

WIND ENERGY RESEARCH AND DEVELOPMENT
ACT OF 2019

SEPTEMBER 8, 2020.—Committed to the Committee of the Whole House on the State
of the Union and ordered to be printed

Ms. JOHNSON of Texas, from the Committee on Science, Space, and
Technology, submitted the following

R E P O R T

together with

MINORITY VIEWS

[To accompany H.R. 3609]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was
referred the bill (H.R. 3609) to provide for a program of wind en-
ergy research, development, and demonstration, and for other pur-
poses, having considered the same, reports favorably thereon with
an amendment and recommends that the bill as amended do pass.

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I. AMENDMENT

The amendment is as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the “Wind Energy Research and Development Act of 2019”.

SEC. 2. WIND ENERGY TECHNOLOGY, RESEARCH, DEVELOPMENT AND TESTING PROGRAM.

(a) IN GENERAL.—The Secretary of Energy (in this Act, referred to as the “Secretary”) shall carry out a program to conduct research, development, testing, and evaluation of wind energy technologies. In carrying out such program and in accordance with subsection (b), the Secretary shall award grants and enter into contracts and cooperative agreements under this section and sections 3, 4, and 5 for each of the following purposes:

(1) To improve the energy efficiency, reliability, resilience, security, and capacity of wind energy generation.

(2) To optimize the design and control of wind energy systems for the broadest practical range of atmospheric conditions.

(3) To reduce the cost and risk of permitting, construction, operation, and maintenance of wind energy systems, including technologies to reduce environmental and community impacts, improve grid integration, and reduce regulatory barriers.

(4) To improve materials, engineering, and manufacturing processes for turbines, including supersized turbines.

(5) To optimize wind plant performance and integration within hybrid energy systems to enhance cost efficiency and electric grid stability and resilience.

(b) GRANTS, CONTRACTS, AND COOPERATIVE AGREEMENTS.—

(1) GRANTS.—In carrying out the program, the Secretary shall award grants on a competitive, merit-reviewed basis to eligible entities for projects that the Secretary determines would best achieve the goals of the program.

(2) CONTRACTS AND COOPERATIVE AGREEMENTS.—In carrying out the program, the Secretary may enter into contracts and cooperative agreements with eligible entities and Federal agencies for projects that the Secretary determines would further the purposes of the program.

(3) APPLICATION.—An entity seeking funding or a contract or agreement under this subsection shall submit to the Secretary an application at such time, in such manner, and containing such information as the Secretary may require.

(c) WIND ENERGY RESEARCH SUBJECT AREAS.—The program established under subsection (a) shall focus on the research, development, testing, and evaluation of each of the following subject areas:

(1) Wind power plant performance and operations including—

(A) wind flows and turbine-to-turbine interactions;

(B) energy conversion potential;

(C) turbine and wind plant control paradigms;

(D) turbine and wind plant security;

(E) turbine components; and

(F) integrated hybrid plant systems.

(2) New materials and designs related to blades, rotors, towers and drivetrains including—

(A) higher tip speed rotor designs;

(B) low noise rotor designs;

(C) advanced drivetrain and generator concepts;

(D) modular construction and onsite or near-site manufacturing and assembly techniques;

(E) sustainable and recyclable materials and manufacturing systems;

(F) supersized turbine design and installation approaches; and

(G) lightweight materials.

(3) Offshore wind-specific projects including—

(A) fixed and floating substructure concepts;

(B) projects to assess and mitigate the impacts of hurricane wind flow, freshwater ice, and other United States-specific conditions;

- (C) innovative operations and maintenance strategies;
- (D) analysis of offshore meteorological, geological, and oceanographic data collection;
- (E) offshore infrastructure monitoring; and
- (F) analysis of corrosion and fatigue for the purpose of extending the design life of offshore wind turbine substructures.
- (4) Recycling and reuse of wind energy components.
- (5) Wind power forecasting and atmospheric measurement systems, including for turbines and plant systems of varying height.
- (6) Distributed wind-specific projects, including—
 - (A) cost-effective turbine designs, components, and manufacturing; and
 - (B) microgrid applications.
- (7) Advanced transportation mechanisms for wind turbine components.
- (8) Transformational technologies for harnessing wind energy, including airborne wind energy concepts.
- (9) Methods to extend the operational lifetime of onshore and offshore wind turbines and systems.
- (10) Storage technologies to address the transience and intermittency of wind energy resources.
- (11) Other research areas as determined by the Secretary.
- (d) REPORT.—
 - (1) IN GENERAL.—Not later than 180 days after the date of the enactment of this Act, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate a report on the potential for, and technical viability of, airborne wind energy systems to provide a significant source of energy in the United States.
 - (2) CONTENTS.—The report under paragraph (1) shall include a summary of research, development, and demonstration needs, including an estimate of Federal funding requirements, to further examine and validate the technical and economic viability of airborne wind energy concepts over the 10-year period beginning on the date of the enactment of this Act.
- (e) COORDINATION.—To the maximum extent practicable, the Secretary shall coordinate activities under the program established under subsection (a) with other relevant programs and capabilities of the Department of Energy and other Federal research programs.
- (f) CONFORMING REPEALS.—
 - (1) Section 931(a)(2) of the Energy Policy Act of 2005 (42 U.S.C. 16231(a)(2)) is amended by striking subparagraph (B).
 - (2) Section 4(a) of the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989 (42 U.S.C. 12003(a)) is amended by striking paragraph (1).
- (g) DEFINITIONS.—In this section:
 - (1) The term “eligible entity” means any of the following entities:
 - (A) An institution of higher education.
 - (B) A National Laboratory.
 - (C) A Federal research agency.
 - (D) A State research agency.
 - (E) A nonprofit research organization.
 - (F) An industrial entity or a multi-institutional consortium thereof.
 - (2) The term “institution of higher education” has the meaning given such term in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001).
 - (3) The term “National Laboratory” has the meaning given such term in section 2(3) of the Energy Policy Act of 2005 (42 U.S.C. 15801(3)).
 - (4) The term “supersized turbine” means a 12 megawatt or greater wind turbine, typically with a tower height greater than 140 meters and blades greater than 75 meters.

SEC. 3. WIND ENERGY TECHNOLOGY VALIDATION AND MARKET TRANSFORMATION PROGRAM.

- (a) IN GENERAL.—In carrying out the program established under section 2(a), the Secretary shall conduct a wind energy technology validation and market transformation program under which the Secretary shall award grants on a competitive, merit-reviewed basis to eligible entities to support activities that demonstrate and validate new wind energy technologies with the potential to be cost-competitive for land-based, offshore, and distributed applications.
- (b) APPLICATION.—An eligible entity seeking a grant under this section shall submit an application in such form and manner as the Secretary may prescribe and that contains—

(1) a certification that any demonstration project carried out using grant funds are—

(A) conducted in collaboration with industry and, as appropriate, with institutions of higher education and other Federal research programs; and

(B) of sufficient size and geographic diversity to measure wind energy system performance under the full productive range of wind conditions in the United States; and

(2) such other information as the Secretary may require.

(c) **FACILITY FOR HYBRID ENERGY SYSTEM RESEARCH AND DEMONSTRATION PROJECTS.**—In carrying out the program established under subsection (a), the Secretary shall establish or support a facility to conduct research and demonstration projects for wind turbines and plants in hybrid energy systems that incorporate diverse generation sources, loads, and storage technologies.

(d) **OFFSHORE RESEARCH FACILITY.**—In carrying out the program established under subsection (a), the Secretary shall establish a facility to conduct research, development, and demonstration projects for ocean and atmospheric resource characterization relevant to offshore wind energy development in coordination with the ocean and atmospheric science communities. The facility shall be an offshore area used to evaluate, test, and advance atmospheric, oceanic, biologic, and geologic monitoring technologies that improve offshore wind energy development, including the generation of benchmark data sets for testing offshore wind energy technologies and informing how such technologies can be financed, insured, and regulated.

(e) **OFFSHORE SUPPORT STRUCTURE TESTING FACILITY.**—In carrying out the program established under subsection (a), the Secretary shall create a facility to conduct research, development, and demonstration projects for large-scale and full-scale offshore wind energy support structure components and systems.

SEC. 4. WIND ENERGY INCUBATOR FUNDING.

In carrying out the program established under section 2(a), the Secretary shall conduct research, development, testing, and evaluation activities, in accordance with section 2(b), to support innovative technologies that are not represented in a significant way in—

(1) the portfolio of wind energy research activities carried out by the Department of Energy as of the date of the enactment of this Act; or

(2) technology roadmaps used by the Department of Energy as of such date of enactment.

SEC. 5. MITIGATING REGULATORY AND MARKET BARRIERS.

(a) **IN GENERAL.**—In carrying out the program established under section 2(a), the Secretary shall research, develop, test, and evaluate, in accordance with section 2(b), ways to reduce regulatory and market barriers to the widespread adoption of wind power, including—

(1) grid transmission and integration challenges; and

(2) permitting issues associated with the potential impacts of wind power systems on wildlife, radar systems, local communities, military operations, and airspace.

(b) **WILDLIFE IMPACT MITIGATION.**—In carrying out the activities described in subsection (a), the Secretary shall support the development, testing, and evaluation of wildlife impact mitigation technologies or strategies to reduce the potential impacts of wind energy facilities on—

(1) bald and golden eagles;

(2) bat species;

(3) marine wildlife; and

(4) other impacted species.

(c) **EDUCATION AND OUTREACH.**—In carrying out the activities described in subsection (a), the Secretary shall support education and outreach activities to disseminate information and promote public understanding of wind technologies and the wind energy workforce, including the Collegiate Wind Competition.

SEC. 6. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the Secretary to carry out this Act—

(1) \$103,692,000 for fiscal year 2020;

(2) \$108,876,600 for fiscal year 2021;

(3) \$114,320,430 for fiscal year 2022;

(4) \$120,036,452 for fiscal year 2023; and

(5) \$126,038,274 for fiscal year 2024.

