

116TH CONGRESS
1ST SESSION

S. _____

To support innovation in advanced geothermal research and development,
and for other purposes.

IN THE SENATE OF THE UNITED STATES

_____ introduced the following bill; which was read twice
and referred to the Committee on _____

A BILL

To support innovation in advanced geothermal research and
development, 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 Innovation Leadership Act of 2019” or the “AGILE Act
6 of 2019”.

7 **SEC. 2. UPDATE TO GEOTHERMAL RESOURCE ASSESSMENT.**

8 Section 2501 of the Energy Policy Act of 1992 (30
9 U.S.C. 1028) is amended—

1 (1) by redesignating subsections (a) and (b) as
2 subsections (b) and (d), respectively;

3 (2) by inserting before subsection (b) (as so re-
4 designated) the following:

5 “(a) DEFINITION OF ENHANCED GEOTHERMAL SYS-
6 TEMS.—In this section, the term ‘enhanced geothermal
7 systems’ has the meaning given the term in section 612
8 of the Energy Independence and Security Act of 2007 (42
9 U.S.C. 17191).”;

10 (3) by inserting after subsection (b) (as so re-
11 designated) the following:

12 “(c) UPDATE TO GEOTHERMAL RESOURCE ASSESS-
13 MENT.—The Secretary of the Interior, acting through the
14 United States Geological Survey, and in consultation with
15 the Secretary of Energy, shall update the United States
16 geothermal resource assessment carried out by the United
17 States Geological Survey, including by focusing on—

18 “(1) with respect to areas previously identified
19 by the Department of Energy or the United States
20 Geological Survey as having significant potential for
21 hydrothermal energy or enhanced geothermal sys-
22 tems energy—

23 “(A) improving the resolution of resource
24 potential at systematic temperatures and
25 depths, including temperatures and depths ap-

1 appropriate for power generation and direct use
2 applications;

3 “(B) quantifying the total potential to co-
4 produce geothermal energy and minerals;

5 “(C) incorporating data relevant to under-
6 ground thermal energy storage and exchange,
7 such as aquifer and soil properties; and

8 “(D) producing high resolution maps, in-
9 cluding—

10 “(i) maps that indicate key subsurface
11 parameters for electric and direct use re-
12 sources; and

13 “(ii) risk maps for induced seismicity
14 based on geologic, geographic, and oper-
15 ational parameters; and

16 “(2) to the maximum extent practicable, ex-
17 panding geothermal assessments, including enhanced
18 geothermal systems assessments, to include assess-
19 ments for the Commonwealth of Puerto Rico and the
20 States of Alaska and Hawaii.”; and

21 (4) in subsection (d) (as so redesignated), by
22 striking “necessary” and inserting “necessary”.

1 **SEC. 3. GENERAL GEOTHERMAL RESEARCH AND DEVELOP-**
2 **MENT PROGRAMS.**

3 Section 614 of the Energy Independence and Security
4 Act of 2007 (42 U.S.C. 17193) is amended by adding at
5 the end the following:

6 “(d) OIL AND GAS TECHNOLOGY TRANSFER INITIA-
7 TIVE.—

8 “(1) IN GENERAL.—The Secretary shall sup-
9 port an initiative among the Office of Fossil Energy,
10 the Office of Energy Efficiency and Renewable En-
11 ergy, and the private sector to modify, improve, and
12 demonstrate the use in geothermal energy develop-
13 ment of relevant advanced technologies and oper-
14 ation techniques used in the oil and gas sector.

15 “(2) PRIORITIES.—In carrying out paragraph
16 (1), the Secretary shall prioritize technologies with
17 the greatest potential to significantly increase the
18 use and lower the cost of geothermal energy in the
19 United States, including the cost and speed of geo-
20 thermal drilling.

21 “(e) SECONDARY USE SUBPROGRAM.—

22 “(1) IN GENERAL.—The Secretary shall sup-
23 port within the Geothermal Technologies Office a
24 program of research, development, and demonstra-
25 tion in the secondary use of geothermal energy other

1 than for electricity, direct use, or geothermal ex-
2 change heat pumps.

3 “(2) PROGRAM AREAS.—The program under
4 paragraph (1) shall include the following areas:

5 “(A) Minerals recovery, including lithium,
6 silica, and rare earth elements.

