expended—

18 “(A) for activities under the research and
19 development program component described in
20 subsection (b)(2)(A)—

21 “(i) \$230,000,000 for each of fiscal
22 years 2020 and 2021; and

23 “(ii) \$150,000,000 for each of fiscal
24 years 2022 through 2024;

1 “(B) subject to paragraph (2), for activi-
2 ties under the large-scale pilot projects program
3 component described in subsection (b)(2)(B)—

4 “(i) \$347,000,000 for each of fiscal
5 years 2020 and 2021;

6 “(ii) \$272,000,000 for each of fiscal
7 years 2022 and 2023; and

8 “(iii) \$250,000,000 for fiscal year
9 2024;

10 “(C) for activities under the demonstration
11 projects program component described in sub-
12 section (b)(2)(C)—

13 “(i) \$100,000,000 for each of fiscal
14 years 2020 and 2021; and

15 “(ii) \$500,000,000 for each of fiscal
16 years 2022 through 2024; and

17 “(D) for activities under the front-end en-
18 gineering and design program described in sub-
19 section (b)(2)(D), \$50,000,000 for each of fis-
20 cal years 2020 through 2023.

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

1 (b) TECHNICAL AMENDMENT.—The table of contents
 2 for the Energy Policy Act of 2005 (Public Law 109–58;
 3 119 Stat. 600) is amended by striking the item relating
 4 to section 962 and inserting the following:

“Sec. 962. Coal and natural gas technology program.”.

5 **SEC. 3. CARBON STORAGE VALIDATION AND TESTING.**

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

9 **“SEC. 963. CARBON STORAGE VALIDATION AND TESTING.**

10 “(a) DEFINITIONS.—In this section:

11 “(1) ELECTRIC GENERATION UNIT.—The term
 12 ‘electric generation unit’ means an electric genera-
 13 tion unit that—

14 “(A) uses coal- or natural gas-based gen-
 15 eration technology; and

16 “(B) is capable of capturing carbon dioxide
 17 emissions from the unit.

18 “(2) LARGE-SCALE CARBON SEQUESTRATION.—
 19 The term ‘large-scale carbon sequestration’ means a
 20 scale that demonstrates the ability to inject into geo-
 21 logic formations and sequester several million metric
 22 tons of carbon dioxide for not less than a 10-year
 23 period.

24 “(3) PROGRAM.—The term ‘program’ means
 25 the program established under subsection (b)(1).

1 “(b) CARBON STORAGE PROGRAM.—

2 “(1) IN GENERAL.—The Secretary shall estab-
3 lish a program of research, development, and dem-
4 onstration for carbon storage.

5 “(2) PROGRAM ACTIVITIES.—Activities under
6 the program shall include—

7 “(A) in coordination with relevant Federal
8 agencies, developing and maintaining mapping
9 tools and resources that assess the capacity of
10 geologic storage formation in the United States;

11 “(B) developing monitoring tools, modeling
12 of geologic formations, and analyses—

13 “(i) to predict and verify carbon diox-
14 ide containment; and

15 “(ii) to account for sequestered car-
16 bon dioxide in geologic storage sites;

17 “(C) researching—

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

21 “(ii) any corresponding mitigation ac-
22 tions or responses to limit harmful con-
23 sequences of such a leak;

24 “(D) evaluating the interactions of carbon
25 dioxide with formation solids and fluids, includ-

1 ing the propensity of injections to induce seis-
2 mic activity;

3 “(E) assessing and ensuring the safety of
4 operations relating to geologic sequestration of
5 carbon dioxide;

6 “(F) determining the fate of carbon diox-
7 ide concurrent with and following injection into
8 geologic formations; and

9 “(G) supporting cost and business model
10 assessments to examine the economic viability
11 of technologies and systems developed under the
12 program.

13 “(3) GEOLOGIC SETTINGS.—In carrying out re-
14 search activities under this subsection, the Secretary
15 shall consider a variety of candidate geologic set-
16 tings, including—

17 “(A) operating oil and gas fields;

18 “(B) depleted oil and gas fields;

19 “(C) residual oil zones;

20 “(D) unconventional reservoirs and rock
21 types;

22 “(E) unmineable coal seams;

23 “(F) saline formations in both sedimentary
24 and basaltic geologies;

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

5 “(H) geologic systems containing in situ
6 carbon dioxide mineralization formations.

7 “(c) LARGE-SCALE CARBON SEQUESTRATION DEM-
8 ONSTRATION PROGRAM.—

9 “(1) IN GENERAL.—The Secretary shall estab-
10 lish a demonstration program under which the Sec-
11 retary shall provide funding for demonstration
12 projects to collect and validate information on the
13 cost and feasibility of commercial deployment of
14 large-scale carbon sequestration technologies.

