

117TH CONGRESS
2D SESSION

H. R. 9659

To direct the Secretary of Energy to carry out a research, development, and demonstration program with respect to building technologies, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

DECEMBER 21, 2022

Ms. JOHNSON of Texas introduced the following bill; which was referred to the Committee on Science, Space, and Technology

A BILL

To direct the Secretary of Energy to carry out a research, development, and demonstration program with respect to building technologies, 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; TABLE OF CONTENTS.**

4 (a) SHORT TITLE.—This Act may be cited as the
5 “Building Technologies Research and Development Act”.

6 (b) TABLE OF CONTENTS.—The table of contents for
7 this Act is as follows:

- Sec. 1. Short title; table of contents.
- Sec. 2. Low emissions research and development.
- Sec. 3. Building technologies research and development.
- Sec. 5. Solid state lighting research and development.

Sec. 6. Better buildings research, development, and demonstration program.
Sec. 7. Authorization of appropriations.
Sec. 7. Clerical amendments.

1 **SEC. 2. LOW EMISSIONS RESEARCH AND DEVELOPMENT.**

2 (a) GOALS.—Section 902(a) of the Energy Policy Act
3 of 2005 (42 U.S.C. 16181) is amended—

4 (1) in paragraph (4), by striking “and” at the
5 end; and

6 (2) by striking paragraph (5) and inserting the
7 following:

8 “(5) decreasing the environmental impact of en-
9 ergy-related activities, including by deeply reducing
10 emissions; and

11 “(6) improving energy-sector resilience to cli-
12 mate change.”.

13 (b) EMISSIONS DEFINED FOR GOALS.—Section 902
14 of the Energy Policy Act of 2005 (42 U.S.C. 16181) is
15 amended by adding at the end the following:

16 “(e) EMISSIONS DEFINED.—In this section, the term
17 ‘emissions’ means greenhouse gas emissions or other pol-
18 lutants.”.

19 (c) EMISSIONS REDUCTION.—Section 911 of the En-
20 ergy Policy Act of 2005 (42 U.S.C. 16191) is amended—

21 (1) in the heading by inserting “**AND EMIS-**
22 **SIONS REDUCTIONS**” after “**ENERGY EFFI-**
23 **CIENCY**”;

24 (2) in subsection (a)—

1 (A) in paragraph (1)—

2 (i) by inserting “and emissions reduc-
3 tions” after “energy efficiency”; and

4 (ii) in subparagraph (A), by inserting
5 “, and reducing emissions from,” after “ef-
6 ficiency of”;

7 (B) in paragraph (2)—

8 (i) by amending the matter preceding
9 subparagraph (A)(i) to read as follows:

10 “(A) advanced, cost-effective technologies
11 to improve the energy efficiency and environ-
12 mental performance of, and reduce emissions
13 from, vehicles, including—”;

14 (ii) by amending subparagraph (B) to
15 read as follows:

16 “(B) cost-effective technologies for new
17 construction and retrofit, to improve the energy
18 efficiency and environmental performance of,
19 and reduce emissions from buildings, using a
20 whole-buildings approach, including onsite clean
21 energy generation and beneficial electrifica-
22 tion;”;

23 (iii) by amending subparagraph (C) to
24 read as follows:

1 application to develop cost-effective tools, technologies,
2 and practices that reduce emissions from, increase produc-
3 tivity and well-being of occupants in, and increase the en-
4 ergy efficiency and beneficial electrification of new and ex-
5 isting commercial and residential buildings, including ret-
6 rofits and electrification of existing buildings, rural hous-
7 ing, low-income housing, multi-family housing, public
8 housing, and manufactured housing.

9 “(b) ENERGY EQUITY.—The Secretary shall carry
10 out research to identify barriers to, and strategies for, ex-
11 panding the use of low-emissions and energy efficient
12 building technologies and appliances in the buildings
13 where members of frontline communities live and work.
14 In carrying out this section, the Secretary may coordinate
15 with other Federal agencies on housing and rural develop-
16 ment programs. Research topics covered under this sub-
17 section may include—

18 “(1) barriers to and solutions for the purchase,
19 integration, and use of technologies developed under
20 this section in rural, low-income, multi-family, pub-
21 lic, and manufactured housing;

22 “(2) causes of, and solutions for, inequitable
23 energy costs or high energy burdens in housing in
24 frontline communities; and

1 “(3) solutions that ensure that housing in
2 frontline communities are energy efficient as well as
3 affordable.