7 “(B) Geothermal-powered desalination.

8 “(C) Industrial applications of geothermal
9 energy.

10 “(D) The use of geothermal energy as a
11 grid management resource or seasonal energy
12 storage.

13 “(E) Other cost competitive secondary uses
14 of geothermal energy, as determined by the Sec-
15 retary.

16 “(F) Systems that utilize a combination of
17 the techniques and uses described in subpara-
18 graphs (A) through (E) with geothermal heat
19 or power.

20 “(3) COPRODUCTION OF GEOTHERMAL ENERGY
21 AND MINERALS PRODUCTION PRIZE COMPETITION.—

22 “(A) IN GENERAL.—The Secretary shall
23 carry out a prize competition under which the
24 Secretary shall award prizes to demonstrate the
25 coproduction of critical minerals (as defined by

1 the Secretary of the Interior on the date of en-
2 actment of the AGILE Act of 2019) from geo-
3 thermal resources.

4 “(B) REQUIREMENTS.—A demonstration
5 awarded a prize under subparagraph (A)
6 shall—

7 “(i) improve the cost-effectiveness of
8 removing minerals from geothermal brines
9 as part of the coproduction process;

10 “(ii) increase recovery rates of the
11 targeted mineral commodity;

12 “(iii) decrease water use and other en-
13 vironmental impacts, as determined by the
14 Secretary; and

15 “(iv) demonstrate a path to commer-
16 cial viability.

17 “(C) MAXIMUM PRIZE AMOUNT.—The
18 maximum amount of a prize awarded under
19 subparagraph (A) shall be \$10,000,000.

20 “(D) AUTHORIZATION OF APPROPRIA-
21 TIONS.—There is authorized to be appropriated
22 to the Secretary to carry out this paragraph
23 \$5,000,000 for each of fiscal years 2020
24 through 2023.”.

1 **SEC. 4. MODIFYING THE DEFINITION OF RENEWABLE EN-**
2 **ERGY TO INCLUDE THERMAL ENERGY.**

3 (a) IN GENERAL.—Section 203 of the Energy Policy
4 Act of 2005 (42 U.S.C. 15852) is amended—

5 (1) in subsection (b)—

6 (A) by redesignating paragraph (2) as
7 paragraph (3);

8 (B) by inserting after paragraph (1) the
9 following:

10 “(2) QUALIFIED WASTE HEAT RESOURCE.—The
11 term ‘qualified waste heat resource’ means—

12 “(A) exhaust heat or flared gas from any
13 industrial process;

14 “(B) waste gas or industrial tail gas that
15 would otherwise be flared, incinerated, or vent-
16 ed;

17 “(C) a pressure drop in any gas as part of
18 an industrial or commercial process; or

19 “(D) such other forms of waste heat as the
20 Secretary determines appropriate.”; and

21 (C) in paragraph (3) (as so redesign-
22 ated)—

23 (i) by striking “generated from” and
24 inserting “produced from, or, in the case
25 of thermal energy resulting from a thermal
26 energy project placed in service after De-

1 cember 31, 2018, thermal energy gen-
2 erated from, or avoided by,”; and

3 (ii) by inserting “qualified waste heat
4 resource,” before “or new”; and

5 (2) in subsection (c)—

6 (A) by redesignating paragraphs (1)
7 through (3) as subparagraphs (A) through (C),
8 respectively, and indenting appropriately;

9 (B) in the matter preceding subparagraph
10 (A) (as so redesignated), by striking “For pur-
11 poses” and inserting the following:

12 “(1) IN GENERAL.—For purposes”; and

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

14 “(2) SEPARATE CALCULATION.—

15 “(A) IN GENERAL.—For purposes of deter-
16 mining compliance with the requirement of this
17 section, any energy consumption that is avoided
18 through the use of renewable energy shall be
19 considered to be renewable energy produced.

20 “(B) DENIAL OF DOUBLE BENEFIT.—

21 Avoided energy consumption that is considered
22 to be renewable energy produced under sub-
23 paragraph (A) shall not also be counted for
24 purposes of achieving compliance with another
25 Federal energy efficiency goal.”.