15 “(2) EXISTING REGIONAL CARBON SEQUESTRATION PARTNERSHIPS.—In carrying out paragraph
16 (1), the Secretary may provide additional funding to
17 regional carbon sequestration partnerships that are
18 carrying out or have completed a large-scale carbon
19 sequestration demonstration project under this sec-
20 tion (as in effect on the day before the date of enact-
21 ment of the Enhancing Fossil Fuel Energy Carbon
22 Technology Act of 2019) for additional work on that
23 project.
24

1 “(3) DEMONSTRATION COMPONENTS.—Each
2 demonstration project carried out under this sub-
3 section shall include longitudinal tests involving car-
4 bon dioxide injection and monitoring, mitigation,
5 and verification operations.

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

9 “(A) existing or completed demonstration
10 projects receiving additional funding under
11 paragraph (2); and

12 “(B) any new demonstration projects fund-
13 ed under this subsection.

14 “(5) REPORT.—Not later than 1 year after the
15 date of enactment of the Enhancing Fossil Fuel En-
16 ergy Carbon Technology Act of 2019, the Secretary
17 shall submit to the Committee on Energy and Nat-
18 ural Resources of the Senate and the Committee on
19 Science, Space, and Technology of the House of
20 Representatives a report that—

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

24 “(B) identifies the remaining challenges in
25 achieving large-scale carbon sequestration that

1 is reliable and safe for the environment and
2 public health; and

3 “(C) creates a roadmap for carbon storage
4 research and development activities of the De-
5 partment through 2025, with the goal of reduc-
6 ing economic and policy barriers to commercial
7 carbon sequestration.

8 “(d) INTEGRATED STORAGE PROGRAM.—

9 “(1) IN GENERAL.—The Secretary may estab-
10 lish a program to transition large-scale carbon se-
11 questration demonstration projects under subsection
12 (c) into integrated commercial storage complexes.

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

16 “(A) to identify geologic storage sites that
17 are able to accept large volumes of carbon diox-
18 ide acceptable for commercial contracts;

19 “(B) to understand the technical and com-
20 mercial viability of carbon dioxide geologic stor-
21 age sites; and

22 “(C) to carry out any other activities nec-
23 essary to transition the large-scale carbon se-
24 questration demonstration projects under sub-

1 section (c) into integrated commercial storage
2 complexes.

3 “(e) COST SHARING.—Activities carried out under
4 this section shall be subject to the cost-sharing require-
5 ments of section 988.

6 “(f) REPORT ON CARBON DIOXIDE CAPTURE CON-
7 TRACTING AUTHORITY.—

8 “(1) REPORT.—Not later than 180 days after
9 the date of enactment of the Enhancing Fossil Fuel
10 Energy Carbon Technology Act of 2019, the Sec-
11 retary shall submit to the Committee on Energy and
12 Natural Resources of the Senate and the Committee
13 on Science, Space, and Technology of the House of
14 Representatives a report that—

15 “(A) describes the costs and benefits of en-
16 tering into long-term binding contracts on be-
17 half of the Federal Government with qualified
18 parties to provide support for capturing carbon
19 dioxide from electricity generated at an electric
20 generation unit or carbon dioxide captured from
21 an electric generation unit and sold to a pur-
22 chaser for—

23 “(i) the recovery of crude oil; or

24 “(ii) other purposes for which a com-
25 mercial market exists;

1 “(B) contains an analysis of how the De-
2 partment would establish, implement, and
3 maintain a contracting program described in
4 subparagraph (A); and

5 “(C) outlines options for how contracts
6 may be structured, and regulations that would
7 be necessary, to implement a contracting pro-
8 gram described in subparagraph (A).

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

12 “(1) \$105,000,000 for fiscal year 2020;

13 “(2) \$110,250,000 for fiscal year 2021;

14 “(3) \$115,763,000 for fiscal year 2022;

15 “(4) \$121,551,000 for fiscal year 2023; and

16 “(5) \$127,628,000 for fiscal year 2024.”.

17 (b) TECHNICAL AMENDMENT.—The table of contents
18 for the Energy Policy Act of 2005 (Public Law 109–58;
19 119 Stat. 600; 121 Stat. 1708) is amended by striking
20 the item relating to section 963 and inserting the fol-
21 lowing:

 “Sec. 963. Carbon storage validation and testing.”.

