

117TH CONGRESS
1ST SESSION

S. _____

To require the Secretary of Energy to establish a research, development, demonstration, and deployment program to improve the efficiency, increase the durability, and reduce the cost of producing hydrogen using electrolyzers, and for other purposes.

IN THE SENATE OF THE UNITED STATES

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

A BILL

To require the Secretary of Energy to establish a research, development, demonstration, and deployment program to improve the efficiency, increase the durability, and reduce the cost of producing hydrogen using electrolyzers, 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 “Advancing the Clean
5 Hydrogen Future Act of 2021”.

6 **SEC. 2. PURPOSES.**

7 The purposes of this Act are—

1 (1) to enhance the leadership role of the United
2 States in the widespread use of renewable energy
3 and clean energy technologies;

4 (2) to reduce greenhouse emissions in the
5 United States by increasing the supply of economical
6 hydrogen for use in transportation, industrial, and
7 power-generation applications;

8 (3) to support existing electrolyzer research, de-
9 velopment, and demonstration efforts of the Depart-
10 ment, including the H2NEW consortium of National
11 Laboratories and the hydrogen and fuel cell commu-
12 nity, which was established by the Office of Hydro-
13 gen and Fuel Cell Technologies of the Department
14 and focuses on making large-scale electrolyzers more
15 durable, efficient, and affordable; and

16 (4) to promote job creation in the United States
17 through the manufacturing of advanced clean energy
18 technologies, including through the manufacturing of
19 electrolyzers and associated systems.

20 **SEC. 3. HYDROGEN ELECTROLYSIS RESEARCH, DEVELOP-**
21 **MENT, DEMONSTRATION, AND DEPLOYMENT**
22 **PROGRAM.**

23 (a) DEFINITIONS.—

24 (1) DEPARTMENT.—The term “Department”
25 means the Department of Energy.

1 (2) ELECTROLYSIS.—The term “electrolysis”
2 means a process that uses electricity to split water
3 into hydrogen and oxygen.

4 (3) ELECTROLYZER.—The term “electrolyzer”
5 means a system that produces hydrogen using elec-
6 trolysis.

7 (4) ELIGIBLE ENTITY.—The term “eligible enti-
8 ty” means—

9 (A) an institution of higher education;

10 (B) a nongovernmental organization;

11 (C) a National Laboratory;

12 (D) a federally recognized Tribal govern-
13 ment or Tribal organization;

14 (E) a private entity; and

15 (F) a partnership or consortium of 2 or
16 more entities described in subparagraphs (A)
17 through (E).

18 (5) INSTITUTION OF HIGHER EDUCATION.—The
19 term “institution of higher education” has the
20 meaning given the term in section 101(a) of the
21 Higher Education Act of 1965 (20 U.S.C. 1001(a)).

22 (6) NATIONAL LABORATORY.—The term “Na-
23 tional Laboratory” has the meaning given the term
24 in section 2 of the Energy Policy Act of 2005 (42
25 U.S.C. 15801).

1 (7) PROGRAM.—The term “program” means
2 the program established under subsection (b).

3 (8) SECRETARY.—The term “Secretary” means
4 the Secretary of Energy.

5 (b) ESTABLISHMENT.—Not later than 90 days after
6 the date of enactment of this Act, the Secretary shall es-
7 tablish a research, development, demonstration, and de-
8 ployment program to improve the efficiency, increase the
9 durability, and reduce the cost of producing hydrogen
10 using electrolyzers.

11 (c) COORDINATION.—In establishing and carrying
12 out the program, the Secretary shall—

13 (1) coordinate activities carried out under this
14 section with—

15 (A) activities carried out under other rel-
16 evant programs of the Department, including
17 activities carried out by the National Labora-
18 tories; and

19 (B) activities carried out by other relevant
20 Federal agencies;

21 (2) effectively manage crosscutting research pri-
22 orities across relevant programs of the Department,
23 including programs carried out by the National Lab-
24 oratories; and

1 (3) coordinate with the heads of other relevant
2 Federal agencies to ensure the effective management
3 of crosscutting research priorities shared by the De-
4 partment and those agencies.

5 (d) COLLABORATION.—In carrying out the program,
6 the Secretary shall collaborate with—

- 7 (1) industry;
- 8 (2) the National Laboratories;
- 9 (3) other relevant Federal agencies;
- 10 (4) relevant State agencies;
- 11 (5) institutions of higher education; and
- 12 (6) international bodies with relevant scientific
13 and technical expertise.

14 (e) GOAL.—The goal of the program is to reduce the
15 cost of hydrogen produced using electrolyzers to less than
16 \$2 per kilogram of hydrogen by 2026.

