

## Union Calendar No. 188

110TH CONGRESS  
1ST SESSION

# H. R. 1933

[Report No. 110-301]

To amend the Energy Policy Act of 2005 to reauthorize and improve the carbon capture and storage research, development, and demonstration program of the Department of Energy, and for other purposes.

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### IN THE HOUSE OF REPRESENTATIVES

APRIL 18, 2007

Mr. UDALL of Colorado introduced the following bill; which was referred to the Committee on Science and Technology

AUGUST 3, 2007

Additional sponsors: Mr. SALAZAR, Mr. MARSHALL, Mr. SCHIFF, Mr. GORDON, Mr. COSTELLO, Ms. MCCOLLUM of Minnesota, Mr. HARE, and Ms. EDDIE BERNICE JOHNSON of Texas

AUGUST 3, 2007

Reported with an amendment, committed to the Committee of the Whole House on the State of the Union, and ordered to be printed

[Strike out all after the enacting clause and insert the part printed in *italic*]

[For text of introduced bill, see copy of bill as introduced on April 18, 2007]

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## A BILL

To amend the Energy Policy Act of 2005 to reauthorize and improve the carbon capture and storage research, development, and demonstration program of the Department of Energy, 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 “Department of Energy*  
5 *Carbon Capture and Storage Research, Development, and*  
6 *Demonstration Act of 2007”.*

7 **SEC. 2. CARBON CAPTURE AND STORAGE RESEARCH, DE-**  
8 **VELOPMENT, AND DEMONSTRATION PRO-**  
9 **GRAM.**

10 *(a) AMENDMENTS.—Section 963 of the Energy Policy*  
11 *Act of 2005 (42 U.S.C. 16293) is amended—*

12 *(1) in the section heading, by striking “RE-*  
13 *SEARCH AND DEVELOPMENT” and inserting*  
14 *“AND STORAGE RESEARCH, DEVELOPMENT,*  
15 *AND DEMONSTRATION”;*

16 *(2) in subsection (a)—*

17 *(A) by striking “research and development”*  
18 *and inserting “and storage research, develop-*  
19 *ment, and demonstration”;* and

20 *(B) by striking “capture technologies on*  
21 *combustion-based systems” and inserting “cap-*  
22 *ture and storage technologies related to electric*  
23 *power generating systems”;*

24 *(3) in subsection (b)—*

1           (A) in paragraph (3), by striking “and” at  
2           the end;

3           (B) in paragraph (4), by striking the period  
4           at the end and inserting “; and”; and

5           (C) by adding at the end the following:

6           “(5) to expedite and carry out large-scale testing  
7           of carbon sequestration systems in a range of geologi-  
8           cal formations that will provide information on the  
9           cost and feasibility of deployment of sequestration  
10          technologies.”; and

11          (4) by striking subsection (c) and inserting the  
12          following:

13          “(c) PROGRAMMATIC ACTIVITIES.—

14                 “(1) FUNDAMENTAL SCIENCE AND ENGINEERING  
15                 RESEARCH AND DEVELOPMENT AND DEMONSTRATION  
16                 SUPPORTING CARBON CAPTURE AND STORAGE TECH-  
17                 NOLOGIES.—

18                 “(A) IN GENERAL.—The Secretary shall  
19                 carry out fundamental science and engineering  
20                 research (including laboratory-scale experiments,  
21                 numeric modeling, and simulations) to develop  
22                 and document the performance of new ap-  
23                 proaches to capture and store carbon dioxide, or  
24                 to learn how to use carbon dioxide in products

1           to lead to an overall reduction of carbon dioxide  
2           emissions.