II. PURPOSE OF THE BILL

The purpose of H.R. 3609, the *Wind Energy Research and Development Act of 2019*, sponsored by Mr. Tonko and cosponsored by Mr. Bacon, Mr. Kennedy, Mr. Fortenberry, Mr. Lowenthal, Mr. Cisneros, Mr. Connolly, Mr. Grijalva, Mr. Peters, Ms. Haaland, Mr. Levin, Mrs. Axne, Mr. McGovern, Ms. Sherrill, Mr. Keating, and Mr. McAdams, is to authorize the Department of Energy (DOE) to carry out research, development, and demonstration (RD&D) of wind energy technologies that improve systems' efficiency, manufacturing, reliability, integration, and affordability, amongst other qualities.

III. BACKGROUND AND NEED FOR THE LEGISLATION

Federal RD&D began supporting wind energy technologies in the 1980s. In 1993, the National Wind Technology Center (NWTC), a facility meant to lead U.S. research in wind energy, was built at the National Renewable Energy Laboratory. Since then, NWTC, DOE, and the Department of Interior launched an offshore wind energy initiative, helping build three offshore wind energy demonstration projects. Growing from this work, the University of Maine installed the first grid-connected offshore wind turbine in the U.S. with substantial DOE support.

These RD&D activities have helped the wind energy industry grow tremendously in subsequent decades, and in 2019, wind power provided 7.3% of all U.S. electricity.¹ However, if wind energy is to meet the goal of supplying 35% of U.S. electricity by 2050, as outlined in the DOE Wind Vision report, continued advancements of these technologies and systems are needed.² According to the report, this level of deployment would result in over 600,000 wind industry-supported jobs, billions of dollars in energy savings, and gigatons of air pollution avoided.³

To date, brief authorizing language from the Energy Policy Act of 2005 (P.L. 109–58) provides the most recent legislative direction for wind RD&D activities at DOE. H.R. 3609 is designed to significantly build upon this prior authorization to ensure that DOE has the appropriate tools and guidance given the changes to the industry over the past 15 years. It directs the Secretary of Energy to carry out a program of research, development, testing, and evaluation of wind energy technologies. The program prioritizes wind energy technologies, including both onshore, distributed, and offshore turbines and airborne technologies, that improve:

- (a) capacity and efficiency;
- (b) manufacturing, construction, operation, and maintenance;
- (c) reliability, resilience, and security;
- (d) operational capability in new geographic and atmospheric environments;
- (e) grid integration; and
- (f) affordability.

¹“What is U.S. electricity generation by energy source?” U.S. Energy Information Administration. <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>.

²“Wind Vision Detailed Roadmap Actions.” U.S. Department of Energy. https://www.energy.gov/sites/prod/files/2018/05/f51/WindVision-Update-052118-web_RMB.pdf.

³“Wind Vision.” U.S. Department of Energy. <https://www.energy.gov/eere/wind/wind-vision>.

The bill also directs the Secretary to award grants for demonstration projects, including the establishment of a Hybrid Energy System Facility would provide a platform for research and demonstration of wind energy technologies in an electric grid system that incorporates diverse generation sources, loads, and storage technologies.

In addition, the bill directs the Secretary to support research technologies that reduce regulatory and market barriers and support innovative wind energy technologies that are not present in DOE's RD&D portfolio or roadmaps. The Act authorizes 5% annual funding increases over five years for wind energy RD&D activities, beginning with \$103.7 million in 2020, to carry out the Act.

IV. COMMITTEE HEARINGS

Pursuant to Section 103(i) of H. Res. 6, the Committee designates the following hearing as having been used to develop or consider the legislation:

The Subcommittee on Energy held a legislative hearing on May 15, 2019 to examine the research, development, and demonstration needs for wind energy in support of a draft of H.R. 3609.

WITNESSES

Dr. Peter Green is Science and Technology Officer and Deputy Laboratory Director for the National Renewable Energy Laboratory (NREL).

Ms. Abby Hopper, Esq. is President and CEO of the Solar Energy Industries Association (SEIA).

Mr. Kenny Stein, Esq. is Director of Policy at the Institute for Energy Research (IER).

Mr. Tom Kiernan is President and CEO of the American Wind Energy Association (AWEA).

V. COMMITTEE CONSIDERATION AND VOTES

The Subcommittee on Energy met to consider H.R. 3609 on July 10, 2019.

Chairman Lamb offered a Manager's amendment to specify that in addition to awarding grants, the Secretary of Energy can enter into contracts and cooperative agreements in carrying out research, development, and demonstration under the wind energy program. The amendment also included a provision that directs the Secretary to conduct RD&D on technologies that address the transience and intermittency of wind energy resources. *The amendment was agreed to by voice vote.*

Ms. Stevens offered an amendment which added text to require DOE to produce a report on the potential and viability of airborne wind technologies and their research needs. *The amendment was agreed to by voice vote.*

Mr. Weber offered an amendment to require the Secretary of Energy to derive funds authorized by the Act from the Office of Energy Efficiency and Renewable Energy. It also mandated that no additional funds are authorized to be appropriated to carry out the Act. *The amendment was rejected by voice vote.*

H.R. 3609 was forwarded by the Subcommittee to the full Committee (as amended) by the Yeas and Nays: 7-5.

The Full Committee met to consider H.R. 3609 on July 24, 2019.

Mr. Beyer offered an amendment to establish an Offshore Research Facility to support RD&D for ocean and atmospheric resource characterization. The facility would provide a platform for testing atmospheric, oceanic, biological, and geological monitoring technologies relevant to offshore wind energy development and would provide benchmark data. The amendment also establishes a facility to support RD&D on large-scale offshore wind energy support structures. *The amendment was agreed to by voice vote.*

Mr. Perlmutter offered an amendment directing the Secretary to prioritize RD&D advancing distributed wind energy technologies, including technologies to reduce their manufacturing costs. *The amendment was agreed to by voice vote.*

Mr. Weber offered an amendment to reduce the amounts authorized to carry out the Act. The amendment also requires the Secretary to derive funds authorized by the Act from amounts appropriated or otherwise made available to DOE. It also mandated that no additional funds are authorized to be appropriated to carry out the Act. *The amendment was rejected by the Yeas and Nays: 13–21.*

Mr. Weber offered an amendment to add a Sense of Congress stating that the Secretary must prioritize research and development of all innovative energy technologies, including improvements to fossil and nuclear energy technologies, to meet 100 percent of power demand through clean, zero-emissions sources. *The amendment was rejected by voice vote.*

H.R. 3609 was forwarded by the full Committee to the full House (as amended) by the Yeas and Nays: 21–13.

VI. SUMMARY OF MAJOR PROVISIONS OF THE BILL

Directs the Secretary of Energy to carry out a program of research, development, testing, and evaluation of wind energy technologies. The program prioritizes wind energy technologies, including both onshore, distributed, and offshore turbines and airborne technologies, that improve: capacity and efficiency; manufacturing, construction, operation, and maintenance; reliability, resilience, and security; operational capability in new geographic and atmospheric environments; grid integration; and affordability.

The bill also directs the Secretary to award grants for demonstration projects, including the establishment of a Hybrid Energy System Facility that would provide a platform for research and demonstration of wind energy technologies in an electric grid system that incorporates diverse generation sources, loads, and storage technologies.

In addition, the bill directs the Secretary to support research technologies that reduce regulatory and market barriers and support innovative wind energy technologies that are not present in DOE's RD&D portfolio or roadmaps. The Act authorizes 5% annual funding increases over five years for wind energy RD&D activities, beginning with \$103.7 million in 2020, to carry out the Act.

VII. SECTION-BY-SECTION ANALYSIS (BY TITLE AND SECTION)

Section 1. Short title

Wind Energy Research and Development Act of 2019

Section 2. Wind Energy Technology Research, Development, and Testing Program

Directs the Secretary to carry out a program for research, development, testing, and evaluation of wind energy technologies. The program prioritizes wind energy technologies, including onshore, distributed, and offshore turbines and airborne technologies, that improve:

- (a) capacity and efficiency;
- (b) manufacturing, construction, operation, and maintenance;
- (c) reliability, resilience, and security;
- (d) operational capability in new geographic and atmospheric environments;
- (e) grid integration; and
- (f) affordability.

Directs the Secretary to coordinate the program's RD&D efforts with relevant federal agencies and research programs.

The Act also instructs the Secretary to produce a report on the potential and technical viability of airborne wind energy systems to provide a significant source of energy to the U.S., including a summary of the RD&D needs to further examine and validate the technical and economic viability of these technologies.

Repeals law that is duplicative and outdated in the context of this Act, and defines "eligible entity", "institution of higher education", "National Laboratory", and "supersized turbine" in the Act.

Section 3. Wind Energy Technology Validation and Market Transformation Program

Directs the Secretary to award grants to validate wind energy technologies, including demonstration projects. The Secretary is specifically directed to establish a Hybrid Energy System Facility, Offshore Research Facility, and Offshore Support Structure Testing Facility. The Hybrid Energy System Facility would provide a platform for research and demonstration of wind energy technologies in an electric grid system that incorporates diverse generation sources, loads, and storage technologies. The Offshore Research Facility would support testing offshore atmospheric, oceanic, biological, and geological monitoring technologies relevant to offshore wind energy development and provide benchmark data. The Offshore Support Structure Testing Facility would support RD&D on large-scale and full-scale offshore wind energy support structures and components.

Section 4. Wind energy incubator funding

Directs the Secretary to provide support for innovative wind energy technologies that are not already well-represented in DOE's existing RD&D portfolio and roadmaps.

Section 5. Mitigating regulatory and market barriers

Directs the Secretary to research, develop, test, and evaluate ways to reduce regulatory and market barriers for wind energy technologies. Projects will prioritize grid integration, permitting challenges, and wildlife impact mitigation. The Secretary must also support education and outreach activities to promote public understanding of wind energy technologies and the wind energy workforce.

Section 6. Authorization of appropriations

Authorizes 5% annual funding increases over five years for wind energy research, development, and demonstration activities, beginning with \$103.7 million in 2020, to carry out this Act.