4 “(c) NON-TECHNICAL BARRIERS.—The Secretary
5 shall support research and analysis to identify non-tech-
6 nical barriers and methods to address such barriers, to
7 enable greater use of tools, technologies, and practices de-
8 veloped under this section in new and existing commercial
9 and residential buildings, including rural, low-income,
10 public, multi-family, and manufactured housing.

11 “(d) RESILIENT BUILDINGS.—As part of the pro-
12 gram established in section (a), the Secretary may, in con-
13 sultation with relevant Federal agencies including the Na-
14 tional Oceanic and Atmospheric Administration, the
15 United States Geological Survey, the National Institute of
16 Standards and Technology, National Science Foundation,
17 and the Federal Emergency Management Agency, support
18 research and development on principles of resilient build-
19 ing design, construction, and operation to address current
20 and future predicted risks over the lifetime of a building,
21 including considerations of regional differences such as
22 natural hazard exposure, resource availability, and fuel
23 mix and energy production.

24 “(e) ADVANCED BUILDING CONSTRUCTION, DESIGN,
25 AND RETROFITS.—As part of the program established in

1 section (a), the Secretary shall support research and devel-
2 opment on technologies and methodologies to enable ad-
3 vanced building design, construction techniques, and ret-
4 rofits. In supporting research and development under this
5 section, the Secretary shall—

6 “(1) include considerations of a full lifecycle
7 analysis inclusive of building design, manufacturing,
8 and construction, including environmental consider-
9 ations, embodied energy and embodied carbon in
10 building materials, transportation of materials, and
11 implications for building retro-commissioning as well
12 as final disposal and recycling;

13 “(2) incorporate considerations of regional dif-
14 ferences such as climate, season, temperature, en-
15 ergy production, fuel mix, and precipitation, in con-
16 sultation with the Administrator of the National
17 Oceanic and Atmospheric Administration, for pro-
18 posed building designs, building sites, or existing
19 buildings, including the development of tools, tech-
20 nologies, and practices to address such regional dif-
21 ferences and improve building energy resilience in
22 the face of natural disasters, wildfires, extreme
23 weather events, and natural hazards;

24 “(3) support research and development on the
25 use of various potential energy sources and distrib-

1 uted generation to supply cooling, heating, and
2 power for buildings, including integrated and adapt-
3 ive control solutions that improve traditional build-
4 ing energy management and emerging technologies
5 such as batteries, and thermal storage compatible
6 with all sizes of buildings;

7 “(4) support the development of technologies
8 that enable low-emissions and energy efficient or ad-
9 vanced buildings, such as lighting systems, heating,
10 ventilation, air-conditioning, and refrigeration sys-
11 tems and other appliances that are cost-competitive
12 over the life of the product as compared to conven-
13 tional technologies and that incorporate consider-
14 ations of integration in new and existing buildings,
15 retrofitting, and ease of installation, using a whole-
16 systems and whole-buildings approach;

17 “(5) support the development of cost-effective
18 next-generation window and building envelope tech-
19 nologies that incorporate considerations of integra-
20 tion in new and existing buildings, retrofitting, and
21 ease of installation, including advanced building ma-
22 terials;

23 “(6) support development of alternative working
24 fluids and refrigerants for use in buildings equip-
25 ment to reduce global warming potential;

1 “(7) support research on methods to enhance
2 the comfort, health, and well-being of individual oc-
3 cupants in buildings that also result in improved en-
4 ergy efficiency and emissions reductions, including
5 indoor air quality; and

6 “(8) support research on modular or off-site
7 construction techniques and technologies for manu-
8 factured housing that advance energy efficiency, re-
9 duce emissions, and enhance affordability of build-
10 ings.

11 “(f) MODELING AND DATA ANALYSIS.—As part of
12 the program established in subsection (a), the Secretary
13 shall support the development of building models, includ-
14 ing for the design and operation of buildings, the analysis
15 of relevant data to enable smart buildings, and building
16 energy modeling. In particular, the Secretary shall focus
17 on the development of—

18 “(1) advanced modeling capabilities that include
19 modeling of grid interactivity, resilience, and rel-
20 evant behavioral, community-scale, and urban-scale
21 activities in order to—

22 “(A) provide system-level analysis of new
23 technologies, including distributed generation
24 and storage;

1 “(B) evaluate system benefits such as
2 emissions reductions, community resilience, dis-
3 tribution grid reliability, and service to under-
4 served communities; and

5 “(C) provide data, derived from both sim-
6 ulation and demonstration projects established
7 in subsection (h), to inform decision making
8 new business models;

9 “(2) automated methods to generate models of
10 proposed or existing buildings;

11 “(3) methods to address barriers, including
12 non-technical barriers, to commercial application of
13 building models for building operation;

14 “(4) methods to analyze data collected by tech-
15 nologies in smart buildings and collections of build-
16 ings;

17 “(5) artificial intelligence and machine learning
18 approaches to building energy management; and

19 “(6) advanced data collection and monitoring
20 methods for utilities at the building level and compo-
21 nent level.