3           “(B) *PROGRAM INTEGRATION.*—The Sec-  
4           retary shall ensure that fundamental research  
5           carried out under this paragraph is appro-  
6           priately applied to energy technology develop-  
7           ment activities and the field testing of carbon se-  
8           questration and carbon use activities, includ-  
9           ing—

10                   “(i) development of new or advanced  
11                   technologies for the capture of carbon diox-  
12                   ide;

13                   “(ii) development of new or advanced  
14                   technologies that reduce the cost and in-  
15                   crease the efficacy of the compression of car-  
16                   bon dioxide required for the storage of car-  
17                   bon dioxide;

18                   “(iii) modeling and simulation of geo-  
19                   logical sequestration field demonstrations;

20                   “(iv) quantitative assessment of risks  
21                   relating to specific field sites for testing of  
22                   sequestration technologies; and

23                   “(v) research and development of new  
24                   and advanced technologies for carbon use,

1           including recycling and reuse of carbon di-  
2           oxide.

3           “(2) *FIELD VALIDATION TESTING ACTIVITIES.*—

4           “(A) *IN GENERAL.*—*The Secretary shall*  
5           *promote, to the maximum extent practicable, re-*  
6           *gional carbon sequestration partnerships to con-*  
7           *duct geologic sequestration tests involving carbon*  
8           *dioxide injection and monitoring, mitigation,*  
9           *and verification operations in a variety of can-*  
10          *didate geological settings, including—*

11                   “(i) *operating oil and gas fields;*

12                   “(ii) *depleted oil and gas fields;*

13                   “(iii) *unmineable coal seams;*

14                   “(iv) *deep saline formations;*

15                   “(v) *deep geologic systems that may be*  
16           *used as engineered reservoirs to extract eco-*  
17           *nomical quantities of heat from geothermal*  
18           *resources of low permeability or porosity;*

19                   “(vi) *deep geologic systems containing*  
20           *basalt formations; and*

21                   “(vii) *high altitude terrain oil and gas*  
22           *fields.*

23           “(B) *OBJECTIVES.*—*The objectives of tests*  
24           *conducted under this paragraph shall be—*

1           “(i) to develop and validate geo-  
2           physical tools, analysis, and modeling to  
3           monitor, predict, and verify carbon dioxide  
4           containment;

5           “(ii) to validate modeling of geological  
6           formations;

7           “(iii) to refine storage capacity esti-  
8           mated for particular geological formations;

9           “(iv) to determine the fate of carbon  
10          dioxide concurrent with and following injec-  
11          tion into geological formations;

12          “(v) to develop and implement best  
13          practices for operations relating to, and  
14          monitoring of, injection and storage of car-  
15          bon dioxide in geologic formations;

16          “(vi) to assess and ensure the safety of  
17          operations related to geological storage of  
18          carbon dioxide;

19          “(vii) to allow the Secretary to pro-  
20          mulgate policies, procedures, requirements,  
21          and guidance to ensure that the objectives of  
22          this subparagraph are met in large-scale  
23          testing and deployment activities for carbon  
24          capture and storage that are funded by the  
25          Department of Energy; and

1                   “(viii) to support *Environmental Pro-*  
2                   *tection Agency efforts, in consultation with*  
3                   *other agencies, to develop a scientifically*  
4                   *sound regulatory framework to enable com-*  
5                   *mercial-scale sequestration operations while*  
6                   *safeguarding human health and under-*  
7                   *ground sources of drinking water.*

8                   “(3) *LARGE-SCALE CARBON DIOXIDE SEQUES-*  
9                   *TRATION TESTING.—*

10                   “(A) *IN GENERAL.—The Secretary shall*  
11                   *conduct not less than 7 initial large-volume se-*  
12                   *questration tests, not including the FutureGen*  
13                   *project, for geological containment of carbon di-*  
14                   *oxide (at least 1 of which shall be international*  
15                   *in scope) to validate information on the cost and*  
16                   *feasibility of commercial deployment of tech-*  
17                   *nologies for geological containment of carbon di-*  
18                   *oxide.*

19                   “(B) *DIVERSITY OF FORMATIONS TO BE*  
20                   *STUDIED.—In selecting formations for study*  
21                   *under this paragraph, the Secretary shall con-*  
22                   *sider a variety of geological formations across the*  
23                   *United States, and require characterization and*  
24                   *modeling of candidate formations, as determined*  
25                   *by the Secretary.*

