

(B) increase recovery rates of the targeted mineral commodity;

(C) decrease water use and other environmental impacts, as determined by the Secretary; and

(D) demonstrate a path to commercial viability.

(f) Flexible operations

The Secretary shall support a research initiative on flexible operation of geothermal power plants.

(g) Integrated energy systems

The Secretary shall identify opportunities for joint research, development, and demonstration programs between geothermal systems and other energy generation or storage systems.

(h) Drilling data repository

(1) In general

The Secretary shall, in consultation with the Secretary of the Interior, establish and operate a voluntary, industry-wide repository of geothermal drilling information to lower the cost of future geothermal drilling.

(2) Repository

(A) In general

In carrying out paragraph (1), the Secretary shall collaborate with countries utilizing a significant amount of geothermal energy, as determined by the Secretary.

(B) Data system

The repository established under paragraph (1) shall be integrated with the National Geothermal Data System.

(Pub. L. 110-140, title VI, §614, Dec. 19, 2007, 121 Stat. 1680; Pub. L. 116-260, div. Z, title III, §3002(c), Dec. 27, 2020, 134 Stat. 2488.)

Editorial Notes

AMENDMENTS

2020—Pub. L. 116-260 amended section generally. Prior to amendment, section related to general geothermal systems research and development.

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE

Section effective on the date that is 1 day after Dec. 19, 2007, see section 1601 of Pub. L. 110-140, set out as a note under section 1824 of Title 2, The Congress.

§ 17194. Enhanced geothermal systems research and development

(a) In general

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

(b) Enhanced geothermal systems technologies

In collaboration with industry partners, institutions of higher education, and the national laboratories, the Secretary shall support a program of research, development, demonstration, and commercial application of the technologies to achieve higher efficiency and lower cost enhanced geothermal systems, including—

- (1) reservoir stimulation;
- (2) drilled, non-stimulated (e.g. closed-loop) reservoir technologies;
- (3) reservoir characterization, monitoring, and modeling and understanding of the surface area and volume of fractures;
- (4) stress and fracture mapping including real time monitoring and modeling;
- (5) tracer development;
- (6) three and four-dimensional seismic imaging and tomography;
- (7) well placement and orientation;
- (8) long-term reservoir management;
- (9) drilling technologies, methods, and tools;
- (10) improved exploration tools;
- (11) zonal isolation; and
- (12) understanding induced seismicity risks from reservoir engineering and stimulation.

(c) Frontier observatory for research in geothermal energy

(1) In general

The Secretary shall support the establishment and construction of up to 3 field research sites, which shall each be known as a “Frontier Observatory for Research in Geothermal Energy” or “FORGE” site to develop, test, and enhance techniques and tools for enhanced geothermal energy.

(2) Duties

The Secretary shall—

(A) provide financial assistance in support of research and development projects focused on advanced monitoring technologies, new technologies and approaches for implementing multi-zone stimulations, nonstimulation techniques, and dynamic reservoir modeling that incorporates all available high-fidelity characterization data; and

(B) seek opportunities to coordinate efforts and share information with domestic and international partners engaged in research and development of geothermal systems and related technology, including coordination between FORGE sites.

(3) Site selection

Of the FORGE sites referred to in paragraph (1), the Secretary shall—

(A) consider applications through a competitive, merit-reviewed process, from National Laboratories, multi-institutional collaborations, institutes of higher education and other appropriate entities best suited to provide national leadership on geothermal related issues and perform the duties enumerated under this subsection;

(B) prioritize existing field sites and facilities with capabilities relevant to the duties enumerated under this subsection;

(C) determine the mission need for and potential location of subsequent FORGE sites following the completion of construction and one year of operation of two FORGE sites; and

(D) ensure geologic diversity among FORGE sites when developing subsequent sites, to the maximum extent practicable.

(4) Existing forge sites

A FORGE site already in existence on December 27, 2020, may continue to receive support.