VIII. COMMITTEE VIEWS

It is the view of the Committee that the Secretary coordinate with the National Oceanic and Atmospheric Administration, the Bureau of Ocean Energy Management, and the DOE National Offshore Wind R&D Consortium in carrying out the Offshore Research Facility, Offshore Support Structure Test Facility, and other offshore wind energy related RD&D activities. The Committee recognizes and commends the Advanced Research Projects Agency-Energy's current ATLANTIS program as contributing to offshore wind turbine research. However, it is the view of the Committee that additional sustained, significant, and comprehensive commitments in the area of offshore wind research remains necessary.

It is also the view of the Committee that the Secretary prioritize research on minimizing the life-cycle environmental impacts of wind energy systems, including through reuse and recycling of wind energy components. The Committee also strongly supports efforts to advance "supersized turbines" that can expand the commercial viability of onshore and offshore wind energy technologies to areas with less accessible wind resources, such as in the U.S. southeast.

IX. COST ESTIMATE

Pursuant to clause 3(c)(2) of rule XIII of the Rules of the House of Representatives, the Committee adopts as its own the estimate of new budget authority, entitlement authority, or tax expenditures or revenues contained in the cost estimate prepared by the Director of the Congressional Budget Office pursuant to section 402 of the Congressional Budget Act of 1974.

X. CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, September 6, 2019.

Hon. EDDIE BERNICE JOHNSON,
Chairwoman, Committee on Science, Space, and Technology,
House of Representatives, Washington, DC.

DEAR MADAM CHAIRWOMAN: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 3609, the Wind Energy Research and Development Act of 2019.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Kathleen Gramp.

Sincerely,

PHILLIP L. SWAGEL,
Director.

Enclosure.

H.R. 3609, Wind Energy Research and Development Act of 2019 As ordered reported by the House Committee on Science, Space and Technology, Space, and Technology on July 24, 2019			
By Fiscal Year, Millions of Dollars	2019	2019-2024	2019-2029
Direct Spending (Outlays)	0	0	0
Revenues	0	0	0
Increase or Decrease (-) in the Deficit	0	0	0
Spending Subject to Appropriation (Outlays)	0	370	574
Statutory pay-as-you-go procedures apply?	No	Mandate Effects	
Increases on-budget deficits in any of the four consecutive 10-year periods beginning in 2030?	No	Contains intergovernmental mandate?	No
		Contains private-sector mandate?	No

H.R. 3609 would authorize appropriations totaling \$574 million over the 2020–2024 period for the Department of Energy (DOE) to conduct research and development on wind energy technologies. Under the bill, those activities would focus on various aspects of such systems, including their design, materials, and performance as well as their technical and economic feasibility in different geographic locations. The bill also would direct DOE to establish an offshore wind research facility, and would allow the department to use grants, cooperative agreements, and contracts to implement the programs.

Based on historical spending patterns for similar activities, and assuming appropriation of the authorized amounts, CBO estimates that implementing H.R. 3609 would cost \$370 million over the 2019–2024 period and \$204 million after 2024. That estimate includes \$1 million for costs that would be incurred by the Department of the Interior (DOI) to review and approve leases for any offshore wind research facilities located in the federal Outer Continental Shelf. CBO estimates that DOI would not begin incurring costs for reviewing a lease application until 2021 because of the time needed to resolve the technical and legal issues associated with developing offshore test facilities.

The costs of the legislation (detailed in Table 1) fall within budget functions 270 (energy) and 300 (natural resources and the environment).

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER H.R. 3609

[illegible]

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER H.R. 3609—Continued

	By fiscal year, millions of dollars—														2019– 2024	2019– 2029
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029					
Total Changes	0	104	110	114	120	126	0	0	0	0	0	574	574			
Estimated Authorization	21	54	81	101	113	96	61	31	12	4	370	574				

The CBO staff contact for this estimate is Kathleen Gramp. The estimate was reviewed by H. Samuel Papenfuss, Deputy Assistant Director for Budget Analysis.

XI. FEDERAL MANDATES STATEMENT

H.R. 3609 contains no unfunded mandates.

XII. COMMITTEE OVERSIGHT FINDINGS AND RECOMMENDATIONS

The Committee's oversight findings and recommendations are reflected in the body of the report.

XIII. STATEMENT ON GENERAL PERFORMANCE GOALS AND OBJECTIVES

The goal of the legislation is to bolster research, development, and demonstration (RD&D) of wind energy technologies that improve systems' efficiency, manufacturing, reliability, integration, and affordability, amongst other qualities.

XIV. FEDERAL ADVISORY COMMITTEE STATEMENT

H.R. 3609 does not create any advisory committees.

XV. DUPLICATION OF FEDERAL PROGRAMS

Pursuant to clause 3(c)(5) of rule XIII of the Rules of the House of Representatives, the Committee finds that no provision of H.R. 3609 establishes or reauthorizes a program of the federal government known to be duplicative of another federal program, including any program that was included in a report to Congress pursuant to section 21 of Public Law 111–139 or the most recent Catalog of Federal Domestic Assistance.

XVI. EARMARK IDENTIFICATION

Pursuant to clause 9(e), 9(f), and 9(g) of rule XXI, the Committee finds that H.R. 3609 contains no earmarks, limited tax benefits, or limited tariff benefits.

XVII. APPLICABILITY TO THE LEGISLATIVE BRANCH

The Committee finds that H.R. 3609 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVIII. STATEMENT ON PREEMPTION OF STATE, LOCAL,
OR TRIBAL LAW

This bill is not intended to preempt any state, local, or tribal law.

XIX. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets and existing law in which no change is proposed is shown in roman):

ENERGY POLICY ACT OF 2005

* * * * *

**TITLE IX—RESEARCH AND
DEVELOPMENT**

* * * * *

Subtitle C—Renewable Energy

SEC. 931. RENEWABLE ENERGY.

(a) IN GENERAL.—

(1) OBJECTIVES.—The Secretary shall conduct programs of renewable energy research, development, demonstration, and commercial application, including activities described in this subtitle. Such programs shall take into consideration the following objectives:

(A) Increasing the conversion efficiency of all forms of renewable energy through improved technologies.

(B) Decreasing the cost of renewable energy generation and delivery.

(C) Promoting the diversity of the energy supply.

(D) Decreasing the dependence of the United States on foreign energy supplies.

(E) Improving United States energy security.

(F) Decreasing the environmental impact of energy-related activities.

(G) Increasing the export of renewable generation equipment from the United States.

(2) PROGRAMS.—

(A) SOLAR ENERGY.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for solar energy, including—

(i) photovoltaics;

(ii) solar hot water and solar space heating;

(iii) concentrating solar power;

(iv) lighting systems that integrate sunlight and electrical lighting in complement to each other in common lighting fixtures for the purpose of improving energy efficiency;

(v) manufacturability of low cost, high quality solar systems; and

(vi) development of products that can be easily integrated into new and existing buildings.

[(B) WIND ENERGY.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for wind energy, including—

[(i) low speed wind energy;

[(ii) offshore wind energy;

[(iii) testing and verification (including construction and operation of a research and testing facility capable of testing wind turbines); and

[(iv) distributed wind energy generation.]]

(C) GEOTHERMAL.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for geothermal energy. The program shall focus on developing improved technologies for reducing the costs of geothermal energy installations, including technologies for—

(i) improving detection of geothermal resources;

(ii) decreasing drilling costs;

(iii) decreasing maintenance costs through improved materials;

(iv) increasing the potential for other revenue sources, such as mineral production; and

(v) increasing the understanding of reservoir life cycle and management.

(D) HYDROPOWER.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for cost competitive technologies that enable the development of new and incremental hydropower capacity, adding to the diversity of the energy supply of the United States, including:

(i) Fish-friendly large turbines.

(ii) Advanced technologies to enhance environmental performance and yield greater energy efficiencies.

(E) MISCELLANEOUS PROJECTS.—The Secretary shall conduct research, development, demonstration, and commercial application programs for—

(i) ocean energy, including wave energy;

(ii) the combined use of renewable energy technologies with one another and with other energy technologies, including the combined use of wind power and coal gasification technologies;

(iii) renewable energy technologies for cogeneration of hydrogen and electricity; and

(iv) kinetic hydro turbines.

(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary to carry out renewable energy research, development, demonstration, and commercial application activities, including activities authorized under this subtitle—

(1) \$632,000,000 for fiscal year 2007;

(2) \$743,000,000 for fiscal year 2008;

(3) \$852,000,000 for fiscal year 2009; and

(4) \$963,000,000 for fiscal year 2010.

(c) BIOENERGY.—From the amounts authorized under subsection (b), there are authorized to be appropriated to carry out section 932—

- (1) \$213,000,000 for fiscal year 2007, of which \$100,000,000 shall be for section 932(d);
- (2) \$377,000,000 for fiscal year 2008, of which \$125,000,000 shall be for section 932(d);
- (3) \$398,000,000 for fiscal year 2009, of which \$150,000,000 shall be for section 932(d); and
- (4) \$419,000,000 for fiscal year 2010, of which \$150,000,000 shall be for section 932(d).

(d) SOLAR POWER.—From amounts authorized under subsection (b), there is authorized to be appropriated to carry out activities under subsection (a)(2)(A)—

- (1) \$140,000,000 for fiscal year 2007, of which \$40,000,000 shall be for activities under section 935;
- (2) \$200,000,000 for fiscal year 2008, of which \$50,000,000 shall be for activities under section 935; and
- (3) \$250,000,000 for fiscal year 2009, of which \$50,000,000 shall be for activities under section 935.

(e) ADMINISTRATION.—Of the funds authorized under subsection (c), not less than \$5,000,000 for each fiscal year shall be made available for grants to—

- (1) part B institutions;
- (2) Tribal Colleges or Universities (as defined in section 316(b) of the Higher Education Act of 1965 (20 U.S.C. 1059c(b))); and
- (3) Hispanic-serving institutions.

(f) RURAL DEMONSTRATION PROJECTS.—In carrying out this section, the Secretary, in consultation with the Secretary of Agriculture, shall demonstrate the use of renewable energy technologies to assist in delivering electricity to rural and remote locations including —

- (1) advanced wind power technology, including combined use with coal gasification;
- (2) biomass; and
- (3) geothermal energy systems.