1           “(C) *SOURCE OF CARBON DIOXIDE FOR*  
2           *LARGE-SCALE SEQUESTRATION DEMONSTRA-*  
3           *TIONS.—In the process of any acquisition of car-*  
4           *bon dioxide for sequestration demonstrations*  
5           *under subparagraph (A), the Secretary shall give*  
6           *preference to purchases of carbon dioxide from*  
7           *industrial and coal-fired electric generation fa-*  
8           *ilities. To the extent feasible, the Secretary shall*  
9           *prefer test projects from industrial and coal-fired*  
10           *electric generation facilities that would facilitate*  
11           *the creation of an integrated system of capture,*  
12           *transportation and storage of carbon dioxide.*  
13           *Until coal-fired electric generation facilities, ei-*  
14           *ther new or existing, are operating with carbon*  
15           *dioxide capture technologies, other industrial*  
16           *sources of carbon dioxide should be pursued*  
17           *under this paragraph. The preference provided*  
18           *for under this subparagraph shall not delay the*  
19           *implementation of the large-scale sequestration*  
20           *tests under this paragraph.*

21           “(D) *DEFINITION.—For purposes of this*  
22           *paragraph, the term ‘large-scale’ means the injec-*  
23           *tion of more than 1,000,000 metric tons of car-*  
24           *bon dioxide annually, or a scale that demon-*  
25           *strably exceeds the necessary thresholds in key*

1           *geologic transients to validate the ability con-*  
2           *tinuously to inject quantities on the order of sev-*  
3           *eral million metric tons of industrial carbon di-*  
4           *oxide annually for a large number of years.*

5           “(4) *LARGE-SCALE DEMONSTRATION OF CARBON*  
6           *DIOXIDE CAPTURE TECHNOLOGIES.—*

7                   “(A) *IN GENERAL.—The Secretary shall*  
8           *carry out at least 3 and no more than 5 dem-*  
9           *onstrations, that include each of the technologies*  
10          *described in subparagraph (B), for the large-*  
11          *scale capture of carbon dioxide from industrial*  
12          *sources of carbon dioxide, at least 2 of which are*  
13          *facilities that generate electric energy from fossil*  
14          *fuels. Candidate facilities for other demonstra-*  
15          *tions under this paragraph shall include facili-*  
16          *ties that refine petroleum, manufacture iron or*  
17          *steel, manufacture cement or cement clinker,*  
18          *manufacture commodity chemicals, and ethanol*  
19          *and fertilizer plants. Consideration may be given*  
20          *to capture of carbon dioxide from industrial fa-*  
21          *ilities and electric generation carbon sources*  
22          *that are near suitable geological reservoirs and*  
23          *could continue sequestration. To ensure reduced*  
24          *carbon dioxide emissions, the Secretary shall*  
25          *take necessary actions to provide for the integra-*

1           tion of the program under this paragraph with  
2           the long-term carbon dioxide sequestration dem-  
3           onstrations described in paragraph (3). These ac-  
4           tions should not delay implementation of the  
5           large-scale sequestration tests authorized in  
6           paragraph (3).

7           “(B) *TECHNOLOGIES.*—The technologies re-  
8           ferred to in subparagraph (A) are precombustion  
9           capture, post-combustion capture, and oxycom-  
10          bustion.

11          “(C) *SCOPE OF AWARD.*—An award under  
12          this paragraph shall be only for the portion of  
13          the project that carries out the large-scale cap-  
14          ture (including purification and compression) of  
15          carbon dioxide, as well as the cost of transpor-  
16          tation and injection of carbon dioxide.

17          “(5) *PREFERENCE IN PROJECT SELECTION FROM*  
18          *MERITORIOUS PROPOSALS.*—In making competitive  
19          awards under this subsection, subject to the require-  
20          ments of section 989, the Secretary shall give pref-  
21          erence to proposals from partnerships among indus-  
22          trial, academic, and government entities.