(5) Site operation**(A) Initial duration**

FORGE sites selected under paragraph (3) shall operate for an initial term of not more than 7 years after the date on which site operation begins.

(B) Performance metrics

The Secretary shall establish performance metrics for each FORGE site supported under this paragraph, which may be used by the Secretary to determine whether a FORGE site should continue to receive funding.

(6) Additional terms**(A) In general**

At the end of an operational term described in subparagraph (B), a FORGE site may—

- (i) be transferred to other public or private entities for further enhanced geothermal testing; or
- (ii) subject to appropriations and a merit review by the Secretary, operate for an additional term of not more than 7 years.

(B) Operational term described

An operational term referred to in subparagraph (A)—

- (i) in the case of an existing FORGE site, is the existing operational term; and
- (ii) in the case of new FORGE sites selected under paragraph (3), is the initial term under paragraph (5)(A) or an additional term under subparagraph (A)(ii) of this paragraph.

(7) Funding**(A) In general**

Out of funds authorized to be appropriated under section 17202 of this title, there shall be made available to the Secretary to carry out the FORGE activities under this paragraph—

- (i) \$45,000,000 for fiscal year 2021;
- (ii) \$55,000,000 for fiscal year 2022;
- (iii) \$65,000,000 for fiscal year 2023;
- (iv) \$70,000,000 for fiscal year 2024; and
- (v) \$70,000,000 for fiscal year 2025.

(B) Considerations

In carrying out this subsection, the Secretary shall consider the balance between funds dedicated to construction and operations and research activities to reflect the state of site development.

(d) Enhanced geothermal systems demonstrations**(1) In general**

Beginning on December 27, 2020, the Secretary, in collaboration with industry partners, institutions of higher education, and the national laboratories, shall support an initiative for demonstration of enhanced geothermal systems for power production or direct use.

(2) Projects**(A) In general**

Under the initiative described in paragraph (1), 4 demonstration projects shall be

carried out in locations that are potentially commercially viable for enhanced geothermal systems development, while also considering environmental impacts to the maximum extent practicable, as determined by the Secretary.

(B) Requirements

Demonstration projects under subparagraph (A) shall—

(i) collectively demonstrate—

(I) different geologic settings, such as hot sedimentary aquifers, layered geologic systems, supercritical systems, and basement rock systems; and

(II) a variety of development techniques, including open hole and cased hole completions, differing well orientations, and stimulation and nonstimulation mechanisms; and

- (ii) to the extent practicable, use existing sites where subsurface characterization or geothermal energy integration analysis has been conducted.

(C) Eastern demonstration

Not fewer than 1 of the demonstration projects carried out under subparagraph (A) shall be located an area east of the Mississippi River that is suitable for enhanced geothermal demonstration for power, heat, or a combination of power and heat.

(D) Milestone-based demonstration projects

The Secretary may carry out demonstration projects under this subsection as a milestone-based demonstration project under section 7256c of this title.

(3) Funding

Out of funds authorized to be appropriated under section 17202 of this title, there shall be made available to the Secretary to carry out the demonstration activities under this subsection \$21,000,000 for each of fiscal years 2021 through 2025.

(Pub. L. 110-140, title VI, §615, Dec. 19, 2007, 121 Stat. 1680; Pub. L. 116-260, div. Z, title III, §3002(d), Dec. 27, 2020, 134 Stat. 2489.)

Editorial Notes

REFERENCES IN TEXT

December 27, 2020, referred to in subsecs. (c)(4) and (d)(1), was in the original “the date of enactment of this Act” and “the date of enactment of this section”, respectively, and were translated as meaning the date of enactment of Pub. L. 116-260, which was approved Dec. 27, 2020.

AMENDMENTS

2020—Pub. L. 116-260 amended section generally. Prior to amendment, section related to enhanced geothermal systems research and development.

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE

Section effective on the date that is 1 day after Dec. 19, 2007, see section 1601 of Pub. L. 110-140, set out as a note under section 1824 of Title 2, The Congress.