(g) ANALYSIS AND EVALUATION.—

(1) IN GENERAL.—The Secretary shall conduct analysis and evaluation in support of the renewable energy programs under this subtitle. These activities shall be used to guide budget and program decisions, and shall include—

- (A) economic and technical analysis of renewable energy potential, including resource assessment;
- (B) analysis of past program performance, both in terms of technical advances and in market introduction of renewable energy; and
- (C) any other analysis or evaluation that the Secretary considers appropriate.

(2) FUNDING.—The Secretary may designate up to 1 percent of the funds appropriated for carrying out this subtitle for analysis and evaluation activities under this subsection.

* * * * *

**SECTION 4 OF THE RENEWABLE ENERGY AND ENERGY
EFFICIENCY TECHNOLOGY COMPETITIVENESS ACT
OF 1989**

**SEC. 4. NATIONAL GOALS AND MULTI-YEAR FUNDING FOR FEDERAL
WIND, PHOTOVOLTAICS, AND SOLAR THERMAL PRO-
GRAMS.**

(a) NATIONAL GOALS.—The following are declared to be the national goals for the wind, photovoltaics, and solar thermal energy programs being carried out by the Secretary:

[(1) WIND.—(A) In general, the goals for the Wind Energy Research Program include improving design methodologies and developing more reliable and efficient wind turbines to increase the cost competitiveness of wind energy. Research efforts shall emphasize—

[(i) activities that address near-term technical problems and assist private sector exploitation of market opportunities of the wind energy industry;

[(ii) developing technologies such as advanced airfoils and variable speed generators to increase wind turbine output and reduce maintenance costs by decreasing structural stress and fatigue;

[(iii) increasing the basic knowledge of aerodynamics, structural dynamics, fatigue, and electrical systems interactions as applied to wind energy technology; and

[(iv) improving the compatibility of electricity produced from wind farms with conventional utility needs.

[(B) Specific goals for the Wind Energy Research Program shall be to—

[(i) reduce average wind energy costs to 3 to 5 cents per kilowatt hour by 1995;

[(ii) reduce capital costs of new wind energy systems to \$500 to \$750 per kilowatt of installed capacity by 1995;

[(iii) reduce operation and maintenance costs for wind energy systems to less than one cent per kilowatt hour by 1995; and

[(iv) increase capacity factors for new wind energy systems to 25 to 35 percent by 1995.]

(2) PHOTOVOLTAICS.—(A) In general, the goals of the Photovoltaic Energy Systems Program shall include improving the reliability and conversion efficiencies of and lowering the costs of photovoltaic conversion. Research efforts shall emphasize advancements in the performance, stability, and durability of photovoltaic materials.

(B) Specific goals of the Photovoltaic Energy Systems Program shall be to—

 (i) improve operational reliability of photovoltaic modules to 30 years by 1995;

 (ii) increase photovoltaic conversion efficiencies by 20 percent by 1995;

 (iii) decrease new photovoltaic module direct manufacturing costs to \$800 per kilowatt by 1995; and

 (iv) increase cost efficiency of photovoltaic power production to 10 cents per kilowatt hour by 1995.

(3) SOLAR THERMAL.—(A) In general, the goal of the Solar Thermal Energy Systems Program shall be to advance re-

search and development to a point where solar thermal technology is cost-competitive with conventional energy sources, and to promote the integration of this technology into the production of industrial process heat and the conventional utility network. Research and development shall emphasize development of a thermal storage technology to provide capacity for shifting power to periods of demand when full insolation is not available; improvement in receivers, energy conversion devices, and innovative concentrators using stretch membranes, lenses, and other materials; and exploration of advanced manufacturing techniques.

(B) Specific goals of the Solar Thermal Energy Systems Program shall be to—

- (i) reduce solar thermal costs for industrial process heat to \$9.00 per million Btu by 1995; and
- (ii) reduce average solar thermal costs for electricity to 4 to 5 cents per kilowatt hour by 1995.

(4) ALCOHOL FROM BIOMASS.—(A) In general, the goal of the Alcohol From Biomass Program shall be to advance research and development to a point where alcohol from biomass technology is cost-competitive with conventional hydrocarbon transportation fuels, and to promote the integration of this technology into the transportation fuel sector of the economy.

(B)(i) Specific goals for producing ethanol from biomass shall be to—

- (I) reduce the cost of alcohol to 70 cents per gallon;
- (II) improve the overall biomass carbohydrate conversion efficiency to 91 percent;
- (II) reduce the capital cost component of the cost of alcohol to 23 cents per gallon; and
- (IV) reduce the operating and maintenance component of the cost of alcohol to 47 cents per gallon.

(ii) Specific goals for producing methanol from biomass shall be to—

- (I) reduce the cost of alcohol to 47 cents per gallon; and
- (II) reduce the capital component of the cost of alcohol to 16 cents per gallon.

(5) OTHER TECHNOLOGIES.—The Secretary shall submit to the Congress, as part of the first report submitted under section 12006 of this title, recommendations for specific cost goals and other pertinent goals for 1995 for Department of Energy research, development, and demonstration programs in Biofuels Energy Systems, Biodiesel Energy Systems, Hydrogen Energy Systems, Solar Buildings Energy Systems, Ocean Energy Systems, Geothermal Energy Systems, Low-Head Hydro, and Energy Storage Systems.

(b) AMENDED GOAL.—Whenever the Secretary determines that any of the goals established under this section is no longer appropriate, the Secretary shall notify Congress, as part of a report submitted under section 12006 of this title, of the reason for the determination and provide an amended goal that is consistent with the purpose stated in section 12001(b) of this title.

(c) AUTHORIZATIONS.—There are authorized to be appropriated to the Secretary for the following renewable energy research, development, and demonstration programs: the Wind Energy Research

Program, the Photovoltaic Energy Systems Program, the Solar Thermal Energy Systems Program, the Biofuels Energy Systems Program, the Hydrogen Energy Systems Program, the Solar Buildings Energy Systems Program, the Ocean Energy Systems Program, and the Geothermal Energy Systems Program—

(1) not to exceed \$113,000,000 for fiscal year 1991, of which—

(A) not to exceed \$39,000,000 shall be available for the Photovoltaic Energy Systems Program;

(B) not to exceed \$19,000,000 shall be available for the Geothermal Energy Systems Program; and

(C) not to exceed \$4,000,000 shall be available for the Hydrogen Energy Systems Program; and

(2) not to exceed \$121,000,000 for fiscal year 1992, of which—

(A) not to exceed \$40,000,000 shall be available for the Photovoltaic Energy Systems Program;

(B) not to exceed \$20,500,000 shall be available for the Geothermal Energy Systems Program; and

(C) not to exceed \$5,000,000 shall be available for the Hydrogen Energy Systems Program.

Each of the President's annual budget requests submitted to Congress after December 11, 1989, shall include as separate line items each of the categories of renewable energy programs described in this subsection.

XX. MINORITY VIEWS

It is the view of the minority that establishing a diverse portfolio of advanced clean energy sources is essential to the long-term economic growth, environmental stewardship, and national security of the United States. It is also the view of the minority that basic research is the most effective means of developing next-generation clean energy technologies. Federal research agencies like the Department of Energy (DOE) should invest in basic research and associated critical infrastructure that will lead to the next scientific discovery and cutting-edge technology, rather than prioritizing support for proven energy applications and private industry.

Last year, the U.S. wind energy industry supported 120,000 jobs and invested \$14 billion in new wind projects. While the minority supports targeted investment in next-generation wind energy technologies and hybrid energy systems, it is the view of the minority that this legislation focuses too heavily on reducing market barriers for mature wind energy technology, where industry already has a clear ability and incentive to step in.

It is the view of the minority that H.R. 3609 includes an unnecessary increase in authorization of appropriations for DOE work. DOE's wind energy activities are housed within the Department's Office of Energy Efficiency and Renewable Energy (EERE), which has more funding at its disposal than DOE's other applied offices in Nuclear Energy, Fossil Energy, Electricity, and Cybersecurity combined. It is the view of the minority that any increased funding for DOE's wind energy activities could be reasonably allocated from within the existing EERE budget.

FRANK D. LUCAS,
Ranking Member.
RANDY K. WEBER, Sr.,
Ranking Member,
Subcommittee on Energy.

XXI. PROCEEDINGS OF THE SUBCOMMITTEE MARKUP

MARKUPS:
**H.R. 3597, SOLAR ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;
H.R. 3607, FOSSIL ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019; AND
H.R. 3609, WIND ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019**

MARKUP
BEFORE THE
SUBCOMMITTEE ON ENERGY
OF THE
COMMITTEE ON SCIENCE, SPACE, AND
TECHNOLOGY
HOUSE OF REPRESENTATIVES
ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

JULY 10, 2019

Serial No. CP: 116-5

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C O N T E N T S

July 10, 2019

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H.R. 3609— <i>Wind Energy Research and Development Act of 2019</i>	88

**MARKUPS:
H.R. 3597, SOLAR ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;
H.R. 3607, FOSSIL ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019; AND
H.R. 3609, WIND ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019**

WEDNESDAY, JULY 10, 2019

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Subcommittee met, pursuant to notice, at 2:02 p.m., in room 2318 of the Rayburn House Office Building, Hon. Conor Lamb [Chairman of the Subcommittee] presiding.

Chairman LAMB. Good afternoon. The Subcommittee will come to order. Without objection, the Chair is authorized to declare recess at any time. Pursuant to Committee Rule 2(e) and House Rule 11, the Chair announces that he may postpone roll call votes. Pursuant to notice, the Subcommittee on Energy meets to consider the following measures: H.R. 3597, *Solar Energy Research and Development Act of 2019*; H.R. 3607, *Fossil Energy Research and Development Act of 2019*; and H.R. 3609, *Wind Energy Research and Development Act of 2019*.

Today we're marking up three bipartisan bills that will strengthen our country's research and development (R&D) across a broad array of energy, and ensure that we are improving our energy systems, our economy, and our climate. This Subcommittee has held two hearings related to these bills, which brought together experts representing industry, our national labs, policy development institutions, and environmental advocates to discuss the R&D needs of solar, wind, and fossil energy technologies. We are fortunate to have many world-leading companies, labs, universities, researchers, and scientists right here in our own country working on, and advancing and discovering energy technologies that can lower the cost for consumers, and limit carbon emissions at the same time. These types of advancements can play a key role in mitigating climate change, producing breakthroughs, and providing good jobs.

