

115TH CONGRESS  
1ST SESSION

# S. 1876

To direct the Secretary of Energy to establish a program to advance energy storage deployment by reducing the cost of energy storage through research, development, and demonstration, and for other purposes.

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## IN THE SENATE OF THE UNITED STATES

SEPTEMBER 27, 2017

Mr. WYDEN (for himself, Mr. WHITEHOUSE, and Mr. REED) 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 direct the Secretary of Energy to establish a program to advance energy storage deployment by reducing the cost of energy storage through research, development, and demonstration, 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 “Reducing the Cost of  
5 Energy Storage Act of 2017”.

6 **SEC. 2. DEFINITIONS.**

7 In this Act:

8 (1) DER.—

1 (A) IN GENERAL.—The term “DER”  
2 means an electric device that can produce or  
3 consume energy that is located—

4 (i) on the distribution system or any  
5 subsystem of the distribution system; or

6 (ii) behind a customer meter.

7 (B) INCLUSIONS.—The term “DER” in-  
8 cludes—

9 (i) an energy storage resource;

10 (ii) an energy generation technology;

11 (iii) a demand response resource;

12 (iv) an energy efficiency resource;

13 (v) an electric vehicle and associated  
14 supply equipment and systems; and

15 (vi) aggregations and integrated con-  
16 trol systems, including virtual power  
17 plants, microgrids, and networks of  
18 microgrid cells.

19 (2) ELECTRIC CONSUMER; STATE REGULATORY  
20 AUTHORITY.—The terms “electric consumer” and  
21 “State regulatory authority” have the meanings  
22 given the terms in section 3 of the Public Utility  
23 Regulatory Policies Act of 1978 (16 U.S.C. 2602).

24 (3) ENERGY STORAGE.—The term “energy  
25 storage” means equipment or facilities capable of

1 absorbing energy, storing energy for a period of  
2 time, and dispatching the stored energy, that—

3 (A) uses mechanical, electrochemical, hy-  
4 droelectric, or thermal processes, as a single fa-  
5 cility or as an aggregation of units, throughout  
6 the electric grid, including behind the meter to  
7 store energy generated at 1 time for use at a  
8 later time;

9 (B) uses mechanical, electrochemical, hy-  
10 droelectric, or thermal processes, as a single fa-  
11 cility or as an aggregation of units, throughout  
12 the electric grid, including behind the meter to  
13 store energy generated from mechanical proc-  
14 esses that would otherwise be wasted for deliv-  
15 ery at a later time; or

16 (C) stores thermal energy for direct use for  
17 heating or cooling at a later time in a manner  
18 that avoids the need to use electricity at that  
19 later time.

20 (4) LIGHT-DUTY CONSUMER VEHICLE.—The  
21 term “light-duty consumer vehicle” has the meaning  
22 given the term “light-duty vehicle” in section  
23 1037.801 of title 40, Code of Federal Regulations  
24 (as in effect on the date of enactment of this Act).

1           (5) MICROGRID.—The term “microgrid” means  
2 a localized grid that can disconnect from the tradi-  
3 tional grid to operate autonomously and help miti-  
4 gate grid disturbances to strengthen grid resilience.

5           (6) PROGRAM.—The term “program” means  
6 the energy storage program established under sec-  
7 tion 3(a).

8           (7) SECRETARY.—The term “Secretary” means  
9 the Secretary of Energy.

10          (8) STATE ENERGY OFFICE.—The term “State  
11 energy office” has the meaning given the term in  
12 section 124(a) of the Energy Policy Act of 2005 (42  
13 U.S.C. 15821(a)).

14          (9) TRANSIT VEHICLE.—The term “transit ve-  
15 hicle” has the meaning given the term “bus” in sec-  
16 tion 1192.3 of title 36, Code of Federal Regulations  
17 (as in effect on the date of enactment of this Act).

18 **SEC. 3. REDUCING THE COST OF ENERGY STORAGE.**

19          (a) ENERGY STORAGE PROGRAM.—

20           (1) ESTABLISHMENT.—Not later than 1 year  
21 after the date of enactment of this Act, the Sec-  
22 retary shall establish a cross-cutting national pro-  
23 gram within the Department of Energy to advance  
24 energy storage deployment by reducing the cost of

1 energy storage through research, development, and  
2 demonstration.