22 “(g) DEMONSTRATION PROGRAM.—The Secretary
23 shall establish a competitive grant program for the dem-
24 onstration of advanced building technologies and systems

1 developed under the program established in subsection (a)
2 that—

3 “(1) focuses on a range of new and existing
4 building types, including low-income housing, rural
5 housing and agricultural buildings, multi-family resi-
6 dential buildings, manufactured housing, and small-
7 and medium-sized commercial buildings; and

8 “(2) includes community-scale demonstration
9 projects.

10 “(h) TESTING AND VALIDATION.—In carrying out
11 the program under subsection (a), the Secretary shall—

12 “(1) support testing and validation activities to
13 improve the commercial application of relevant tools,
14 sensors, technologies, and methods, including the use
15 of testbeds and the development of test methods to
16 determine cost savings and performance in realistic
17 scenarios; and

18 “(2) support analysis, testing, and validation to
19 accurately determine energy savings, emissions re-
20 ductions, cost-savings, and other potential impacts
21 of the highest-performing appliances and equipment
22 that are commercially available.

23 “(i) PARTNERSHIPS.—In carrying out the activities
24 authorized in this section, the Secretary shall work with
25 utilities, State and local energy offices, building owners,

1 technology developers and manufacturers, contractors,
2 building developers, connected building system manufac-
3 turers, and other relevant entities to guide the focus areas
4 of the activities of the program authorized in paragraph
5 (a), provide feedback on roadmap documents, and encour-
6 age the commercial application of these technologies by
7 building owners, operators, developers, occupants, contrac-
8 tors, or other relevant entities.

9 “(j) COORDINATION.—In carrying out this section,
10 the Secretary shall coordinate across all relevant program
11 offices at the Department, including the Office of Elec-
12 tricity, the Office of Fossil Energy and Carbon Manage-
13 ment, the Office of Energy Efficiency and Renewable En-
14 ergy, and the Office of Cybersecurity, Energy Security,
15 and Emergency Response.

16 “(k) DEFINITIONS.—In this section:

17 “(1) EMISSIONS.—The term ‘emissions’ means
18 greenhouse gas emissions or other pollutants.

19 “(2) FRONTLINE COMMUNITY.—The term
20 ‘frontline community’ means a community with sig-
21 nificant representation of communities of color, low-
22 income communities, or Tribal and indigenous com-
23 munities, that—

1 “(A) experiences, or is at risk of experi-
2 encing, higher or more adverse human health or
3 environmental effects; or

4 “(B) faces an above average proportion of
5 their income directed to the payment of energy-
6 related costs.

7 “(3) SMART BUILDING.—The term ‘Smart
8 Building’ has the meaning given such term in sec-
9 tion 1007(a) of Division Z of the Consolidated Ap-
10 propriations Act of 2021.”.

11 **SEC. 4. GRID-INTERACTIVE EFFICIENT BUILDINGS RE-**
12 **SEARCH AND DEVELOPMENT.**

13 (a) IN GENERAL.—As part of the research and devel-
14 opment program authorized in section 3 of this Act, the
15 Secretary shall carry out a grid-interactive buildings re-
16 search and development program authorized in section
17 426 of the Energy Independence and Security Act of 2007
18 (42 U.S.C. 17086), as amended in subsection (b).

19 (b) GRID-INTERACTIVE EFFICIENT BUILDINGS RE-
20 SEARCH PROGRAM.—426(a) of the Energy Independence
21 and Security Act of 2007 (42 U.S.C. 17086(a)) is amend-
22 ed—

23 (1) by redesignating paragraph (8) as para-
24 graph (12); and

1 (2) by striking paragraph (7) and inserting the
2 following:

3 “(7) advanced building energy management sys-
4 tems through the integration of sensors and ad-
5 vanced control technologies and systems that allow
6 whole building optimization and integration with
7 other energy systems including photovoltaics, electric
8 vehicles, and energy storage technologies such as
9 thermal storage;

10 “(8) building energy storage capabilities, in-
11 cluding load shifting, to modulate peak and off-en-
12 ergy demand;

13 “(9) distributed energy resources at the
14 community- and building-level through localized elec-
15 tric grids;

16 “(10) technologies to reduce energy use and
17 emissions in connected communities and neighbor-
18 hoods located in a variety of climates, including by
19 enabling transactive energy concepts;

20 “(11) cybersecurity best practices, including
21 those that protect privacy and personally identifiable
22 information and addressing security vulnerabilities
23 of building systems or equipment; and”.