1 (b) CONFORMING AMENDMENT.—Section 2410q(a)
2 of title 10, United States Code, is amended by striking
3 “section 203(b)(2) of the Energy Policy Act of 2005 (42
4 U.S.C. 15852(b)(2))” and inserting “section 203(b) of the
5 Energy Policy Act of 2005 (42 U.S.C. 15852(b))”.

6 **SEC. 5. ENHANCED GEOTHERMAL RESEARCH AND DEVEL-**
7 **OPMENT.**

8 (a) DEFINITION OF ENGINEERED.—Section 612(1)
9 of the Energy Independence and Security Act of 2007 (42
10 U.S.C. 17191(1)) is amended in the matter preceding sub-
11 paragraph (A) by striking “subjected to intervention, in-
12 cluding intervention” and inserting “designed to access
13 subsurface heat, including nonstimulation technologies,”.

14 (b) PROGRAMS.—Section 615(b) of the Energy Inde-
15 pendence and Security Act of 2007 (42 U.S.C. 17194(b))
16 is amended—

17 (1) in paragraph (1)—

18 (A) in subparagraph (C), by striking
19 “mapping” and inserting “and fracture map-
20 ping, including real-time modeling”;

21 (B) in subparagraph (E), by striking
22 “and” at the end;

23 (C) by redesignating subparagraph (F) as
24 subparagraph (K); and

1 (D) by inserting after subparagraph (E)
2 the following:

3 “(F) well placement and orientation;

4 “(G) long-term reservoir management;

5 “(H) drilling technologies, methods, and
6 tools;

7 “(I) improved exploration tools;

8 “(J) zonal isolation; and”; and

9 (2) by striking paragraph (2) and inserting the
10 following:

11 “(2) FRONTIER OBSERVATORIES FOR RE-
12 SEARCH IN GEOTHERMAL ENERGY.—

13 “(A) PROGRAM.—The Secretary shall sup-
14 port 2 field research sites operated by public or
15 academic entities, which shall each be known as
16 a ‘Frontier Observatory for Research in Geo-
17 thermal Energy’ or ‘FORGE’ site, to develop,
18 test, and enhance techniques and tools for en-
19 hanced geothermal energy.

20 “(B) SITE SELECTION.—Of the FORGE
21 sites referred to in subparagraph (A)—

22 “(i) 1 shall be the existing research
23 site in Milford, Utah; and

1 “(ii) 1 shall be selected by the Sec-
2 retary through a competitive selection
3 process.

4 “(C) SITE DURATION.—The FORGE site
5 selected under subparagraph (B)(ii) shall oper-
6 ate for an initial term of not more than 7 years
7 after the date on which site preparation is com-
8 plete.

9 “(D) ADDITIONAL TERMS.—

10 “(i) IN GENERAL.—At the end of an
11 operational term described in clause (ii), a
12 FORGE site may—

13 “(I) be transferred to the private
14 sector for further enhanced geo-
15 thermal testing; or

16 “(II) subject to appropriations
17 and a merit review by the Secretary,
18 operate for an additional term of not
19 more than 7 years.

20 “(ii) OPERATIONAL TERM DE-
21 SCRIBED.—An operational term referred to
22 in clause (i)—

23 “(I) in the case of the FORGE
24 site designated under subparagraph

1 (B)(i), is the existing operational
2 term; and

3 “(II) in the case of the FORGE
4 site selected under subparagraph
5 (B)(ii), is the initial term under sub-
6 paragraph (C) or an additional term
7 under clause (i)(II).

8 “(3) ENHANCED GEOTHERMAL SYSTEMS DEM-
9 ONSTRATIONS.—

10 “(A) IN GENERAL.—Beginning on the date
11 of enactment of the AGILE Act of 2019, the
12 Secretary, in collaboration with industry part-
13 ners and institutions of higher education, shall
14 support an initiative for demonstration of en-
15 hanced geothermal systems for power produc-
16 tion or direct use.

17 “(B) PROJECTS.—

18 “(i) IN GENERAL.—Under the initia-
19 tive described in subparagraph (A), not
20 less than 4 demonstration projects shall be
21 carried out in locations that are commer-
22 cially viable for enhanced geothermal sys-
23 tems development, as determined by the
24 Secretary.