3 (b) GOALS.—In developing the program, the Sec-  
4 retary shall consider the goals of—

5 (1)(A) reducing the full lifecycle cost and envi-  
6 ronmental impact of energy storage technologies,  
7 services, and applications, with an emphasis on re-  
8 ducing costs associated with combining energy stor-  
9 age with intermittent renewable energy generation;  
10 and

11 (B) increasing the cost-competitiveness of en-  
12 ergy storage technologies, services, and applications,  
13 including—

14 (i) the costs of subsystem components, in-  
15 stallation, and integration; and

16 (ii) the costs associated with the applica-  
17 tion of energy storage technologies within inte-  
18 grated control systems;

19 (2) facilitating innovation in the manner in  
20 which energy storage systems are conceived, de-  
21 signed, manufactured, installed, and used for various  
22 energy services;

23 (3) improving the understanding of the econom-  
24 ics and technical characteristics of new electric grid

1 operating principles enabled by energy storage, in-  
2 cluding by considering regional characteristics;

3 (4)(A) identifying the various use cases that are  
4 possible with energy storage (including individual  
5 technology applications, combination technology ap-  
6 plications, and integrated control system applica-  
7 tions); and

8 (B) quantifying, demonstrating, and maxi-  
9 mizing—

10 (i) the value of energy storage in the var-  
11 ious use cases identified under subparagraph  
12 (A); and

13 (ii) the energy storage services that could  
14 be provided in those various use cases—

15 (I) individually; and

16 (II) in multiple or stacked services, in-  
17 cluding the generation of multiple value  
18 streams from integrated control systems,  
19 such as microgrids;

20 (5) identifying, addressing, and reducing mar-  
21 ket barriers that limit energy storage adoption, in-  
22 cluding by—

23 (A) identifying wholesale and retail market  
24 barriers;

25 (B) helping to streamline processes—

1 (i) to reduce the time required for  
2 project completion; and

3 (ii) to lower interconnection costs; and

4 (C) facilitating increased deployment of en-  
5 ergy storage across sectors, including facili-  
6 tating—

7 (i) the deployment of residential, com-  
8 mercial, and industrial applications; and

9 (ii) the deployment to low-income in-  
10 dividuals and communities;

11 (6) advancing and validating the safety, reli-  
12 ability, and performance of energy storage, including  
13 by—

14 (A) establishing procedures for evaluating,  
15 verifying, and reporting the performance of en-  
16 ergy storage technologies, including the oper-  
17 ational safety and usable life of energy storage  
18 technologies; and

19 (B) refining existing or developing new in-  
20 dustry-accepted codes, standards, and testing  
21 procedures to specify desired performance pa-  
22 rameters for energy storage services;

23 (7) mapping pathways for energy storage de-  
24 ployment that increase the reliability, efficiency, se-

1 curity, and resilience of the electricity system, in-  
2 cluding by—

3 (A) increasing the understanding of trends  
4 in electricity system inertia; and

5 (B) assessing the ability of energy storage  
6 to provide the technical services needed for  
7 management of electricity system inertia;

8 (8) optimizing energy storage deployment—

9 (A) to increase the deployment of variable  
10 renewable energy-generation technology and  
11 electric transportation; and

12 (B) to support the optimal use of distrib-  
13 uted and grid scale energy resources, including  
14 assessing the use of energy storage technologies  
15 to manage and optimize DERs—

16 (i) at different levels of market pene-  
17 tration; or

18 (ii) within integrated control systems  
19 or energy management systems, at dif-  
20 ferent scales;

21 (9) advancing analytical resources to employ  
22 storage technology effectively and profitably, includ-  
23 ing by—

24 (A) using existing integrated resource  
25 planning, transmission, and distribution design



1 tools and other resources to build staff capacity  
2 for State regulatory authorities, State energy  
3 offices, electric utilities, balancing authorities,  
4 and Federal power marketing administrations  
5 to assist in reducing the uncertainty and risks  
6 relating to energy storage deployment;

7 (B) developing techniques for conducting  
8 energy storage business case analyses; and

9 (C) developing end-state modeling of least-  
10 cost solutions in scenarios in which—

11 (i) energy storage is deployed; and

12 (ii) 90 to 100 percent of electricity is  
13 produced by renewable generation re-  
14 sources;

15 (10) spurring an increase in the number of en-  
16 ergy storage technologies that are manufactured  
17 cost-competitively in the United States—

18 (A) through public-private partnerships;

19 and

20 (B) by reducing investment risk;

21 (11) identifying—

22 (A) critical and conflict materials issues re-  
23 lating to energy storage technologies; and

24 (B) innovative, low-impact, and cost-com-  
25 petitive methods for procuring energy storage

1 materials that address the conflict issues identi-  
2 fied under subparagraph (A), including—

3 (i) materials recycling programs,  
4 which may also have the effect of increas-  
5 ing the life of batteries; and

6 (ii) novel methods for obtaining lith-  
7 ium and other minerals domestically; and

8 (12) enabling responsible lifecycle management  
9 of energy storage technologies through—

10 (A) conducting research on responsible re-  
11 cycling of advanced battery materials and chem-  
12 istries;

13 (B) encouraging the sustainable design of  
14 new energy storage technologies; and

15 (C) investigating end-of-life and second-life  
16 applications for advanced batteries.

