

116TH CONGRESS  
2D SESSION

# S. 4727

To require the establishment of an advanced energy technology research initiative and an advanced energy technology and modeling grant program, and for other purposes.

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IN THE SENATE OF THE UNITED STATES

SEPTEMBER 24, 2020

Mr. WHITEHOUSE introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

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## A BILL

To require the establishment of an advanced energy technology research initiative and an advanced energy technology and modeling grant program, 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 Energy

5       Technologies and Grid Efficiency Act of 2020”.

6       **SEC. 2. DEFINITIONS.**

7       In this Act:

1                             (1) ADVANCED ENERGY TECHNOLOGY.—The  
2                             term “advanced energy technology” means any en-  
3                             ergy generation, modifying transmission loading, or  
4                             storage technology with zero or minimal greenhouse  
5                             gas emissions that is connected—

- 6                                 (A) to the distribution system;  
7                                 (B) to the transmission system; or  
8                                 (C) behind the meter.

9                             (2) ADVISORY COMMITTEE.—The term “Advi-  
10                             sory Committee” means the advisory committee es-  
11                             tablished under section 3(a)(2)(A).

12                             (3) COMMISSION.—The term “Commission”  
13                             means the Federal Energy Regulatory Commission.

14                             (4) ELECTRIC UTILITY.—The term “electric  
15                             utility” has the meaning given the term in section  
16                             3 of the Federal Power Act (16 U.S.C. 796).

17                             (5) GRID OPERATOR.—The term “grid oper-  
18                             ator” means—

19                                 (A) a Transmission Organization, includ-  
20                                 ing—

- 21                                     (i) an Independent System Operator;  
22                                     and  
23                                     (ii) a Regional Transmission Organi-  
24                                     zation;

25                                 (B) a public utility; and

1 (C) an electric utility.

2                             (6) INDEPENDENT SYSTEM OPERATOR.—The  
3 term “Independent System Operator” has the mean-  
4 ing given the term in section 3 of the Federal Power  
5 Act (16 U.S.C. 796).

(7) INITIATIVE.—The term “Initiative” means the Advanced Energy Technology Research Initiative established under section 3(a)(1).

(10) SECRETARY.—The term “Secretary” means the Secretary of Energy.

18                             (11) TRANSMISSION ORGANIZATION.—The term  
19                             “Transmission Organization” has the meaning given  
20                             the term in section 3 of the Federal Power Act (16  
21                             U.S.C. 796).

1     **SEC. 3. POWER SYSTEM MODELING REFORM AND UPDATES**

2                 **TO GRID SERVICES AND GRID OPERATOR**

3                 **SOFTWARE.**

4     (a) ADVANCED ENERGY TECHNOLOGY RESEARCH

5 INITIATIVE.—

6                 (1) IN GENERAL.—Not later than 90 days after  
7     the date of enactment of this Act, the Commission,  
8     in coordination with the Secretary, shall establish  
9     within the Office of Energy Policy and Innovation of  
10    the Commission an initiative, to be known as the  
11    “Advanced Energy Technology Research Initiative”,  
12    to research and provide recommendations on how to  
13    improve the modeling, operational, and planning  
14    practices used for the bulk electric system.

15                 (2) ADVISORY COMMITTEE.—

16                 (A) IN GENERAL.—Not later than 180  
17    days after the date of enactment of this Act,  
18    the Commission, in coordination with the Sec-  
19    retary, shall establish an advisory committee to  
20    research, report on, and provide recomme-  
21    dations on matters relating to the Initiative, in-  
22    cluding—

23                 (i) whether the existing modeling (in-  
24    cluding power flow modeling) and long-  
25    term and short-term planning practices  
26    used by grid operators for power systems,

including power markets, adequately incorporate expected integration with respect to advanced energy technologies;

(ii) whether the methods used to determine future transmission and capacity needs and make reliability-related determinations use the right data to adequately forecast and model the integration of advanced energy technology into electric power systems;