According to the EPA (Environmental Protection Agency), the electricity, industrial, and transportation sectors account for roughly 79 percent of the United States' greenhouse gas emissions. Energy innovation is a critical step to reducing those emissions, while

also improving our economy, and the affordability of energy. One of today's bills, which I am proud to be a co-sponsor of, the *Fossil Energy Research and Development Act of 2019*, embodies this dual opportunity. It supports carbon capture, utilization, and storage technologies, and this will help us de-carbonize fossil fuels, and preserve American jobs in some of our most important industries.

The Federal Government's research, development, and demonstration activities have already led us to significant advancements in these areas. As we've discussed before this Subcommittee, the growth of natural gas production, which we have seen, and are continuing to see, in western Pennsylvania, and the surge in residential and utility scale photovoltaic solar panels across the country have a very direct link back to the Department of Energy's (DOE's) research and development. We need to build on these achievements, and accordingly Congress must provide the direction, tools, and resources that DOE needs to meet these challenges. Unfortunately, much of the existing law authorizing DOE's work in solar, wind, and fossil energy is insufficient and outdated. These bills will change that. They will reauthorize DOE's existing work, and provide updated guidance and tools that reflect the immense changes each industry has experienced over the past 15 years.

Specifically, H.R. 3597, the *Solar Research and Development Act of 2019*, reauthorizes and expands research, development, and demonstration on a range of solar energy technologies, including photovoltaic and concentrating solar power systems. The bill authorizes research on emerging technologies and market mechanisms to improve solar energy's efficiency and affordability, like new materials that could allow solar panels to be integrated into windows, and other types of infrastructure.

H.R. 3607, the *Fossil Energy Research and Development Act of 2019*, reauthorizes and expands research, development, and demonstration of carbon capture technologies for power plants and industrial sources. It would also authorize R&D activities in carbon storage, carbon utilization, improvements in efficiency in rare Earth elements; launch new initiatives in carbon dioxide removal, waste gas utilization, and also help us prevent significant leaks of methane from natural gas infrastructure.

Finally, H.R. 3609, the *Wind Energy Research and Development Act of 2019*, reauthorizes and expands research, development, testing, and evaluation of wind energy technologies, including onshore and offshore turbines, as well as airborne technologies. The bill specifically authorizes research on technologies that can enable next-generation, very large scale wind turbines and floating offshore wind farms.

The energy industry is critical to our economy. Passing these bills will ensure that our Nation leads in energy innovation, allows us to mitigate climate change, and continue creating American jobs. I look forward to advancing these important bills out of our Subcommittee today, and I now recognize the Ranking Member, Mr. Weber, to present his opening remarks.

[The prepared statement of Chairman Lamb follows:]

Today, we are marking up three bipartisan bills that will bolster our country's research and development across a broad array of the energy sector and ensure we are improving our energy systems, our economy, and our climate. This Sub-

committee has held two hearings related to these bills, which brought together experts representing industry, our National Labs, well-respected policy development institutions, and environmental advocacy organizations to discuss the R&D needs of solar, wind, and fossil energy technologies.

We're fortunate to have many world-leading companies, labs, universities, researchers and scientists right here in our country working on advancing and discovering energy technologies that can decrease energy costs for consumers and limit carbon emissions. These types of advancements can play a key role in mitigating climate change, producing scientific breakthroughs, and providing good jobs for American workers. According to the Environmental Protection Agency, the electricity, industrial, and transportation sectors account for roughly 79% of the United States' greenhouse gas emissions. Energy innovation is a critical step in reducing these emissions while improving our economy and energy affordability. One of today's bills which I am a proud cosponsor of, the *Fossil Energy Research and Development Act of 2019*, embodies this dual opportunity. Supporting carbon capture, utilization, and storage technologies will simultaneously help decarbonize fossil fuels and preserve American jobs in those important industries.

The Federal Government's research, development, and demonstration activities have already led to significant energy advancements. As we have discussed before this Subcommittee, the growth of natural gas production, which we are certainly seeing in western Pennsylvania, and the surge in residential and utility-scale photovoltaic solar panels across the country have clear ties back to Department of Energy R&D. We need to build on these achievements and accordingly, Congress must provide the direction, tools, and resources that DOE needs to meet the challenges of today.

Unfortunately, much of the existing law authorizing DOE's work through its Solar, Wind, and Fossil Energy Technology Offices is insufficient and outdated. These bills reauthorize DOE's existing work and provide updated guidance and tools that reflect the immense changes each industry has experienced over the past 15 years. Specifically:

H.R. 3597, the *Solar Research and Development Act of 2019*, reauthorizes and expands research, development, and demonstration on a range of solar energy technologies, including photovoltaic and concentrating solar power systems. The bill authorizes research on emerging technologies and market mechanisms to improve solar energy's efficiency and affordability, like new materials that could allow solar panels to be integrated into windows and other types of infrastructure.

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Finally, H.R. 3609, the *Wind Energy Research and Development Act of 2019*, reauthorizes and expands research, development, testing, and evaluation of wind energy technologies, including onshore and offshore turbines as well as airborne technologies. The bill specifically authorizes research on technologies that can enable next-generation, very large-scale wind turbines and floating offshore wind farms.

It's clear—the energy industry is critical to the American economy. Passing these bills would help ensure that our nation leads in energy innovation, allowing us to mitigate climate change, continue creating American jobs in the energy industry, and improve the air we breathe. I look forward to advancing these important bills out of our Subcommittee today.

Mr. WEBER. Thank you, Mr. Chairman—and good afternoon to all—for the opportunity to speak on H.R. 3597, I thank you. It is the *Solar Energy Research and Development Act of 2019*. Also H.R. 3609, the *Wind Energy Research and Development Act of 2019*, and H.R. 3607, the *Fossil Energy Research and Development Act of 2019*.

On the Science Committee, as my friends on both sides of the aisle here can attest, we pride ourselves on our ability to do great bipartisan work to support the research and development activities that will grow our economy, strengthen our national security, protect our environment, and help maintain U.S. leadership in science and technology. That's why it's unfortunate that we cannot come

to an agreement on this legislation today. The three bills we will consider this afternoon are focused on demonstrating energy technologies, many of which are already currently available in the commercial marketplace, and they propose unrealistic budget increases to a number of DOE applied programs. If enacted, these bills could further limit Federal investment available for truly innovative early-stage research that industry cannot undertake.

The *Solar Energy Research and Development Act* authorizes solar energy research conducted by the DOE's Office of Energy Efficiency and Renewable Energy, or EERE. EERE is the largest applied program at the DOE by far, and received almost \$2.4 billion in funding in 2019. This legislation before us today would authorize approximately \$1.5 billion for this work, reaching a 33 percent total increase in funding from enacted levels by 2024. And while this legislation makes references to "next generation" solar technologies, and does include authorizations for some critical basic research priorities that I support like innovative energy storage, and advanced computing capabilities, it focuses heavily on expanding the deployment of today's solar technologies. Similarly, the *Wind Energy Research and Development Act* authorizes wind energy research conducted under EERE, and would provide over \$570 million for this work. This amounts to a 37 percent increase from enacted levels by 2024.

And while this legislation addresses some shared priorities, like basic research in material science and hybrid energy systems, its primary focus is on reducing "market barriers" for existing wind technologies. I think I can safely say we all support the incredible growth we've seen in the wind and solar industries in the past decade—Texas leads the Nation in wind energy—but American industry is already leading the way on deploying these wind energy technologies, and we won't discover the next game-changing technology by duplicating those efforts.

Finally, the *Fossil Energy Research and Development Act* reauthorizes DOE's fossil energy research and development, FER&D programs, and brings total spending in this area to over \$1 billion by Fiscal Year 2024, a 36 percent increase from enacted levels. And while I'm supportive of funding research to help us better capture, store, and utilize carbon, this can't be our only goal when it comes to fossil energy technology. This bill's singular focus on emissions control technology ignores the reality of our Nation's continued reliance on fossil fuel resources, and their role in our clean energy future.

Now, let me be clear, I'm supportive of DOE funding for innovative research that will lead to new solar, wind, and fossil energy technologies. But, as stewards of taxpayers' resources, we must focus funding on projects that are truly cutting-edge, like basic research in advanced computing, advanced manufacturing, and the development of new materials. The fact is fundamental research often leads to improvements in all forms of energy technologies, and not just ones that get attention from Members of Congress. With our national debt at \$22 trillion and rising, we simply can't afford to increase spending for every program. So, instead of trying to pick and choose, or just setting aspirational spending goals, let's take the common sense approach, and let's work together to invest

in the basic research that we all support. Mr. Chairman, I yield back.

[The prepared statement of Mr. Weber follows:]

Good afternoon. Thank you, Chairman Lamb, for the opportunity to speak on H.R. 3597, the *Solar Energy Research and Development Act of 2019*, H.R. 3609, the *Wind Energy Research and Development Act of 2019*, H.R. 3607, the *Fossil Energy Research and Development Act of 2019*.

On the Science Committee—as my friends on both sides of the aisle here can attest—we pride ourselves on our ability to do great, bipartisan work to support the research and development activities that will grow our economy, strengthen our national security, protect our environment, and help maintain U.S. leadership in science and technology.

That's why it's unfortunate that we could not come to an agreement on this legislation today. The three bills we will consider this afternoon are focused on demonstrating energy technologies—many of which are already currently available in the commercial marketplace—and they propose unrealistic budget increases to a number of Department of Energy applied programs. If enacted, these bills could further limit federal investment available for truly innovative, early-stage research that industry cannot undertake.

The *Solar Energy Research and Development Act* authorizes solar energy research conducted by the Department of Energy (DOE)'s Office of Energy Efficiency and Renewable Energy (or E-E-R-E). EERE is the largest applied program at DOE by far—and received almost \$2.4 billion dollars in funding in 2019.

This legislation would authorize approximately one and a half billion dollars for this work, reaching a 33% total increase in funding from enacted levels by 2024.