1 **SEC. 5. SOLID STATE LIGHTING RESEARCH AND DEVELOP-**
2 **MENT.**

3 Section 912 of the Energy Policy Act of 2005 (42
4 U.S.C. 16192) is amended as follows:

5 (1) in subsections (a)(1), (a)(4), (a)(5), (b), (c),
6 by striking “white” in each place it appears; and

7 (2) by amending subsection (i) to read as fol-
8 lows:

9 “(i) **SOLID STATE LIGHTING RESEARCH AND DE-**
10 **VELOPMENT.**—Not later than 180 days after the enact-
11 ment of the Building Technologies Research and Develop-
12 ment Act, the Secretary shall establish a program of re-
13 search, development, demonstration, and commercial ap-
14 plication on advanced solid state lighting technologies,
15 controls, and systems that provide energy and emissions
16 reductions. In particular, the Secretary shall support
17 projects related to—

18 “(1) communication and data capabilities that
19 leverage solid state lighting technologies and sys-
20 tems, including those that enable energy savings
21 through energy reporting, interoperability, or cyber-
22 security capabilities;

23 “(2) innovations to support domestic manufac-
24 turing and other United States economic benefits of
25 solid state lighting technologies;

26 “(3) solid state emitters; and

1 “(4) the uses and benefits of solid state lighting
2 technologies in a variety of settings such as health
3 care, agriculture, other commercial or industrial
4 buildings, and vehicles.”.

5 **SEC. 6. BETTER BUILDINGS RESEARCH, DEVELOPMENT,**
6 **AND DEMONSTRATION PROGRAM.**

7 (a) BETTER BUILDINGS DEMONSTRATION PRO-
8 GRAM.—Section 1007(d) of Division Z of the Consolidated
9 Appropriations Act of 2021 is amended by striking “and
10 commercial buildings sectors” and inserting “and labora-
11 tory, industrial, commercial, and residential sectors, in-
12 cluding in rural housing, low-income housing, multi-family
13 housing, and manufactured housing, through partner-
14 ships.”.

15 (b) BETTER BUILDINGS RESEARCH PROGRAMS.—
16 Section 1007 of Division Z of the Consolidated Appropria-
17 tions Act of 2021 is amended by adding after subsection
18 (d) (and redesignating subsequent subsections accord-
19 ingly)—

20 “(e) EDUCATION AND OUTREACH.—The Secretary
21 shall support education and outreach activities to dissemi-
22 nate information and promote public understanding of
23 building technologies and the building technologies work-
24 force.

1 “(f) BUILDING AMERICA PROGRAM.—The Secretary
2 shall carry out a research, development, and demonstra-
3 tion program on tools, technologies, and practices to re-
4 duce energy use and emissions in new and existing resi-
5 dential buildings, in partnership with industry entities.”.

6 **SEC. 7. AUTHORIZATION OF APPROPRIATIONS.**

7 There are authorized to be appropriated to the Sec-
8 retary to carry out the activities under section 1007(d)
9 of Division Z of the Consolidated Appropriations Act of
10 2021, section 426 of the Energy Independence and Secu-
11 rity Act of 2007 (42 U.S.C. 17086), and the amendments
12 made by this Act—

- 13 (1) \$392,000,000 for fiscal year 2023;
14 (2) \$411,600,000 for fiscal year 2024;
15 (3) \$432,180,000 for fiscal year 2025;
16 (4) \$453,789,000 for fiscal year 2026; and
17 (5) \$476,478,450 for fiscal year 2027.

18 **SEC. 8. CLERICAL AMENDMENTS.**

19 The table of sections for the Energy Policy Act of
20 2005 (42 U.S.C. 15801 et seq.) is amended—

- 21 (1) in the item relating to section 911 by in-
22 serting “and emissions reductions” after “energy ef-
23 ficiency”; and

- 1 (2) by adding after the item relating to section
- 2 918 the following:

“Sec. 919. Building technologies research and development.”.