(iii) whether the modeling and planning practices described in clause (i) and the methods described in clause (ii) need to be updated to better account for the integration of advanced energy technology into electric power systems;

(iv) any undue barriers to the adoption of advanced energy technology presented by—

(I) existing modeling, operational, and planning practices; and

## (II) State estimation tools for planning and reliability;

(v) any need to develop emerging technologies or software for use in improv-

ing modeling, planning, and operations in wholesale electricity markets to resolve computational or technical barriers to the adoption of advanced energy technology, including software relating to—

(I) the use of big data, artificial intelligence, and probabilistic methods to predict, in near-real-time—

(aa) energy generation from variable and distributed re-  
sources;

(bb) load profiles; and

(cc) consumption and con-  
gestion; and

(II) the use of artificial intelligence to improve the responsiveness of energy system operations;

18 (vi) whether existing and future grid  
19 reliability service definitions and the mod-  
20 eling techniques, operational processes, and  
21 planning processes used to procure grid re-  
22 liability services—

(I) appropriately account for the technical and operational characteristics of advanced energy technologies;

(II) allow for the use of those advanced energy technologies to provide grid reliability services when cost-effective to do so; and

(III) include appropriate cybersecurity safeguards; and

(vii) any rulemaking, technical conference, or policy statement that, in the determination of the Advisory Committee, the Commission should consider.

(B) COMPOSITION.—The Advisory Committee shall consist of—

(I) the Commission;

(II) the Department of Energy;

### (III) the Electric Reliability Or-

ganization (as defined in section 215(a) of the Federal Power Act (16 U.S.C. 824o(a)));

(IV) an Independent System Operator or a Regional Transmission Organization;

(V) an entity generating electric power that is not affiliated with a

1                   transmission-owning public or non-  
2                   public utility;

3                   (VI) an entity generating electric  
4                   power that provides power directly to  
5                   wholesale or retail customers and is  
6                   not affiliated with a transmission-own-  
7                   ing public or nonpublic utility;

8                   (VII) an environmental organiza-  
9                   tion with expertise on the bulk electric  
10                  system; and

11                  (VIII) an institution of higher  
12                  education with expertise on the bulk  
13                  electric system;

14                  (ii) not fewer than 2 designees of the  
15                  National Association of Regulatory Utility  
16                  Commissioners;

17                  (iii) not fewer than 4 representatives  
18                  from public utilities or electric utilities, re-  
19                  gardless of whether the utility is in an area  
20                  serviced by an Independent System Oper-  
21                  ator or a Regional Transmission Organiza-  
22                  tion; and

23                  (iv) not fewer than 2 representatives  
24                  from private and nonprofit associations  
25                  with expertise in the development, deploy-

1                   ment, and use of advanced energy tech-  
2                   nologies.

3                   (C) REPORTS.—Not later than 18 months  
4                   after the date of enactment of this Act, and  
5                   every 2 years thereafter for 10 years, the Advi-  
6                   sory Committee shall submit to the Committee  
7                   on Energy and Natural Resources of the Senate  
8                   and the Committee on Energy and Commerce  
9                   of the House of Representatives a report on the  
10                  Initiative, including the findings or rec-  
11                  ommendations of the Advisory Committee with  
12                  respect to the matters described in clauses (i)  
13                  through (vii) of subparagraph (A).

14                 (b) ADVANCED ENERGY TECHNOLOGY AND GRID  
15                 SERVICES PROGRAM.—

16                 (1) IN GENERAL.—Not later than 180 days  
17                 after the date of enactment of this Act, the Sec-  
18                 retary shall establish a competitive financial assist-  
19                 ance program, to be known as the “Advanced En-  
20                 ergy Technology and Grid Services Program”, under  
21                 which the Secretary shall enter into Federal finan-  
22                 cial assistance agreements with eligible entities de-  
23                 scribed in paragraph (2) for the purpose of increas-  
24                 ing the market penetration of advanced energy tech-

1 nology through advanced research and development  
2 and pilot demonstrations of—

3 (A) software upgrades, including upgrades  
4 to the software platforms used to operate  
5 wholesale energy markets;

6 (B) updated power system planning;  
7 (C) new power system (including power  
8 market) modeling platforms;

9 (D) cybersecurity and physical security up-  
10 grades; and

11 (E) resilience upgrades.