And while this legislation makes references to “next generation” solar technologies, and does include authorizations for some critical basic research priorities that I support like innovative energy storage and advanced computing capabilities, it focuses heavily on expanding the deployment of today's solar technologies. Similarly, the *Wind Energy Research and Development Act* authorizes wind energy research conducted under E-E-R-E and would provide over \$570 million for this work. This amounts to a 37% increase from enacted levels by 2024.

And while this legislation addresses some shared priorities, like basic research in materials science and hybrid energy systems, its primary focus is on reducing “market barriers” for existing wind technologies.

I think I can safely say we all support the incredible growth we've seen in the wind and solar industries in the past decade. But American industry is already leading the way on deploying these technologies—and we won't discover the next game changing technology by duplicating their efforts.

Finally, the *Fossil Energy Research and Development Act* reauthorizes DOE's Fossil Energy Research and Development programs and brings total spending in this area to over \$1 billion by FY 2024, a 36% increase from enacted levels. And while I'm supportive of funding research to help us better capture, storage, and utilize carbon, this can't be our only goal when it comes fossil to energy technology.

This bill's singular focus on emissions control technologies ignores the reality of our nation's continued reliance on fossil fuel resources, and their role in our clean energy future.

Now, I want to be clear—I'm supportive of DOE funding for innovative research that will lead to new solar, wind, and fossil energy technologies. But, as stewards of taxpayer resources, we must focus funding on projects that are truly cutting edge—like basic research in advanced computing, advanced manufacturing, and the development of new materials. The fact is, fundamental research often leads to improvements in all forms of energy technologies—not just the ones that get attention from Members of Congress.

With our national debt at \$22 trillion and rising, we simply can't afford to increase spending for every program.

So instead of trying to pick and choose, or just setting aspirational spending goals, let's take the common-sense approach, and work together to invest in the basic research we all support.

Chairman LAMB. Thank you, Mr. Weber. Now I recognize the Chair of the Full Committee to present her opening remarks.

Chairwoman JOHNSON. Thank you very much, and good afternoon, and thank you, Chairman Lamb, for holding this markup to advance bipartisan legislation that focuses on several of our Nation's most important energy resources: Solar, wind, and fossil en-

ergy. We're in a moment of transformation in this Nation. Both Democrats and Republicans recognize the importance of prioritizing a clean energy future for America. The research paths we set forth today, such as those laid out in these bills, will be essential to helping us achieve our climate change mitigation and adaptation goals, while ensuring that every American has access to low-cost, reliable electricity.

First we have H.R. 3597, the *Solar Research and Development Act of 2019*, led by Congressman McAdams. This legislation lays out a thoughtful research agenda for solar energy; prioritizing technologies that are efficient, reliable, and affordable. This bill also supports a new solar technology manufacturing initiative that instructs the Department of Energy to develop and implement a plan for re-establishing a domestic solar energy manufacturing base.

Next we have H.R. 3607, the *Fossil Energy Research and Development Act of 2019*, led by Congressman Veasey, which I was very happy to co-sponsor, along with my colleagues Mr. Lamb, the Environment Subcommittee Chairwoman Fletcher, and Congressman Schweikert. We know how important it is to invest in research to address the environmental impacts of fossil fuels, and this legislation does exactly that. This bill sets forth a research agenda for important topics like carbon capture, storage, and utilization, carbon renewal; and methane leak detection and mitigation. And by doing so, this bill establishes a strong foundation for our Nation's research priorities on fossil energy.

And last, we have H.R. 3609, the *Wind Energy Research and Development Act of 2019*, led by Congressman Tonko. This legislation directs the Department of Energy to focus on a robust wind energy research agenda that includes new materials and system designs that promote sustainability and ease of manufacturing. This bill also supports a robust research agenda for offshore wind, which has significant potential for leveraging untapped energy resources near our Nation's coasts.

I thank my fellow Members of Congress on both sides of the aisle who worked hard on these bills, and for their leadership in advancing these important energy technologies. They're each strong examples of the kind of non-partisan constructive efforts that move us forward as a Nation. I yield back.

[The prepared statement of Chairwoman Johnson follows:]

Good afternoon and thank you, Chairman Lamb, for holding this markup to advance bipartisan legislation that focuses on several of our nation's most important energy resources: solar, wind, and fossil energy.

We are in a moment of transformation in this nation. Both Democrats and Republicans recognize the importance of prioritizing a clean energy future for America. The research paths we set forth today, such as those laid out in these bills, will be essential to helping us achieve our climate change mitigation and adaptation goals while ensuring that every American has access to low-cost, reliable electricity.

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Next, we have H.R. 3607, the *Fossil Energy Research and Development Act of 2019*, led by Congressman Veasey, which I was very happy to cosponsor along with my colleagues Chairman Lamb, our Environment Subcommittee Chairwoman Fletcher, and Congressman Schweikert. We know how important it is to invest in

research to address the environmental impacts of fossil fuels, and this legislation does exactly that. This bill sets forth a research agenda for important topics like carbon capture, storage, and utilization; carbon removal; and methane leak detection and mitigation. And by doing so, this bill establishes a strong foundation for our nation's research priorities on fossil energy.

Lastly, we have H.R. 3609, the *Wind Energy Research and Development Act of 2019*, led by Congressman Tonko. This legislation directs the Department of Energy to focus on a robust wind energy research agenda that includes new materials and system designs that promotesustainability and ease of manufacturing. This bill also supports a robust research agenda for offshore wind, which has significant potential for leveraging untapped energy resources near our nation's coasts.

I thank my fellow Members of Congress on both sides of the aisle who have worked hard on these bills for their leadership in advancing these important energy technologies. They are each strong examples of the kind of nonpartisan, constructive efforts that move us forward as a nation.

With that, I yield back.

29

87

H.R. 3609

Chairman LAMB. We will now consider H.R. 3609, the *Wind Energy Research and Development Act of 2019*. The Clerk will report the bill.

The CLERK. H.R. 3609, a bill——

[The bill follows:]

30

88

116TH CONGRESS
1ST SESSION

H. R. _____

To provide for a program of wind energy research, development, and demonstration, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

M. _____ introduced the following bill; which was referred to the
Committee on _____

A BILL

To provide for a program of wind energy 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 “Wind Energy Research
5 and Development Act of 2019”.

6 **SEC. 2. WIND ENERGY TECHNOLOGY, RESEARCH, DEVELOP-**
7 **MENT AND TESTING PROGRAM.**

8 (a) IN GENERAL.—The Secretary of Energy (in this
9 Act, referred to as the “Secretary”) shall carry out a pro-
10 gram to conduct research, development, testing, and eval-

1 uation of wind energy technologies. In carrying out such
2 program, the Secretary shall award grants under this sec-
3 tion and sections 3, 4, and 5 on a competitive, merit-re-
4 viewed basis to eligible entities for each of the following
5 purposes:

6 (1) To improve the energy efficiency, reliability,
7 resilience, security, and capacity of wind energy gen-
8 eration.

9 (2) To optimize the design and control of wind
10 energy systems for the broadest practical range of
11 atmospheric conditions.

12 (3) To reduce the cost and risk of permitting,
13 construction, operation, and maintenance of wind
14 energy systems, including technologies to reduce en-
15 vironmental and community impacts, improve grid
16 integration and reduce regulatory barriers.

17 (4) To improve materials, engineering, and
18 manufacturing processes for turbines, including
19 supersized turbines.

20 (5) To optimize wind plant performance and in-
21 tegration within hybrid energy systems to enhance
22 cost efficiency and electric grid stability and resil-
23 ience.

24 (b) WIND ENERGY RESEARCH SUBJECT AREAS.—

25 The program established under subsection (a) shall focus

32

90

3

1 on the research, development, testing, and evaluation of
2 each of the following subject areas:

3 (1) Wind power plant performance and oper-
4 ations including—

5 (A) wind flows and turbine-to-turbine
6 interactions;

7 (B) energy conversion potential;

8 (C) turbine and wind plant control para-
9 digms;

10 (D) turbine and wind plant security;

11 (E) turbine components; and

12 (F) integrated hybrid plant systems.

13 (2) New materials and designs related to
14 blades, rotors, towers and drivetrains including—

15 (A) higher tip speed rotor designs;

16 (B) low noise rotor designs;

17 (C) advanced drivetrain and generator con-
18 cepts;

19 (D) modular construction and onsite or
20 near-site manufacturing and assembly tech-
21 niques;

22 (E) sustainable and recyclable materials
23 and manufacturing systems;

24 (F) supersized turbine design and installa-
25 tion approaches; and

- 1 (G) lightweight materials.
- 2 (3) Offshore wind-specific projects including—
 - 3 (A) fixed and floating substructure con-
4 cepts;
 - 5 (B) projects to assess and mitigate the im-
6 pacts of hurricane wind flow, freshwater ice,
7 and other United States-specific conditions;
 - 8 (C) innovative operations and maintenance
9 strategies;
 - 10 (D) analysis of offshore meteorological, ge-
11 ological, and oceanographic data collection; and
12 (E) offshore infrastructure monitoring.
- 13 (4) Recycling and reuse of wind energy compo-
14 nents.
- 15 (5) Wind power forecasting and atmospheric
16 measurement systems, including for turbines and
17 plant systems of varying height.
- 18 (6) The distributed wind energy sector.
- 19 (7) Advanced transportation mechanisms for
20 wind turbine components.
- 21 (8) Transformational technologies for har-
22 nassing wind energy, including airborne wind energy
23 concepts.
- 24 (9) Methods to extend the operational lifetime
25 of onshore and offshore wind turbines and systems.

1 (10) Other research areas as determined by the
2 Secretary.

3 (c) COORDINATION.—To the maximum extent prac-
4 ticable, the Secretary shall coordinate activities under the
5 program established under subsection (a) with other rel-
6 evant programs and capabilities of the Department of En-
7 ergy and other Federal research programs.

8 (d) CONFORMING REPEALS.—

9 (1) Section 931(a)(2) of the Energy Policy Act
10 of 2005 (42 U.S.C. 16231(a)(2)) is amended by
11 striking subparagraph (B).

12 (2) Section 4(a) of the Renewable Energy and
13 Energy Efficiency Technology Competitiveness Act
14 of 1989 (42 U.S.C. 12003(a)) is amended by strik-
15 ing paragraph (1).