23          “(6) *COST SHARING.*—Activities under this sub-  
24          section shall be considered research and development  
25          activities that are subject to the cost-sharing require-

1        *ments of section 988(b), except that the Federal share*  
2        *of a project under paragraph (4) shall not exceed 50*  
3        *percent.*

4        *“(d) AUTHORIZATION OF APPROPRIATIONS.—*

5                *“(1) IN GENERAL.—There are authorized to be*  
6        *appropriated to the Secretary for carrying out this*  
7        *section, other than subsection (c)(3) and (4)—*

8                        *“(A) \$100,000,000 for fiscal year 2008;*

9                        *“(B) \$100,000,000 for fiscal year 2009;*

10                      *“(C) \$100,000,000 for fiscal year 2010; and*

11                      *“(D) \$100,000,000 for fiscal year 2011.*

12                *“(2) SEQUESTRATION.—There are authorized to*  
13        *be appropriated to the Secretary for carrying out sub-*  
14        *section (c)(3)—*

15                      *“(A) \$140,000,000 for fiscal year 2008;*

16                      *“(B) \$140,000,000 for fiscal year 2009;*

17                      *“(C) \$140,000,000 for fiscal year 2010; and*

18                      *“(D) \$140,000,000 for fiscal year 2011.*

19                *“(3) CARBON CAPTURE.—There are authorized to*  
20        *be appropriated to the Secretary for carrying out sub-*  
21        *section (c)(4)—*

22                      *“(A) \$180,000,000 for fiscal year 2009;*

23                      *“(B) \$180,000,000 for fiscal year 2010;*

24                      *“(C) \$180,000,000 for fiscal year 2011; and*

25                      *“(D) \$180,000,000 for fiscal year 2012.”.*

1           **(b) TABLE OF CONTENTS AMENDMENT.**—*The item re-*  
2 *lating to section 963 in the table of contents for the Energy*  
3 *Policy Act of 2005 is amended to read as follows:*

*“Sec. 963. Carbon capture and storage research, development, and demonstration program.”.*

4           **SEC. 3. REVIEW OF LARGE-SCALE PROGRAMS.**

5           *The Secretary of Energy shall enter into an arrange-*  
6 *ment with the National Academy of Sciences for an inde-*  
7 *pendent review and oversight, beginning in 2011, of the pro-*  
8 *grams under section 963(c)(3) and (4) of the Energy Policy*  
9 *Act of 2005, as added by section 2 of this Act, to ensure*  
10 *that the benefits of such programs are maximized. Not later*  
11 *than January 1, 2012, the Secretary shall transmit to the*  
12 *Congress a report on the results of such review and over-*  
13 *sight.*

14           **SEC. 4. SAFETY RESEARCH.**

15           **(a) PROGRAM.**—*The Assistant Administrator for Re-*  
16 *search and Development of the Environmental Protection*  
17 *Agency shall conduct a research program to determine pro-*  
18 *cedures necessary to protect public health, safety, and the*  
19 *environment from impacts that may be associated with cap-*  
20 *ture, injection, and sequestration of greenhouse gases in sub-*  
21 *terranean reservoirs.*

22           **(b) AUTHORIZATION OF APPROPRIATIONS.**—*There are*  
23 *authorized to be appropriated for carrying out this section*  
24 *\$5,000,000 for each fiscal year.*

1 **SEC. 5. GEOLOGICAL SEQUESTRATION TRAINING AND RE-**  
2 **SEARCH.**

3 (a) *STUDY.*—

4 (1) *IN GENERAL.*—*The Secretary of Energy shall*  
5 *enter into an arrangement with the National Acad-*  
6 *emy of Sciences to undertake a study that—*

7 (A) *defines an interdisciplinary program in*  
8 *geology, engineering, hydrology, environmental*  
9 *science, and related disciplines that will support*  
10 *the Nation's capability to capture and sequester*  
11 *carbon dioxide from anthropogenic sources;*

12 (B) *addresses undergraduate and graduate*  
13 *education, especially to help develop graduate*  
14 *level programs of research and instruction that*  
15 *lead to advanced degrees with emphasis on geo-*  
16 *logical sequestration science;*

17 (C) *develops guidelines for proposals from*  
18 *colleges and universities with substantial capa-*  
19 *bilities in the required disciplines that wish to*  
20 *implement geological sequestration science pro-*  
21 *grams that advance the Nation's capacity to ad-*  
22 *dress carbon management through geological se-*  
23 *questration science; and*