§ 17195. Geothermal energy production from oil and gas fields and recovery and production of geopressured gas resources

(a) In general

The Secretary shall establish a program of research, development, demonstration, and commercial application to support development of geothermal energy production from oil and gas fields and production and recovery of energy, including electricity, from geopressured resources. In addition, the Secretary shall conduct such supporting activities including research, resource characterization, and technology development as necessary.

(b) Geothermal energy production from oil and gas fields

The Secretary shall implement a grant program in support of geothermal energy production from oil and gas fields. The program shall include grants for a total of not less than three demonstration projects of the use of geothermal techniques such as advanced organic rankine cycle systems at marginal, unproductive, and productive oil and gas wells. The Secretary shall, to the extent practicable and in the public interest, make awards that—

- (1) include not less than five oil or gas well sites per project award;
- (2) use a range of oil or gas well hot water source temperatures from 150 degrees Fahrenheit to 300 degrees Fahrenheit;
- (3) cover a range of sizes up to one megawatt;
- (4) are located at a range of sites;
- (5) can be replicated at a wide range of sites;
- (6) facilitate identification of optimum techniques among competing alternatives;
- (7) include business commercialization plans that have the potential for production of equipment at high volumes and operation and support at a large number of sites; and
- (8) satisfy other criteria that the Secretary determines are necessary to carry out the program and collect necessary data and information.

The Secretary shall give preference to assessments that address multiple elements contained in paragraphs (1) through (8).

(c) Grant awards

Each grant award for demonstration of geothermal technology such as advanced organic rankine cycle systems at oil and gas wells made by the Secretary under subsection (b) shall include—

- (1) necessary and appropriate site engineering study;
- (2) detailed economic assessment of site specific conditions;
- (3) appropriate feasibility studies to determine whether the demonstration can be replicated;
- (4) design or adaptation of existing technology for site specific circumstances or conditions;
- (5) installation of equipment, service, and support;
- (6) operation for a minimum of 1 year and monitoring for the duration of the demonstration; and

(7) validation of technical and economic assumptions and documentation of lessons learned.

(d) Geopressured gas resource recovery and production

(1) The Secretary shall implement a program to support the research, development, demonstration, and commercial application of cost-effective techniques to produce energy from geopressured resources.

(2) The Secretary shall solicit preliminary engineering designs for geopressured resources production and recovery facilities.

(3) Based upon a review of the preliminary designs, the Secretary shall award grants, which may be cost-shared, to support the detailed development and completion of engineering, architectural and technical plans needed to support construction of new designs.

(4) Based upon a review of the final design plans above, the Secretary shall award cost-shared development and construction grants for demonstration geopressured production facilities that show potential for economic recovery of the heat, kinetic energy and gas resources from geopressured resources.

(e) Competitive grant selection

Not less than 90 days after December 19, 2007, the Secretary shall conduct a national solicitation for applications for grants under the programs outlined in subsections (b) and (d). Grant recipients shall be selected on a competitive basis based on criteria in the respective subsection.

(f) Well drilling

No funds may be used under this section for the purpose of drilling new wells.

(Pub. L. 110-140, title VI, §616, Dec. 19, 2007, 121 Stat. 1681.)

Statutory Notes and Related Subsidiaries

EFFECTIVE DATE

Section effective on the date that is 1 day after Dec. 19, 2007, see section 1601 of Pub. L. 110-140, set out as a note under section 1824 of Title 2, The Congress.

§ 17195a. Geothermal heat pumps and direct use research and development

(a) Purposes

The purposes of this section are—

(1) to improve the understanding of related earth sciences, components, processes, and systems used for geothermal heat pumps and the direct use of geothermal energy; and

(2) to increase the energy efficiency, lower the cost, increase the use, and improve and demonstrate the effectiveness of geothermal heat pumps and the direct use of geothermal energy.

(b) Definitions

In this section:

(1) Direct use of geothermal energy

The term “direct use of geothermal energy” means geothermal systems that use water directly or through a heat exchanger to provide—