12 (2) ELIGIBLE ENTITIES DESCRIBED.—An eligi-  
13 ble entity referred to in paragraph (1) is—

14 (A) a grid operator;

15 (B) a State public utility commission;

16 (C) an energy cooperative;

17 (D) a municipality;

18 (E) an electric utility;

19 (F) a gas utility; or

20 (G) a State energy office.

21 (3) ELIGIBLE ACTIVITIES.—The Secretary may  
22 enter into a financial assistance agreement under  
23 this subsection for—

24 (A) software upgrades by grid operators;

1                         (B) new power system (including power  
2                         market) modeling platforms;

3                         (C) enhancements to cybersecurity safe-  
4                         guards; or

5                         (D) updated power system (including  
6                         power market) planning, updated power system  
7                         (including power market) modeling, or updated  
8                         reliability planning and modeling by grid opera-  
9                         tors.

10                         (4) COST SHARING.—In awarding Federal fi-  
11                         nancial assistance (including grants, loans, and any  
12                         other form of financial assistance) to fund eligible  
13                         activities under this subsection, the Secretary shall  
14                         require cost sharing in accordance with section 988  
15                         of the Energy Policy Act of 2005 (42 U.S.C.  
16                         16352).

17                         (5) COORDINATION.—In carrying out the Ad-  
18                         vanced Energy Technology and Grid Services Pro-  
19                         gram established under this subsection, the Sec-  
20                         retary, to the maximum extent practicable, shall co-  
21                         ordinate with existing programs of the Department  
22                         of Energy that focus on grid modernization efforts.

23                         **SEC. 4. ADVANCED ENERGY AND GRID EFFICIENCY STUD-  
24                         IES AND REPORT.**

25                         (a) STUDIES.—

- 1                             (1) ADVANCED ENERGY STUDY.—The Sec-  
2                             retary, in coordination with the Commission, shall  
3                             carry out a study of the costs and benefits to con-  
4                             sumers of updating power system planning, mod-  
5                             eling, and operational practices, including reliability-  
6                             related planning, and energy market participation  
7                             rules on advanced energy technologies and resources,  
8                             including distributed energy technologies and re-  
9                             sources, such as—  
10                                 (A) energy storage technologies;  
11                                 (B) energy efficiency and transmission effi-  
12                             ciency technologies;  
13                                 (C) distributed solar and wind energy gen-  
14                             eration;  
15                                 (D) fuel cells;  
16                                 (E) smart thermostats and smart building  
17                             technologies;  
18                                 (F) demand response technologies, includ-  
19                             ing natural gas demand response technologies;  
20                                 (G) advanced metering technologies;  
21                                 (H) electric vehicles and electric vehicle  
22                             charging infrastructure;  
23                                 (I) any aggregation of the distributed en-  
24                             ergy technologies and resources described in  
25                             subparagraph (A) or (C); and

1                                     (J) any other advanced energy tech-  
2                                     nologies, as determined by the Secretary.

3                                     (2) GRID EFFICIENCY STUDY.—

4                                     (A) IN GENERAL.—The Secretary, in co-  
5                                     ordination with the Commission, shall carry out  
6                                     a study of the barriers and opportunities for  
7                                     advanced energy technologies that provide in-  
8                                     creased, more efficient, or more effective deliv-  
9                                     ery over the existing transmission network.