22 **SEC. 4. CARBON UTILIZATION PROGRAM.**

23 (a) CARBON UTILIZATION PROGRAM.—

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

4 **“SEC. 969. CARBON UTILIZATION PROGRAM.**

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

8 “(1) to assess and monitor—

9 “(A) potential changes in lifecycle carbon
10 dioxide and other greenhouse gas emissions;
11 and

12 “(B) other environmental safety indicators
13 of new technologies, practices, processes, or
14 methods used in enhanced hydrocarbon recovery
15 as part of the activities authorized under sec-
16 tion 963;

17 “(2) to identify and assess novel uses for car-
18 bon, including the conversion of carbon dioxide for
19 commercial and industrial products, such as—

20 “(A) chemicals;

21 “(B) plastics;

22 “(C) building materials;

23 “(D) fuels;

24 “(E) cement;

1 “(F) products of coal use in power systems
2 or other applications; or

3 “(G) other products with demonstrated
4 market value;

5 “(3) to identify and assess carbon capture tech-
6 nologies for industrial systems; and

7 “(4) to identify and assess alternative uses for
8 coal, including products derived from carbon engi-
9 neering, carbon fiber, and coal conversion methods.

10 “(b) AUTHORIZATION OF APPROPRIATIONS.—There
11 are authorized to be appropriated to the Secretary to carry
12 out this section—

13 “(1) \$25,000,000 for fiscal year 2020;

14 “(2) \$26,250,000 for fiscal year 2021;

15 “(3) \$27,562,500 for fiscal year 2022;

16 “(4) \$28,940,625 for fiscal year 2023; and

17 “(5) \$30,387,656 for fiscal year 2024.”.

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

“Sec. 969. Carbon utilization program.”.

23 (b) STUDY.—

24 (1) IN GENERAL.—The Secretary of Energy
25 shall enter into an agreement with the National

1 Academies of Sciences, Engineering, and Medicine
2 under which the National Academies of Sciences,
3 Engineering, and Medicine shall conduct a study to
4 assess any barriers and opportunities relating to
5 commercializing carbon dioxide in the United States.

6 (2) REQUIREMENTS.—The study under para-
7 graph (1) shall—

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

10 (i) expanding carbon dioxide pipeline
11 capacity;

12 (ii) mitigating environmental impacts;

13 (iii) access to capital;

14 (iv) geographic barriers; and

15 (v) regional economic challenges and
16 opportunities;

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

20 (C) assess—

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

23 (ii) any necessary updates to infra-
24 structure to allow for the integration of

1 safe and reliable carbon dioxide transpor-
2 tation, use, and storage;

3 (D) describe the economic, climate, and en-
4 vironmental impacts of any well-integrated na-
5 tional carbon dioxide pipeline system, including
6 suggestions for policies that could—

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

9 (ii) mitigate impacts of the system;

10 (E) assess the global status and progress
11 of chemical and biological carbon utilization
12 technologies in practice as of the date of the
13 study that utilize anthropogenic carbon, includ-
14 ing carbon dioxide, carbon monoxide, methane,
15 and biogas, from power generation, biofuels
16 production, and other industrial processes;

17 (F) identify emerging technologies and ap-
18 proaches for carbon utilization that show prom-
19 ise for scale-up, demonstration, deployment,
20 and commercialization;

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

1 (H)(i) assess the major technical chal-
2 lenges associated with increasing the commer-
3 cial viability of carbon reuse technologies; and

4 (ii) identify the research and development
5 questions that will address the challenges de-
6 scribed in clause (i);

7 (I)(i) assess research efforts being carried
8 out as of the date of the study, including basic,
9 applied, engineering, and computational re-
10 search efforts, that are addressing the chal-
11 lenges described in subparagraph (H)(i); and

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

14 (J) develop a comprehensive research agen-
15 da that addresses long- and short-term research
16 needs and opportunities.

17 (3) DEADLINE.—Not later than 180 days after
18 the date of enactment of this Act, the National
19 Academies of Sciences, Engineering, and Medicine
20 shall submit to the Secretary of Energy a report de-
21 scribing the results of the study under paragraph
22 (1).

23 **SEC. 5. CARBON REMOVAL.**

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

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

3 **“SEC. 969A. CARBON REMOVAL.**

4 “(a) ESTABLISHMENT.—The Secretary, in coordina-
 5 tion with the heads of appropriate Federal agencies, in-
 6 cluding the Secretary of Agriculture, shall establish a re-
 7 search, development, and demonstration program (re-
 8 ferred to in this section as the ‘program’) to test, validate,
 9 or improve technologies and strategies to remove carbon
 10 dioxide from the atmosphere on a large scale.

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

13 “(1) is cross-cutting in nature; and

14 “(2) includes the coordinated participation of
 15 the Office of Fossil Energy, the Office of Science,
 16 and the Office of Energy Efficiency and Renewable
 17 Energy.