17 (c) PRIORITY.—In developing the program, the Sec-  
18 retary shall pay special attention to energy storage needs  
19 and opportunities that are relatively underdeveloped and  
20 potentially transformative for the electric grid.

21 (d) SUBPROGRAMS.—The program shall be comprised  
22 of not fewer than 4 subprograms, including—

23 (1) a large-scale energy storage subprogram  
24 with emphasis on large-scale energy storage systems,  
25 including—

- 1 (A) electrochemical storage;
- 2 (B) pumped hydroelectric storage;
- 3 (C) mechanical storage;
- 4 (D) thermal storage;
- 5 (E) compression storage; and
- 6 (F) other technologies, as determined by
- 7 the Secretary;
- 8 (2) a distributed storage subprogram that fo-
- 9 cuses on distributed energy storage technologies and
- 10 applications, including existing assets and infra-
- 11 structure, such as electric hot water heaters and
- 12 thermal storage for space heating and cooling;
- 13 (3) a transportation electrification subprogram
- 14 that focuses on storage for and within electric vehi-
- 15 cles, including—
- 16 (A) light-, medium-, and heavy-duty pas-
- 17 senger, utility, transit, and fleet vehicles;
- 18 (B) vehicle-grid integration, including vehi-
- 19 cle-to-grid applications and time-varying pricing
- 20 signals; and
- 21 (C) charging infrastructure and related
- 22 networks and systems; and
- 23 (4) a responsible battery lifecycle management
- 24 subprogram that focuses on—

1 (A) recycling spent batteries, including all  
2 chemistries of batteries; and

3 (B) designing new batteries for end-of-life  
4 recycling.

5 (e) COST TARGET.—

6 (1) IN GENERAL.—The Secretary shall develop  
7 cost targets (including technology costs, installation  
8 costs, balance of services costs, and soft costs) for  
9 energy storage across all types of energy storage  
10 technology.

11 (2) TARGET UPDATE; SUBTARGETS.—Not later  
12 than 5 years after the date of enactment of this Act  
13 and every 5 years thereafter, the Secretary shall—

14 (A) increase the rigor of cost targets based  
15 on—

16 (i) a technology-neutral approach that  
17 considers all types of—

18 (I) energy storage;

19 (II) application and sector-spe-  
20 cific use profiles; and

21 (III) energy storage deployment  
22 scenarios, including individual tech-  
23 nologies, technology combination use  
24 profiles, and integrated control system  
25 applications;

1 (ii) input from a variety of stake-  
2 holders, including the stakeholders de-  
3 scribed in subsection (i);

4 (iii) the inclusion and use of existing  
5 infrastructure; and

6 (iv) the ability to optimize the integra-  
7 tion of intermittent renewable energy gen-  
8 eration technology and DERs; and

9 (B) establish cost subtargets specific to  
10 technologies and applications selected by the  
11 Secretary, taking into consideration electricity  
12 market prices and what is required to be cost-  
13 competitive in specific markets for electric grid  
14 products and services.

15 (3) DEFAULT TARGET.—During the period be-  
16 ginning on the date of enactment of this Act and  
17 ending on the date on which the Secretary first in-  
18 creases the rigor of cost targets under paragraph  
19 (2), the default cost targets to be achieved by the  
20 date that is 10 years after the date of enactment of  
21 this Act, shall be an 80-percent reduction in the per  
22 kilowatt hour all-in installed cost of each energy  
23 storage technology class, as determined under para-  
24 graph (4).

1 (4) ENERGY STORAGE TECHNOLOGY CLASSI-  
2 FICATIONS.—

3 (A) IN GENERAL.—Not later than 1 year  
4 after the date of enactment of this Act, the Sec-  
5 retary shall, based on input from the stake-  
6 holders described in subsection (i), establish  
7 categories of energy storage technologies for the  
8 purposes of—

9 (i) updating the cost targets under  
10 paragraph (2); and

11 (ii) assigning the default cost target  
12 under paragraph (3).

