

110TH CONGRESS
1ST SESSION

H. R. 2304

To direct the Secretary of Energy to conduct a program of research, development, demonstration, and commercial application for geothermal energy, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

MAY 14, 2007

Mr. MCNERNEY (for himself, Mr. GORDON of Tennessee, and Mr. LAMPSON) introduced the following bill; which was referred to the Committee on Science and Technology

A BILL

To direct the Secretary of Energy to conduct a program of research, development, demonstration, and commercial application for geothermal 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 “Advanced Geothermal
5 Energy Research and Development Act of 2007”.

6 **SEC. 2. FINDINGS.**

7 The Congress finds the following:

1 (1) The United States has a critical national in-
2 terest in developing clean, domestic, renewable
3 sources of energy in order to mitigate the causes of
4 climate change, reduce other environmental impacts
5 of energy production, increase national security, im-
6 prove public health, and bolster economic stability.

7 (2) Geothermal energy is a renewable energy re-
8 source.

9 (3) Geothermal energy is unusual among renew-
10 able energy sources because of its ability to provide
11 an uninterrupted supply of baseload electricity.

12 (4) Recently published assessments by rep-
13 utable experts, including the Massachusetts Institute
14 of Technology, the Western Governors Association,
15 and the National Renewable Energy Laboratory, in-
16 dicate that the Nation's geothermal resources are
17 widely distributed, vast in size, and barely tapped.

18 (5) Sustained and expanded research, develop-
19 ment, demonstration, and commercial application
20 programs are needed to locate and characterize geo-
21 thermal resources, and to develop the technologies
22 that will enable their widespread commercial devel-
23 opment.

24 (6) Federal support is critical to reduce the fi-
25 nancial risk associated with developing new geo-

1 thermal technologies, thereby encouraging the pri-
2 vate sector investment necessary to make geothermal
3 resources commercially viable as a source of electric
4 power and for other applications.

5 **SEC. 3. DEFINITIONS.**

6 For purposes of this Act:

7 (1) ENHANCED GEOTHERMAL SYSTEMS.—The
8 term “enhanced geothermal systems” means geo-
9 thermal reservoir systems that are engineered, as op-
10 posed to occurring naturally.

11 (2) GEOFLUID.—The term “geofluid” means
12 any fluid used to extract thermal energy from the
13 Earth which is transported to the surface for direct
14 use or electric power generation, except that such
15 term shall not include oil or natural gas.

16 (3) GEOTHERMAL.—The term “geothermal” re-
17 fers to heat energy stored in the Earth’s crust that
18 can be accessed for direct use or electric power gen-
19 eration.

20 (4) HYDROTHERMAL.—The term “hydro-
21 thermal” refers to naturally occurring subsurface
22 reservoirs of hot water or steam.

23 (5) SECRETARY.—The term “Secretary” means
24 the Secretary of Energy.

1 (6) SYSTEMS APPROACH.—The term “systems
2 approach” means an approach to solving problems
3 or designing systems that considers the entire sys-
4 tem, rather than a particular component of the sys-
5 tem.

6 **SEC. 4. HYDROTHERMAL RESEARCH AND DEVELOPMENT.**

7 (a) IN GENERAL.—The Secretary shall support pro-
8 grams of research, development, demonstration, and com-
9 mercial application to expand the use of geothermal en-
10 ergy production from hydrothermal systems, including the
11 programs described in subsection (b).

12 (b) PROGRAMS.—

13 (1) ADVANCED HYDROTHERMAL RESOURCE
14 TOOLS.—The Secretary, in consultation with other
15 appropriate agencies, shall support a program to de-
16 velop advanced geophysical, geochemical, and geo-
17 logic tools to assist in locating hidden hydrothermal
18 resources, and to increase the reliability of site char-
19 acterization before, during, and after initial drilling.
20 The program shall develop new prospecting tech-
21 niques to assist in prioritization of targets for char-
22 acterization. The program shall include a field com-
23 ponent.

24 (2) INDUSTRY COUPLED EXPLORATORY DRILL-
25 ING.—The Secretary shall support a program of

1 cost-shared field demonstration programs, to be pur-
2 sued, simultaneously and independently, in collabo-
3 ration with industry partners, for the demonstration
4 of technologies and techniques of exploratory drilling
5 for undiscovered resources in a variety of geologic
6 settings. The program shall include incentives to en-
7 courage the use of advanced technologies and tech-
8 niques.