17 (f) DURATION.—The program shall have a duration
18 of 5 years.

19 (g) FOCUS.—The program shall focus on research re-
20 lating to, and the development, demonstration, and deploy-
21 ment of—

- 22 (1) low-temperature electrolyzers, including liq-
23 uid-alkaline electrolyzers, membrane-based
24 electrolyzers, and other advanced electrolyzers, capa-
25 ble of converting intermittent sources of electric

1 power to hydrogen with enhanced efficiency and du-
2 rability;

3 (2) high-temperature electrolyzers that combine
4 electricity and heat to improve the efficiency of hy-
5 drogen production;

6 (3) advanced reversible fuel cells that combine
7 the functionality of an electrolyzer and a fuel cell;

8 (4) new highly active, selective, and durable
9 electrolyzer catalysts and electro-catalysts that—

10 (A) greatly reduce or eliminate the need
11 for platinum group metals; and

12 (B) enable electrolysis of complex mixtures
13 with impurities, including seawater;

14 (5) modular electrolyzers for distributed energy
15 systems and the bulk-power system (as defined in
16 section 215(a) of the Federal Power Act (16 U.S.C.
17 824o(a)));

18 (6) low-cost membranes or electrolytes and sep-
19 aration materials that are durable in the presence of
20 impurities or seawater;

21 (7) improved component design and material in-
22 tegration, including with respect to electrodes, po-
23 rous transport layers and bipolar plates, and bal-
24 ance-of-system components, to allow for scale-up and

1 domestic manufacturing of electrolyzers at a high
2 volume;

3 (8) hydrogen storage technologies;

4 (9) technologies that integrate hydrogen pro-
5 duction with—

6 (A) hydrogen compression and drying tech-
7 nologies;

8 (B) hydrogen storage; and

9 (C) transportation or stationary systems;

10 and

11 (10) integrated systems that combine hydrogen
12 production with renewable power generation tech-
13 nologies, including hybrid systems with hydrogen
14 storage.

15 (h) GRANTS, CONTRACTS, COOPERATIVE AGREE-
16 MENTS, AND DEMONSTRATION PROJECTS.—

17 (1) GRANTS.—In carrying out the program, the
18 Secretary shall award grants, on a competitive basis,
19 to eligible entities for projects that the Secretary de-
20 termines would provide the greatest progress toward
21 achieving the goal of the program described in sub-
22 section (e).

23 (2) CONTRACTS AND COOPERATIVE AGREE-
24 MENTS.—In carrying out the program, the Secretary
25 may enter into contracts and cooperative agreements

1 with eligible entities and Federal agencies for
2 projects that the Secretary determines would further
3 the purpose of the program described in subsection
4 (b).

5 (3) DEMONSTRATION PROJECTS.—In sup-
6 porting technologies developed under the program,
7 the Secretary shall fund demonstration projects—

8 (A) to demonstrate technologies that
9 produce hydrogen using electrolysis; and

10 (B) to validate information on the cost, ef-
11 ficiency, durability, and feasibility of commer-
12 cial deployment of the technologies described in
13 subparagraph (A).

14 (4) APPLICATIONS.—An eligible entity desiring
15 to receive a grant under paragraph (1), to enter into
16 a contract or cooperative agreement under para-
17 graph (2), or to receive funding for a demonstration
18 project under paragraph (3) shall submit to the Sec-
19 retary an application at such time, in such manner,
20 and containing such information as the Secretary
21 may require.

22 (5) COST SHARING.—In awarding grants, enter-
23 ing into contracts and cooperative agreements, and
24 funding demonstration projects under this section,
25 the Secretary shall require cost sharing in accord-

1 ance with section 988 of the Energy Policy Act of
2 2005 (42 U.S.C. 16352).

3 (i) REPORTS.—

4 (1) IN GENERAL.—The Secretary shall submit
5 to Congress 2 reports describing, as of the date of
6 the applicable report—

7 (A) the activities carried out by the Sec-
8 retary under this section; and

9 (B) any progress made toward achieving
10 the goal of the program described in subsection
11 (e).

12 (2) TIMING OF SUBMISSIONS.—The Secretary
13 shall submit the reports described in paragraph (1)
14 by—

15 (A) in the case of the first report, not later
16 than 2 years after the date of enactment of this
17 Act; and

18 (B) in the case of the second report, not
19 later than 6 years after that date of enactment.

20 (j) AUTHORIZATION OF APPROPRIATIONS.—There is
21 authorized to be appropriated to the Secretary to carry
22 out the program \$200,000,000 for each of fiscal years
23 2022 through 2026, to remain available until expended.