10                                    (B) REQUIREMENTS.—The study under  
11                                     subparagraph (A) shall include—

12                                     (i) an examination of—

13                                         (I) the reliability, resilience, and  
14                                     economic benefits of technologies such  
15                                     as power flow control, topology optimi-  
16                                     zation, and dynamic line ratings;

17                                         (II) the costs, benefits, and chal-  
18                                     lenges associated with deployment of  
19                                     the advanced energy technologies de-  
20                                     scribed in subparagraph (A); and

21                                         (III) the impact of grid efficiency  
22                                     improvements on wholesale and retail  
23                                     electricity rates; and

24                                     (ii) an analysis of the benefits of per-  
25                                     formance-based financial and regulatory

1           incentives in the deployment of advanced  
2           energy technologies relative to the cost-of-  
3           service of those advanced energy tech-  
4           nologies, as determined by the Secretary.

5       (b) REPORT.—Not later than 18 months after the  
6 date of enactment of this Act, the Secretary shall submit  
7 to the Committee on Energy and Natural Resources of  
8 the Senate and the Committee on Energy and Commerce  
9 of the House of Representatives a report describing the  
10 results of the studies under paragraphs (1) and (2) of sub-  
11 section (a).

12 **SEC. 5. INTERCONNECTION PROCESSES AND TRANS-**

13           **MISSION UPGRADES.**

14       (a) PRIORITY OF FINANCIAL ASSISTANCE.—

15           (1) IN GENERAL.—The Secretary shall use the  
16 existing grant funding provided through relevant  
17 funding streams and programs of the Office of Elec-  
18 tricity of the Department of Energy—

19           (A) to give priority to transmission and  
20 distribution utilities seeking to conduct pilot  
21 programs aimed at integrating advanced energy  
22 technologies into the bulk electric system; and

23           (B) to focus on escalating demand for ad-  
24 vanced energy technology interconnections.

1                         (2) REQUIREMENT.—In carrying out paragraph  
2                         (1), the Secretary shall develop the design of and  
3                         method for carrying out any funding opportunities  
4                         identified pursuant to that paragraph.

5                         (b) TRANSMISSION PLANNING AND SITING.—

6                         (1) INDEPENDENT REPORT.—The Commission  
7                         shall offer to enter into an agreement with the Na-  
8                         tional Academy of Sciences to prepare a report on  
9                         whether—

10                         (A) existing regional and interregional  
11                         transmission planning and siting processes are  
12                         effectively supporting State resource planning  
13                         objectives; and

14                         (B) Federal regulators have the tools to ef-  
15                         fективly regulate the planning and siting of  
16                         interregional transmission lines.

17                         (2) REQUIREMENTS.—The report under para-  
18                         graph (1) shall examine whether—

19                         (A) there are deficiencies in transmission  
20                         planning and siting that affect resource devel-  
21                         opment for—

22                         (i) interregional and regional energy  
23                         generation;  
24                         (ii) interconnection queues; and  
25                         (iii) advanced energy technologies;

- 1                             (B) the Commission has the programmatic  
2                             and regulatory structure necessary to facilitate  
3                             continued improvements in transmission plan-  
4                             ning, including planning with respect to trans-  
5                             mission—  
6                                 (i) across the boundaries of Inde-  
7                             pendent System Operators and Regional  
8                             Transmission Organizations; and  
9                                 (ii) across boundaries that are not as-  
10                             sociated with Independent System Opera-  
11                             tors or Regional Transmission Organiza-  
12                             tions;
- 13                             (C) State resource planning requirements  
14                             are addressed in existing transmission planning  
15                             processes;
- 16                             (D) the Commission lacks tools with re-  
17                             spect to the siting of transmission lines that  
18                             could help States improve transmission plan-  
19                             ning to meet State resource planning objectives;  
20                             and
- 21                             (E) there are barriers to the inclusion and  
22                             integration in the grid of any technology—  
23                                 (i) to reduce transmission losses;  
24                                 (ii) to improve the efficiency of the  
25                             transmission and distribution systems;

15 (c) AUTHORIZATION OF APPROPRIATIONS.—There is  
16 authorized to be appropriated to the Secretary to provide  
17 grants through relevant programs of the Office of Elec-  
18 tricity of the Department of Energy, in accordance with  
19 subparagraphs (A) and (B) of subsection (a)(1),  
20 \$50,000,000 for each of fiscal years 2021 through 2025.

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