13 (B) REQUIREMENTS.—At a minimum, the  
14 Secretary shall establish the following energy  
15 storage technology classes under subparagraph

16 (A):

17 (i) Electrochemical storage.

18 (ii) Pumped hydroelectric storage.

19 (iii) Mechanical storage.

20 (iv) Thermal storage.

21 (v) Compression storage.

22 (f) SCOPING REPORT.—

23 (1) IN GENERAL.—Not later than 1 year after  
24 the date of enactment of this Act, the Secretary

1 shall submit to Congress a report that includes a  
2 scoping plan for the organization of the program.

3 (2) PREPARATION OF REPORT.—In preparing  
4 the report under paragraph (1), the Secretary shall  
5 confer with, and seek advice from, public and private  
6 stakeholders, such as the stakeholders described in  
7 subsection (i).

8 (g) ANNUAL REPORT.—The Secretary shall submit  
9 to Congress an annual report that describes the progress  
10 of the program, including—

11 (1) a detailed summary of—

12 (A) actions taken to address each goal list-  
13 ed in subsection (b); and

14 (B) the outcomes of those actions;

15 (2) the quantity of energy storage deployed;

16 (3) the administrative costs of the program;

17 (4) the total amount of program funds award-  
18 ed, including a description, by State, of the amount  
19 of funds awarded; and

20 (5) a discussion of the efficacy of the program,  
21 including discussion of the metrics described in sub-  
22 section (h).

23 (h) METRICS OF SUCCESS.—The Secretary shall de-  
24 velop metrics for evaluating the performance of the pro-

1 gram and the efficacy of the program in achieving the  
2 goals described in subsection (b).

3 (i) CONSULTATION.—In carrying out the activities  
4 under this section, the Secretary shall consult with stake-  
5 holders, including—

6 (1) other Federal agencies, including the Fed-  
7 eral Energy Regulatory Commission;

8 (2) the National Laboratories;

9 (3) States;

10 (4) tribal governments;

11 (5) units of local government;

12 (6) electric utilities, such as investor-owned  
13 electric utilities, publicly owned electric utilities, and  
14 electric cooperatives;

15 (7) private companies, including energy tech-  
16 nology manufacturers;

17 (8) third-party energy service providers;

18 (9) institutions of higher education; and

19 (10) nonprofit organizations.

20 (j) PERSONAL PROTECTIONS FOR SENSITIVE PER-  
21 SONAL DATA.—

22 (1) PROTECTING PRIVACY AND SECURITY.—In  
23 carrying out this section, the Secretary, the Admin-  
24 istrator of the Energy Information Administration,  
25 and the Secretary of Homeland Security shall iden-



1       tify, incorporate, and follow best practices for pro-  
2       tecting the privacy of individuals and businesses and  
3       the respective sensitive data of the individuals and  
4       businesses, including by managing privacy risk and  
5       implementing the Fair Information Practice Prin-  
6       ciples of the Federal Trade Commission for the col-  
7       lection, use, disclosure, and retention of individual  
8       electric consumer information in accordance with the  
9       Office of Management and Budget Circular A-130  
10      (or successor circulars).

11               (2) PERSONAL PROTECTIONS FOR SENSITIVE  
12      PERSONAL DATA.—

13                   (A) IN GENERAL.—No Federal entity shall  
14                   request the creation, recording, or collection of  
15                   data identified to an individual person as a re-  
16                   sult of the program.

17                   (B) LAW ENFORCEMENT REQUIRE-  
18                   MENTS.—All law enforcement agencies intend-  
19                   ing to request access to data regarding elec-  
20                   tricity consumption or generation shall be re-  
21                   quired—

22                           (i) to produce a probable cause war-  
23                           rant as a requirement for gaining access to  
24                           the data; and

1                   (ii) to publicly report on the annual  
2                   number of requests by that law enforce-  
3                   ment agency for the data.

4           (k) AUTHORIZATION OF APPROPRIATIONS.—There  
5 are authorized to be appropriated to the Secretary to carry  
6 out this section—

7                   (1) \$225,000,000 for fiscal year 2018;

8                   (2) \$275,000,000 for fiscal year 2019;

9                   (3) \$325,000,000 for fiscal year 2020;

10                  (4) \$400,000,000 for fiscal years 2021 through  
11                  2024;

12                  (5) \$325,000,000 for fiscal year 2025;

13                  (6) \$275,000,000 for fiscal year 2026; and

14                  (7) \$225,000,000 for fiscal year 2027.

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