9 **SEC. 5. GENERAL GEOTHERMAL SYSTEMS RESEARCH AND**
10 **DEVELOPMENT.**

11 (a) **SUBSURFACE COMPONENTS AND SYSTEMS.**—The
12 Secretary shall support a program of research, develop-
13 ment, demonstration, and commercial application of com-
14 ponents and systems capable of withstanding extreme geo-
15 thermal environments and necessary to cost-effectively de-
16 velop, produce, and monitor geothermal reservoirs and
17 produce geothermal energy. These components and sys-
18 tems shall include advanced casing systems (expandable
19 tubular casing, low-clearance casing designs, and others),
20 high-temperature cements, high-temperature submersible
21 pumps, and high-temperature packers, as well as tech-
22 nologies for under-reaming, multilateral completions,
23 high-temperature logging, and logging while drilling.

24 (b) **RESERVOIR PERFORMANCE MODELING.**—The
25 Secretary shall support a program of research, develop-

1 ment, demonstration, and commercial application of mod-
2 els of geothermal reservoir performance, with an emphasis
3 on accurately modeling performance over time. Models
4 shall be developed to assist both in the development of geo-
5 thermal reservoirs and to more accurately account for
6 stress-related effects in stimulated hydrothermal and en-
7 hanced geothermal systems production environments.

8 **SEC. 6. ENHANCED GEOTHERMAL SYSTEMS RESEARCH**
9 **AND DEVELOPMENT.**

10 (a) IN GENERAL.—The Secretary shall support a
11 program of research, development, demonstration, and
12 commercial application for enhanced geothermal systems,
13 including the programs described in subsection (b).

14 (b) PROGRAMS.—

15 (1) ENHANCED GEOTHERMAL SYSTEMS TECH-
16 NOLOGIES.—The Secretary shall support a program
17 of research, development, demonstration, and com-
18 mercial application of the technologies and knowl-
19 edge necessary for enhanced geothermal systems to
20 advance to a state of commercial readiness, includ-
21 ing advances in—

22 (A) reservoir stimulation;

23 (B) reservoir characterization, monitoring,
24 and modeling;

25 (C) stress mapping;

- 1 (D) tracer development;
2 (E) three-dimensional tomography; and
3 (F) understanding seismic effects of deep
4 drilling and reservoir engineering.

5 (2) ENHANCED GEOTHERMAL SYSTEMS RES-
6 ERVOIR STIMULATION.—

7 (A) PROGRAM.—In collaboration with in-
8 dustry partners, the Secretary shall support a
9 program of research, development, and dem-
10 onstration of enhanced geothermal systems res-
11 ervoir stimulation technologies and techniques.
12 A minimum of 5 sites shall be selected in loca-
13 tions that show particular promise for enhanced
14 geothermal systems development. Each site
15 shall—

16 (i) represent subsurface geological
17 conditions; and

18 (ii) take advantage of an existing site
19 where subsurface characterization has been
20 conducted or existing drill holes can be uti-
21 lized, if possible.

22 (B) CONSIDERATION OF EXISTING
23 SITES.—The following 2 sites, where Depart-
24 ment of Energy and industry cooperative en-
25 hanced geothermal systems projects are already

1 underway, may be considered for inclusion
2 among the sites selected under subparagraph
3 (A):

4 (i) Desert Peak, Nevada.

5 (ii) Coso, California.

6 **SEC. 7. COST SHARING.**

7 (a) **APPLICABILITY.**—In carrying out the research,
8 development, demonstration, and commercial application
9 programs under this Act, the Secretary shall require cost-
10 sharing as follows:

11 (1) **IN GENERAL.**—For the programs described
12 in sections 4(b)(1), 5(a), 5(b), and 6(b)(1), except as
13 provided in paragraph (2) of this subsection, the
14 Secretary shall require that not less than 20 percent
15 of the cost of an activity be provided by non-Federal
16 sources. For the programs described in sections
17 4(b)(2) and 6(b)(2), except as provided in paragraph
18 (2) of this subsection, the Secretary shall require
19 that not less than 50 percent of the cost of an activ-
20 ity be provided by non-Federal sources.

21 (2) **REDUCTION OF NON-FEDERAL SHARE.**—
22 The Secretary may reduce or eliminate the require-
23 ment of paragraph (1) for an activity if the Sec-
24 retary determines that the reduction is necessary
25 and appropriate.

1 (b) NON-FEDERAL CONTRIBUTIONS.—Non-Federal
2 contributions required under subsection (a)—

3 (1) may include—

4 (A) personnel costs;

5 (B) the value of a service, other resource,
6 or third party in-kind contribution; and

7 (C) indirect costs or facilities and adminis-
8 trative costs; and

9 (2) shall not include—

10 (A) revenues or royalties from the prospec-
11 tive operation of an activity beyond the dura-
12 tion of the award; or

13 (B) proceeds from the prospective sale of
14 an asset of an activity.

15 (c) REPAYMENT OF FEDERAL SHARE.—The Sec-
16 retary shall not require repayment of the Federal share
17 of a cost-shared activity under this section as a condition
18 of making an award.