16 (e) DEFINITIONS.—In this section:

17 (1) The term “eligible entity” means any of the
18 following entities:

19 (A) An institution of higher education.

20 (B) A National Laboratory.

21 (C) A Federal research agency.

22 (D) A State research agency.

23 (E) A nonprofit research organization.

24 (F) An industrial entity or a multi-institu-
25 tional consortium thereof.

1 (2) The term “institution of higher education”
2 has the meaning given such term in section 101 of
3 the Higher Education Act of 1965 (20 U.S.C.
4 1001).

5 (3) The term “National Laboratory” has the
6 meaning given such term in section 2(3) of the En-
7 ergy Policy Act of 2005 (42 U.S.C. 15801(3)).

8 (4) The term “supersized turbine” means a 12
9 megawatt or greater wind turbine, typically with a
10 tower height greater than 140 meters and blades
11 greater than 75 meters.

12 **SEC. 3. WIND ENERGY TECHNOLOGY VALIDATION AND**
13 **MARKET TRANSFORMATION PROGRAM.**

14 (a) **IN GENERAL.**—In carrying out the program es-
15 tablished under section 2(a), the Secretary shall conduct
16 a wind energy technology validation and market trans-
17 formation program under which the Secretary shall award
18 grants on a competitive, merit-reviewed basis to eligible
19 entities to support activities that demonstrate and validate
20 new wind energy technologies with the potential to be cost-
21 competitive for land-based, offshore, and distributed appli-
22 cations.

23 (b) **APPLICATION.**—An eligible entity seeking a grant
24 under this section shall submit an application in such form

1 and manner as the Secretary may prescribe and that con-
2 tains—

3 (1) a certification that any demonstration
4 project carried out using grant funds are—

5 (A) conducted in collaboration with indus-
6 try and, as appropriate, with institutions of
7 higher education and other Federal research
8 programs; and

9 (B) of sufficient size and geographic diver-
10 sity to measure wind energy system perform-
11 ance under the full productive range of wind
12 conditions in the United States; and

13 (2) such other information as the Secretary
14 may require.

15 (c) FACILITY FOR HYBRID ENERGY SYSTEM RE-
16 SEARCH AND DEMONSTRATION PROJECTS.—In carrying
17 out the program established under subsection (a), the Sec-
18 retary shall establish or support a facility to conduct re-
19 search and demonstration projects for wind turbines and
20 plants in hybrid energy systems that incorporate diverse
21 generation sources, loads, and storage technologies.

22 **SEC. 4. WIND ENERGY INCUBATOR FUNDING.**

23 In carrying out the program established under section
24 2(a), the Secretary shall award grants on a competitive,
25 merit-reviewed basis to eligible entities to support innova-

1 tive technologies that are not represented in a significant
2 way in—

3 (1) the portfolio of wind energy research activi-
4 ties carried out by the Department of Energy as of
5 the date of the enactment of this Act; or

6 (2) technology roadmaps used by the Depart-
7 ment of Energy as of such date of enactment.

8 **SEC. 5. MITIGATING REGULATORY AND MARKET BARRIERS.**

9 (a) **IN GENERAL.**—In carrying out the program es-
10 tablished under section 2(a), the Secretary shall award
11 grants on a competitive, merit-reviewed basis to eligible
12 entities to research, develop, test, and evaluate ways to
13 reduce regulatory and market barriers to the widespread
14 adoption of wind power, including—

15 (1) grid transmission and integration chal-
16 lenges; and

17 (2) permitting issues associated with the poten-
18 tial impacts of wind power systems on wildlife, radar
19 systems, local communities, military operations, and
20 airspace.

21 (b) **WILDLIFE IMPACT MITIGATION.**—In carrying out
22 the activities described in subsection (a), the Secretary
23 shall support the development, testing, and evaluation of
24 wildlife impact mitigation technologies or strategies to re-
25 duce the potential impacts of wind energy facilities on—

- 1 (1) bald and golden eagles;
- 2 (2) bat species;
- 3 (3) marine wildlife; and
- 4 (4) other impacted species.

5 (c) EDUCATION AND OUTREACH.—In carrying out
6 the activities described in subsection (a), the Secretary
7 shall support education and outreach activities to dissemi-
8 nate information and promote public understanding of
9 wind technologies and the wind energy workforce, includ-
10 ing the Collegiate Wind Competition.

11 **SEC. 6. AUTHORIZATION OF APPROPRIATIONS.**

12 There are authorized to be appropriated to the Sec-
13 retary to carry out this Act—

- 14 (1) \$103,692,000 for fiscal year 2020;
- 15 (2) \$108,876,600 for fiscal year 2021;
- 16 (3) \$114,320,430 for fiscal year 2022;
- 17 (4) \$120,036,452 for fiscal year 2023; and
- 18 (5) \$126,038,274 for fiscal year 2024.

Chairman LAMB. Without objection, the bill is considered as read, and open to amendment at any point. I recognize myself briefly to comment on the bill.

H.R. 3609, the *Wind Energy Research and Development Act of 2019*, re-authorizes the Department of Energy's Wind Energy Technology Office, and provides updated direction to the Department's research efforts to ensure that we are advancing the next generation of wind energy technologies. The bipartisan bill is sponsored by my colleague, Mr. Tonko of New York, and co-sponsored by Mr. Bacon of Nebraska, Mr. Kennedy of Massachusetts, and Mr. Fortenberry of Nebraska. The legislation is endorsed by the American Wind Energy Association and the Distributed Wind Energy Association, which collectively represent around 1,000 wind companies nationwide, as well as the Natural Resources Defense Council and the Environmental Defense Fund.

Does anyone else wish to be recognized? We will now proceed with the amendments in the order of the roster. The first amendment on the roster is an amendment offered by the Chair, and the Clerk will report the amendment.

The CLERK. Amendment No. 1, amendment to H.R. 3609 offered by Mr. Lamb.

[The amendment of Mr. Lamb follows:]

AMENDMENT TO H.R. 3609
OFFERED BY Mr . Lamb

Page 2, line 2, insert “and in accordance with subsection (b)” after “program”.

Page 2, line 2, insert “and enter into contracts and cooperative agreements” after “grants”.

Page 2, line 3, strike “on a competitive, merit-reviewed basis to eligible entities”.

Redesignate subsections (b) through (e) of section 2 as subsections (c) through (f), respectively.

Add after section 2(a) the following:

1 (b) GRANTS, CONTRACTS, AND COOPERATIVE
2 AGREEMENTS.—

3 (1) GRANTS.—In carrying out the program, the
4 Secretary shall award grants on a competitive,
5 merit-reviewed basis to eligible entities for projects
6 that the Secretary determines would best achieve the
7 goals of the program.

8 (2) CONTRACTS AND COOPERATIVE AGREE-
9 MENTS.—In carrying out the program, the Secretary
10 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 purposes of the program.

4 (3) APPLICATION.—An entity seeking funding
5 or a contract or agreement under this subsection
6 shall submit to the Secretary an application at such
7 time, in such manner, and containing such informa-
8 tion as the Secretary may require.

In section 2(c), as so redesignated—

(1) redesignate paragraph (10) as paragraph
(11); and

(2) add after paragraph (9) the following:

9 (10) Storage technologies to address the tran-
10 sience and intermittency of wind energy resources.

Page 7, line 24, strike “award grants” and all that
follows through “eligible entities” and insert “conduct re-
search, development, testing, and evaluation activities in
accordance with subsection (b)”.

Page 8, line 10, strike “award grants” and all that
follows through “eligible entities”.

Page 8, line 12, insert “, in accordance with sub-
section (b),” after “evaluate”.



Chairman LAMB. I ask unanimous consent to dispense with the reading. Without objection, so ordered. I recognize myself briefly to explain the amendment. This amendment makes technical and conforming changes made in consultation with the Department of Energy, expert stakeholders, and our minority Committee staff. Is there any further discussion on this amendment?

A vote will occur on the amendment. All in favor say aye.

Those opposed say no.

The ayes have it, and the amendment is agreed to.

The next amendment on the roster is an amendment offered by the gentlelady from Michigan. She is recognized to offer an amendment.

Ms. STEVENS. Mr. Chairman, I have an amendment at the desk.

Chairman LAMB. The Clerk will report the amendment.

The CLERK. Amendment No. 2, amendment to H.R. 3609 offered by Ms. Stevens.

[The amendment of Ms. Stevens follows:]

AMENDMENT TO H.R. 3609**OFFERED BY Ms . Stevens**

Page and line numbers refer to wind_04 noticed by Committee on Science, Space, and Technology with timestamp of June 12, 2019 at 11:54AM.

Page 5, after line 8, insert the following:

1 (d) REPORT.—

2 (1) IN GENERAL.—Not later than 180 days
3 after the date of the enactment of this Act, the Sec-
4 retary shall submit to the Committee on Science,
5 Space, and Technology of the House of Representa-
6 tives and the Committee on Energy and Natural Re-
7 sources of the Senate a report on the potential for,
8 and technical viability of, airborne wind energy sys-
9 tems to provide a significant source of energy in the
10 United States.

11 (2) CONTENTS.—The report under subsection
12 (a) shall include a summary of research, develop-
13 ment, and demonstration needs, including an esti-
14 mate of Federal funding requirements, to further ex-
15 amine and validate the technical and economic via-
16 bility of airborne wind energy concepts over the 10-

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2

1 year period beginning on the date of the enactment
2 of this Act.



Chairman LAMB. I ask unanimous consent to dispense with the reading. Without objection, so ordered. I recognize the gentlelady for 5 minutes to explain the amendment.

Ms. STEVENS. Thank you, Mr. Chairman, and thank you for your expedient leadership in today's markup. Not long ago we sat in this very hearing room and heard from experts in renewable energy about the need for more research and resources to advance solar and wind technologies. As we heard, the Federal Government has a critical role to play in catalyzing the development and commercialization of these technologies. Today I'd like to challenge my colleagues to look further into innovative renewable energy technologies. My amendment would direct the Department of Energy to report on its research, development, and demonstration needs to further examine and validate the technical and economic viability of airborne wind energy systems.