24 (D) *outlines a budget and recommendations*  
25 *for how much funding will be necessary to estab-*

1            *lish and carry out the grant program under sub-*  
2            *section (b).*

3            (2) *REPORT.*—*Not later than 1 year after the*  
4            *date of enactment of this Act, the Secretary of Energy*  
5            *shall transmit to the Congress a copy of the results of*  
6            *the study provided by the National Academy of*  
7            *Sciences under paragraph (1).*

8            (3) *AUTHORIZATION OF APPROPRIATIONS.*—  
9            *There are authorized to be appropriated to the Sec-*  
10           *retary for carrying out this subsection \$1,000,000 for*  
11           *fiscal year 2008.*

12           (b) *GRANT PROGRAM.*—

13           (1) *ESTABLISHMENT.*—*The Secretary of Energy,*  
14           *through the National Energy Technology Laboratory,*  
15           *shall establish a competitive grant program through*  
16           *which colleges and universities may apply for and re-*  
17           *ceive 4-year grants for—*

18           (A) *salary and startup costs for newly des-*  
19           *ignated faculty positions in an integrated geo-*  
20           *logical carbon sequestration science program;*  
21           *and*

22           (B) *internships for graduate students in ge-*  
23           *ological sequestration science.*

24           (2) *RENEWAL.*—*Grants under this subsection*  
25           *shall be renewable for up to 2 additional 3-year*

1 *terms, based on performance criteria, established by*  
2 *the National Academy of Sciences study conducted*  
3 *under subsection (a), that include the number of grad-*  
4 *uates of such programs.*

5 (3) *INTERFACE WITH REGIONAL GEOLOGICAL*  
6 *CARBON SEQUESTRATION PARTNERSHIPS.—To the*  
7 *greatest extent possible, geological carbon sequestra-*  
8 *tion science programs supported under this subsection*  
9 *shall interface with the research of the Regional Car-*  
10 *bon Sequestration Partnerships operated by the De-*  
11 *partment of Energy to provide internships and prac-*  
12 *tical training in carbon capture and geological se-*  
13 *questration.*

14 (4) *AUTHORIZATION OF APPROPRIATIONS.—*  
15 *There are authorized to be appropriated to the Sec-*  
16 *retary for carrying out this subsection such sums as*  
17 *may be necessary.*

18 **SEC. 6. UNIVERSITY BASED RESEARCH AND DEVELOPMENT**

19 **GRANT PROGRAM.**

20 (a) *ESTABLISHMENT.—The Secretary of Energy, in*  
21 *consultation with other appropriate agencies, shall establish*  
22 *a university based research and development program to*  
23 *study carbon capture and sequestration using the various*  
24 *types of coal.*

1           (b) *GRANTS.*—*Under this section, the Secretary shall*  
2 *award 5 grants for projects submitted by colleges or univer-*  
3 *sities to study carbon capture and sequestration in conjunc-*  
4 *tion with the recovery of oil and other enhanced elemental*  
5 *and mineral recovery. Consideration shall be given to areas*  
6 *that have regional sources of coal for the study of carbon*  
7 *capture and sequestration.*

8           (c) *RURAL AND AGRICULTURAL INSTITUTIONS.*—*The*  
9 *Secretary shall designate that at least 2 of these grants shall*  
10 *be awarded to rural or agricultural based institutions that*  
11 *offer interdisciplinary programs in the area of environ-*  
12 *mental science to study carbon capture and sequestration*  
13 *in conjunction with the recovery of oil and other enhanced*  
14 *elemental and mineral recovery.*

15           (d) *AUTHORIZATION OF APPROPRIATIONS.*—*There are*  
16 *to be authorized to be appropriated \$10,000,000 to carry*  
17 *out this section.*



Union Calendar No. 188

110<sup>TH</sup> CONGRESS  
1<sup>ST</sup> Session

**H. R. 1933**

[Report No. 110-301]

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## **A BILL**

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AUGUST 3, 2007

Reported with an amendment, committed to the Committee of the Whole House on the State of the Union, and ordered to be printed