1 “(ii) REQUIREMENTS.—Demonstra-
2 tion projects under clause (i) shall—

3 “(I) collectively demonstrate—

4 “(aa) different geologic set-
5 tings, such as hot sedimentary
6 aquifers, layered geologic sys-
7 tems, supercritical systems, and
8 basement rock systems; and

9 “(bb) a variety of develop-
10 ment techniques, including open
11 hole and cased hole completions,
12 differing well orientations, and
13 stimulation mechanisms;

14 “(II) to the extent practicable,
15 use existing sites where subsurface
16 characterization or geothermal energy
17 integration analysis has been con-
18 ducted; and

19 “(III) each be carried out in ac-
20 cordance with section 988 of the En-
21 ergy Policy Act of 2005 (42 U.S.C.
22 16352).

23 “(iii) EASTERN DEMONSTRATION.—
24 Not less than 1 demonstration project
25 under clause (i) shall be located in an area

1 east of the Mississippi River that is suit-
2 able for enhanced geothermal demonstra-
3 tion for power, heat, or a combination of
4 power and heat.

5 “(C) OPTIONAL PROGRAM STRUCTURE.—

6 “(i) IN GENERAL.—The Secretary
7 may, pursuant to section 646(g) of the De-
8 partment of Energy Organization Act (42
9 U.S.C. 7256(g)), structure the initiative
10 described in subparagraph (A) as a cost
11 share milestone-based payment initiative
12 (similar to the National Aeronautics and
13 Space Administration Commercial Orbital
14 Transportation Services program).

15 “(ii) REQUIREMENTS.—If the Sec-
16 retary elects to carry out clause (i), the
17 Secretary shall—

18 “(I) request proposals from eligi-
19 ble entities, as determined by the Sec-
20 retary, that include—

21 “(aa) a business plan;

22 “(bb) technical details; and

23 “(cc) proposed milestones
24 and associated payments; and

25 “(II) select projects—

1 “(aa) based on the dem-
2 onstrated ability of the eligible
3 entity to meet the milestones and
4 associated payments described in
5 the proposal of that eligible enti-
6 ty; and

7 “(bb) that have the greatest
8 potential commercial applica-
9 bility.”.

10 **SEC. 6. AUTHORIZATION OF APPROPRIATIONS.**

11 Section 623 of the Energy Independence and Security
12 Act of 2007 (42 U.S.C. 17202) is amended by striking
13 “\$90,000,000” in the first sentence and all that follows
14 through the period at the end of the second sentence and
15 inserting “\$150,000,000 for each of fiscal years 2020
16 through 2024.”.

17 **SEC. 7. REAUTHORIZATION OF HIGH COST REGION GEO-**
18 **THERMAL ENERGY GRANT PROGRAM.**

19 Section 625 of the Energy Independence and Security
20 Act of 2007 (42 U.S.C. 17204) is amended—

21 (1) in subsection (a)(2), by inserting “or heat”
22 after “electrical power”; and

23 (2) by striking subsection (e) and inserting the
24 following:

1 “(e) AUTHORIZATION OF APPROPRIATIONS.—There
2 is authorized to be appropriated to carry out this section
3 \$5,000,000 for each of fiscal years 2020 through 2024.”.

4 **SEC. 8. PROGRAM TO IMPROVE FEDERAL GEOTHERMAL**
5 **PERMIT COORDINATION.**

6 (a) DEFINITIONS.—In this section:

7 (1) PROGRAM.—The term “Program” means
8 the Geothermal Energy Permitting Coordination
9 Program established under subsection (b).

10 (2) SECRETARY.—The term “Secretary” means
11 the Secretary of the Interior.

12 (b) ESTABLISHMENT OF PROGRAM.—Not later than
13 90 days after the date of enactment of this Act, the Sec-
14 retary shall establish a program, to be known as the “Geo-
15 thermal Energy Permitting Coordination Program”, to
16 improve Federal permit coordination and reduce regu-
17 latory timelines with respect to geothermal energy projects
18 on Federal land by increasing the expertise of officials ad-
19 ministering and approving permits.

20 (c) ESTABLISHMENT OF PROGRAM OFFICES.—To
21 carry out the Program, the Secretary shall establish 1 or
22 more Program offices at State or district offices of the
23 Department of the Interior.