18 “(c) PROGRAM ACTIVITIES.—The program may in-
 19 clude research, development, and demonstration activities
 20 relating to—

21 “(1) direct air capture and storage technologies;

22 “(2) bioenergy with carbon capture and seques-
 23 tration;

24 “(3) enhanced geological weathering;

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 “(d) REQUIREMENTS.—In developing and identifying
5 carbon removal technologies and strategies under the pro-
6 gram, the Secretary shall consider—

7 “(1) land use changes, including impacts on
8 natural and managed ecosystems;

9 “(2) ocean acidification;

10 “(3) net greenhouse gas emissions;

11 “(4) commercial viability;

12 “(5) potential for near-term impact;

13 “(6) potential for carbon reductions on a
14 gigaton scale; and

15 “(7) economic cobenefits.

16 “(e) AIR CAPTURE TECHNOLOGY PRIZE COMPETI-
17 TION.—

18 “(1) DEFINITIONS.—In this subsection:

19 “(A) DILUTE MEDIA.—The term ‘dilute
20 media’ means media in which the concentration
21 of carbon dioxide is less than 1 percent by vol-
22 ume.

23 “(B) PRIZE COMPETITION.—The term
24 ‘prize competition’ means the competitive tech-

1 nology prize competition established under
2 paragraph (2).

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

11 “(3) REQUIREMENTS.—In carrying out this
12 subsection, the Secretary, in accordance with section
13 24 of the Stevenson-Wydler Technology Innovation
14 Act of 1980 (15 U.S.C. 3719), shall develop require-
15 ments for—

16 “(A) the prize competition process; and

17 “(B) monitoring and verification proce-
18 dures for projects selected to receive a prize
19 under the prize competition.

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

23 “(A) meet minimum performance stand-
24 ards set by the Secretary;

1 “(B) meet minimum levels set by the Sec-
2 retary for the capture of carbon dioxide from
3 dilute media; and

4 “(C) demonstrate in the application of the
5 project for a prize—

6 “(i) a design for a promising carbon
7 capture technology that will—

8 “(I) be operated on a demonstra-
9 tion scale; and

10 “(II) have the potential to
11 achieve significant reduction in the
12 level of carbon dioxide in the atmos-
13 phere;

14 “(ii) a successful bench-scale dem-
15 onstration of a carbon capture technology;
16 or

17 “(iii) an operational carbon capture
18 technology on a commercial scale.

19 “(f) INTRAAGENCY COORDINATION.—The direct air
20 capture activities carried out under subsections (c)(1) and
21 (e) shall be carried out in coordination with, and
22 leveraging lessons learned from, the coal and natural gas
23 technology program established under section 962(b)(1).

24 “(g) ACCOUNTING.—The Secretary shall collaborate
25 with the Administrator of the Environmental Protection

1 Agency and the heads of other relevant Federal agencies
 2 to develop and improve accounting frameworks and tools
 3 to accurately measure carbon removal and sequestration
 4 methods and technologies across the Federal Government.

5 “(h) AUTHORIZATION OF APPROPRIATIONS.—There
 6 are authorized to be appropriated to the Secretary to carry
 7 out this section—

8 “(1) \$45,000,000 for fiscal year 2020, of which
 9 \$15,000,000 shall be used to carry out subsection
 10 (e);

11 “(2) \$31,500,000 for fiscal year 2021;

12 “(3) \$33,075,000 for fiscal year 2022;

13 “(4) \$34,729,000 for fiscal year 2023; and

14 “(5) \$36,465,000 for fiscal year 2024.”.

15 (b) TECHNICAL AMENDMENT.—The table of contents
 16 for the Energy Policy Act of 2005 (Public Law 109–58;
 17 119 Stat. 600) (as amended by section 4(a)(2)) is amend-
 18 ed by adding at the end of the items relating to subtitle
 19 F of title IX the following:

“Sec. 969A. Carbon removal.”.

20 **SEC. 6. FOSSIL ENERGY.**

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

23 (1) in paragraph (6), by inserting “, including
 24 technology development to reduce emissions of car-
 25 bon dioxide and associated emissions of heavy metals

1 within coal combustion residues and gas streams re-
2 sulting from fossil fuel use and production” before
3 the period at the end; and

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

6 “(7) Increasing the export of emissions control
7 technologies from the United States for fossil en-
8 ergy-related equipment, technology, and services.

9 “(8) Developing carbon removal and utilization
10 technologies, products, and methods that result in
11 net reductions in greenhouse gas emissions, includ-
12 ing direct air capture and storage, and carbon use
13 and reuse for commercial application.

14 “(9) Improving the conversion, use, and storage
15 of carbon dioxide produced from fossil fuels.”.

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