19 (d) ORGANIZATION AND ADMINISTRATION OF PRO-
20 GRAMS.—Programs under this Act shall incorporate the
21 following organizational and administrative elements:

22 (1) Non-Federal participants shall be chosen
23 through a competitive selection process.

24 (2) The request for proposals for each program
25 shall stipulate, at a minimum, the following:

1 (A) The non-Federal funding requirements
2 for projects.

3 (B) The funding mechanism to be used
4 (i.e. grants, contracts, or cooperative agree-
5 ments).

6 (C) Milestones and a schedule for comple-
7 tion.

8 (D) Criteria for evaluating proposals.

9 (3) In evaluating proposals, the Secretary shall
10 give priority to proposals that draw on relevant ex-
11 pertise from industry, academia, and the national
12 laboratories, as appropriate.

13 (4) In evaluating proposals, the Secretary shall
14 consult with relevant experts from industry, aca-
15 demia, and the national laboratories, as appropriate.

16 (5) In evaluating proposals, the Secretary shall
17 give priority to proposals that demonstrate clear evi-
18 dence of employing a systems approach.

19 (6) Data collected by the Secretary as a result
20 of any project supported with funds provided under
21 this Act shall be made available to the public, except
22 to the extent that they contain information that is
23 protected from disclosure under section 552(b) of
24 title 5, United States Code.

1 **SEC. 8. CENTERS FOR GEOTHERMAL TECHNOLOGY TRANS-**
2 **FER.**

3 (a) IN GENERAL.—The Secretary shall award grants
4 to institutions of higher education (or consortia thereof)
5 to establish 2 Centers for Geothermal Technology Trans-
6 fer.

7 (b) CENTERS.—

8 (1) HYDROTHERMAL CENTER.—The purpose of
9 one Technology Transfer Center shall be to serve as
10 an information clearinghouse for the geothermal in-
11 dustry, collecting and disseminating information on
12 best practices in all areas related to developing and
13 managing hydrothermal resources, including data
14 available for disclosure as provided under section
15 7(d)(6). This Center shall be based at the institution
16 west of the Mississippi River that the Secretary con-
17 siders to be best suited to the purpose. The Center
18 shall collect and disseminate information on all sub-
19 jects germane to the development of hydrothermal
20 systems, including—

21 (A) resource location;

22 (B) reservoir characterization, monitoring,
23 and modeling;

24 (C) drilling techniques; and

25 (D) reservoir management techniques.

1 (2) ENHANCED GEOTHERMAL SYSTEMS CEN-
2 TER.—The purpose of a second Technology Transfer
3 Center shall be to serve as an information clearing-
4 house for the geothermal industry, collecting and
5 disseminating information on best practices in all
6 areas related to developing and managing enhanced
7 geothermal systems resources, including data avail-
8 able for disclosure as provided under section 7(d)(6).
9 This Center shall be based at an academic institu-
10 tion east of the Mississippi River which, in the opin-
11 ion of the Secretary is best suited to provide na-
12 tional leadership on enhanced geothermal systems-
13 related issues.

14 (c) AWARD DURATION.—An award made by the Sec-
15 retary under this section shall be for an initial period of
16 5 years, and may be renewed for additional 5-year periods
17 on the basis of—

18 (1) satisfactory performance in meeting the
19 goals of the research plan proposed by the Center;
20 and

21 (2) other requirements as specified by the Sec-
22 retary.

1 **SEC. 9. STUDY ON ADVANCED USES OF GEOTHERMAL EN-**
2 **ERGY.**

3 Not later than 1 year, 3 years, and 5 years, after
4 the date of enactment of this Act, the Secretary shall re-
5 port to the Committee on Science and Technology of the
6 House of Representatives and the Committee on Energy
7 and Natural Resources of the Senate on advanced con-
8 cepts and technologies to maximize the geothermal re-
9 source potential of the United States. The reports shall
10 include—

11 (1) the use of carbon dioxide as an alternative
12 geofluid with potential carbon sequestration benefits;

13 (2) mineral recovery from geofluids;

14 (3) use of geothermal energy to produce hydro-
15 gen;

16 (4) use of geothermal energy to produce
17 biofuels;

18 (5) use of geothermal heat for oil recovery from
19 oil shales and tar sands;

20 (6) coproduction of geofluids for direct use or
21 electric power generation in conjunction with exist-
22 ing oil and gas extraction operations; and

23 (7) other advanced geothermal technologies, in-
24 cluding advanced drilling technologies and advanced
25 power conversion technologies.

1 **SEC. 10. AUTHORIZATION OF APPROPRIATIONS.**

2 There are authorized to be appropriated to the Sec-
3 retary to carry out this Act \$80,000,000 for each of the
4 fiscal years 2008 through 2012.

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