24 (d) MEMORANDUM OF UNDERSTANDING.—

1 (1) IN GENERAL.—Not later than 90 days after
2 the date of enactment of this Act, the Secretary
3 shall enter into a memorandum of understanding for
4 purposes of this section with—

5 (A) the Secretary of Agriculture;

6 (B) the Administrator of the Environ-
7 mental Protection Agency; and

8 (C) the Secretary of Defense.

9 (2) STATE PARTICIPATION.—The Secretary
10 may request that the Governor of any State be a sig-
11 natory to the memorandum of understanding under
12 paragraph (1).

13 (e) DESIGNATION OF QUALIFIED STAFF.—

14 (1) IN GENERAL.—Not later than 30 days after
15 the date on which the memorandum of under-
16 standing under subsection (d) is executed, all Fed-
17 eral signatories, as appropriate, shall assign to each
18 Program office established under subsection (c) 1 or
19 more employees who have expertise in the regulatory
20 issues relating to the office or agency in which the
21 employee is employed, including, as applicable, par-
22 ticular expertise in—

23 (A) consultation regarding, and prepara-
24 tion of, biological opinions under section 7 of

1 the Endangered Species Act of 1973 (16 U.S.C.
2 1536);

3 (B) permits under section 404 of the Fed-
4 eral Water Pollution Control Act (33 U.S.C.
5 1344);

6 (C) regulatory matters under the Clean Air
7 Act (42 U.S.C. 7401 et seq.);

8 (D) the Federal Land Policy and Manage-
9 ment Act of 1976 (43 U.S.C. 1701 et seq.);

10 (E) planning under section 14 of the Na-
11 tional Forest Management Act of 1976 (16
12 U.S.C. 472a);

13 (F) developing geothermal resources under
14 the Geothermal Steam Act of 1970 (30 U.S.C.
15 1001 et seq.); and

16 (G) the preparation of analyses under the
17 National Environmental Policy Act of 1969 (42
18 U.S.C. 4321 et seq.).

19 (2) DUTIES.—Each employee assigned under
20 paragraph (1) shall—

21 (A) not later than 90 days after the date
22 on which the employee is assigned, report to the
23 State Director of the Bureau of Land Manage-
24 ment for the State in which the office to which
25 the employee is assigned is located;

1 (B) be responsible for all issues relating to
2 the jurisdiction of the home office or agency of
3 the employee; and

4 (C) participate as part of the team of per-
5 sonnel working on proposed energy projects,
6 planning, and environmental analyses.

7 (f) **ADDITIONAL PERSONNEL.**—The Secretary shall
8 assign to each Program office any additional personnel
9 that are necessary to ensure the effective implementation
10 of—

11 (1) the Program; and

12 (2) any program administered by the Program
13 office, including inspection and enforcement relating
14 to energy development on Federal land, in accord-
15 ance with the multiple use mandate of the Federal
16 Land Policy and Management Act of 1976 (43
17 U.S.C. 1701 et seq.).

18 (g) **TRANSFER OF FUNDS.**—To facilitate the coordi-
19 nation and processing of geothermal permits on Federal
20 land under the administration of a Program office, the
21 Secretary may authorize the expenditure or transfer of
22 any funds that are necessary to—

23 (1) the United States Fish and Wildlife Service;

24 (2) the Bureau of Indian Affairs;

25 (3) the Forest Service;

- 1 (4) the Environmental Protection Agency;
2 (5) the Corps of Engineers;
3 (6) the Department of Defense; or
4 (7) any State in which a geothermal project is
5 located.

6 (h) REPORTS.—Not later than 3 years after the date
7 of enactment of this Act, the Secretary shall submit to
8 Congress a report that describes—

- 9 (1) the progress of the Program; and
10 (2) any problems relating to leasing, permitting,
11 or siting with respect to geothermal energy develop-
12 ment on Federal land.

13 (i) SAVINGS CLAUSE.—Nothing in this section af-
14 fects—

- 15 (1) the operation of any Federal or State law;
16 or
17 (2) any delegation of authority made by the
18 head of a Federal agency any employee of which is
19 participating in the Program.