Global scientific research has proven that there is enough power in wind energy to be a primary source of near zero emission electrical power as the global economy continues to grow throughout the 21st century. Federal investment in wind energy technologies is critical for many States, including my home State of Michigan. The Department of Energy's Office of Wind Energy Technologies has granted nearly \$12 million to projects in my State alone.

While wind energy is traditionally derived from turbines on the Earth's surface, higher altitude winds have been found to be steadier and faster than those found on the surface. Airborne wind turbines have the potential to generate over 4 times the power of traditional surface turbines. Successful widescale use of this technology would exponentially help our global efforts to combat the negative effects of climate change.

The Department of Energy has already started to invest in research in airborne wind technologies. A company called Makani received \$5 million from ARPA-E in 2010 to develop an airborne wind turbine that would enable widespread use of wind power to reduce CO₂ emissions, reduce the power of clean energy for consumers, and increase the security of the U.S. power grid by diversifying our energy resources.

Soon after its success with ARPA-E, Google's parent company, Alphabet, acquired Makani, and began improving the technology for transition to a commercial product. This company is the only company in the United States that is working toward utility scale wind farms with multiple units. I think it's worth looking into whether U.S. innovators should be taking more shots on a goal in this emerging sector.

H.R. 3609, the *Wind Energy Research and Development Act of 2019*, is an important step in prioritizing research, development, testing, and evaluation of wind energy technologies. My amendment would strengthen its goal of increasing the use of wind energy in the United States by determining where taxpayer dollars can be the most effective as we invest in improving the economic and technical viability of this technology.

Thank you, Mr. Chairman, and I yield back.

Chairman LAMB. Thank you, Ms. Stevens. Is there any further discussion on the amendment?

A vote will occur on the amendment. All in favor say aye.

Those opposed say no.

The ayes have it, and the amendment is agreed to.

The next amendment on the roster is an amendment offered by the gentleman from Texas, and he is recognized to offer an amendment.

Mr. WEBER. Mr. Chairman, I have an amendment at the desk.

Chairman LAMB. The Clerk will report the amendment.

The CLERK. Amendment No. 3, amendment to H.R. 3609 offered by Mr. Weber.

[The amendment of Mr. Weber follows:]

AMENDMENT TO H.R. 3609
OFFERED BY MR. WEBER

[Page and line numbers refer to windl04 noticed by Committee on Science, Space, and Technology with timestamp of June 12, 2019 at 11:54AM.]

Page 9, line 12, strike "There are" and insert the following:

1 (a) IN GENERAL.—There are

Page 9, after line 18, add the following:

2 (b) DERIVATION OF FUNDS.—Amounts made avail-
3 able to carry out this section shall be derived from
4 amounts appropriated or otherwise made available to the
5 Office of Energy Efficiency and Renewable Energy of the
6 Department of Energy.

7 (c) SPENDING LIMITATION.—No additional funds are
8 authorized to be appropriated to carry out this Act and
9 the amendments made by this Act, and this Act and such
10 amendments shall be carried out using amounts otherwise
11 available for such purpose.



Chairman LAMB. I ask unanimous consent to dispense with the reading. Without objection, so ordered, and I recognize the gentleman for 5 minutes to explain the amendment.

Mr. WEBER. Thank you, Chairman Lamb. My amendment to H.R. 3609, the *Wind Energy Research and Development Act of 2019*, adds a requirement that no additional funds are authorized to carry out this legislation. Instead, it directs the Department of Energy to fund the work authorized under this legislation using amounts already appropriated to its Office of Energy Efficiency and Renewable Energy, or EERE, without increasing overall spending. As I mentioned in my opening statement, EERE is funded at almost \$2.4 billion, with a B, dollars, a budget that dwarfs those of the other applied research programs at the Department. Today DOE's wind energy research receives \$92 million in annual funding through this office.

While there are significant opportunities for new and exciting research in areas, like material science and computing, that can improve wind energy technologies, it is our job in Congress to focus Federal agencies on the best use of finite Federal funding. That's a lot of alliteration. Put simply, we can't increase overall spending every time we establish priorities for Federal research programs, and we have to focus our resources on work that industry cannot support.

Now, I think a case can be made for supporting aspects of the research programs authorized in this legislation, but it's very clear that DOE already receives ample funding to maintain its solar energy technology programs, and meet the mission goals of the Department, without another top line spending increase. As I said in my opening statement, I'd like to, again, encourage the majority to work with us to prioritize the fundamental research we all support, but we have to stop pretending DOE can get a 30 to 40 percent increase for every single program. I believe this is a commonsense proposal, and I encourage my colleagues to support this amendment. Mr. Chairman, I yield back.

Chairman LAMB. I'd like to make some brief comments about the amendment, which will mostly echo the comments I made about the amendment to the solar bill. This is an authorization bill, not an appropriations bill, so the amendment in question, I believe, would deprive this Committee of its job of providing long-term guidance to the appropriators. I also just think the amendment is too restricted. Again, I think that most, if not all, of the activities will probably be carried out by EERE, but there's no good reason for us to restrict the Secretary's ability to do that. I think that the experts at DOE can decide how best to carry out the aim of this bill.

We are authorizing additional funds for energy R&D activities, rather than what the amendment calls for, which is to restrict additional funds, so I just think those goals are at odds with each other. For those reasons, I oppose the amendment.

Is there any further discussion on the amendment? OK. All in favor say aye.

Those opposed say no.

The noes have it, and the amendment is not agreed to.

Are there any other amendments? If not, a reporting quorum being present, I move that the Energy Subcommittee of the Committee on Science, Space, and Technology report H.R. 3609, as amended, to the Full Committee, with the recommendation that the bill be approved. Those in favor of the motion will signify by saying aye.

Opposed, say no.

The ayes have it, and the bill is favorably reported.

Mr. WEBER. Mr. Chairman?

Chairman LAMB. Yes?

Mr. WEBER. I request a recorded vote.

Chairman LAMB. Further proceedings on this amendment will be postponed. We will now recess for 10 minutes.

[Recess.]

The question is now on the motion to favorably report H.R. 3609, and the clerk will call the roll.

The CLERK. Chairman Lamb?
Chairman LAMB. Aye.
The CLERK. Chairman Lamb, aye.
Mr. Lipinski?
Mr. LIPINSKI. Aye.
The CLERK. Mr. Lipinski, aye.
Mrs. Fletcher?
Mrs. FLETCHER. Aye.
The CLERK. Mrs. Fletcher, aye.
Ms. Stevens?
Ms. STEVENS. Aye.
The CLERK. Ms. Stevens, aye.
Ms. Horn?
[No response.]
The CLERK. Mr. McNerney?
[No response.]
The CLERK. Mr. Foster?
Mr. FOSTER. Aye.
The CLERK. Mr. Foster, aye.
Mr. Casten?
Mr. CASTEN. Aye.
The CLERK. Mr. Casten, aye.
Ms. Johnson?
Chairwoman JOHNSON. Aye.
The CLERK. Ms. Johnson, aye.
Mr. Weber?
Mr. WEBER. No.
The CLERK. Mr. Weber, no.
Mr. Biggs?
Mr. BIGGS. No.
The CLERK. Mr. Biggs, no.
Mr. Norman?
Mr. NORMAN. No.
The CLERK. Mr. Norman, no.
Mr. Cloud?
Mr. CLOUD. No.
The CLERK. Mr. Cloud, no.
Mr. Lucas?
Mr. LUCAS. No.

The CLERK. Mr. Lucas, no.

Chairman LAMB. Are there any Members who haven't voted, or would like to change their vote? The Clerk will report.

The CLERK. Chairman Lamb, the ayes are seven, and the noes are five.

Chairman LAMB. The bill is favorably reported, and without objection, the motion to reconsider is laid upon the table. I ask unanimous consent that staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered. Members will have 2 subsequent calendar days in which to submit supplemental, minority, or additional views on the measure.

I want to thank the Members for their attendance today, and this concludes our Subcommittee markup.

[Whereupon, at 2:55 p.m., the Subcommittee was adjourned.]



XXII. PROCEEDINGS OF THE FULL COMMITTEE MARKUP

MARKUPS:

**H.R. 3597, SOLAR ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;
H.R. 3607, FOSSIL ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019;
H.R. 3609, WIND ENERGY RESEARCH
AND DEVELOPMENT ACT OF 2019; AND
H.R. 335, SOUTH FLORIDA CLEAN
COASTAL WATERS ACT OF 2019**

MARKUP

BEFORE THE

COMMITTEE ON SCIENCE, SPACE, AND
TECHNOLOGY

HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

JULY 24, 2019

Serial No. CP: 116-6

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C O N T E N T S

July 24, 2019

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MARKUPS:
**H.R. 3597, SOLAR ENERGY RESEARCH
 AND DEVELOPMENT ACT OF 2019;**
**H.R. 3607, FOSSIL ENERGY RESEARCH
 AND DEVELOPMENT ACT OF 2019;**
**H.R. 3609, WIND ENERGY RESEARCH
 AND DEVELOPMENT ACT OF 2019; AND**
**H.R. 335, SOUTH FLORIDA CLEAN
 COASTAL WATERS ACT OF 2019**

WEDNESDAY, JULY 24, 2019

HOUSE OF REPRESENTATIVES,
 COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Committee met, pursuant to notice, at 10:07 a.m., in room 2318 of the Rayburn House Office Building, Hon. Eddie Bernice Johnson [Chairwoman of the Committee] presiding.

Chairwoman JOHNSON. Good morning. The Committee will come to order. And without objection, the Chair is authorized to declare recess at any time. Pursuant to Committee rule 2(e) and House rule XI, the Chair announces that she may postpone roll call votes.

Pursuant to the notice, the Committee meets to consider the following measures: H.R. 3597, the *Solar Energy Research and Development Act of 2019*; H.R. 3607, the *Fossil Energy Research and Development Act of 2019*; H.R. 3609, the *Wind Energy Research and Development Act of 2019*; and H.R. 335, the *South Florida Clean Coastal Waters Act of 2019*.

Welcome to today's markup of four bipartisan bills. The first three bills, H.R. 3597 and 3607, as well as 3609, all deal with various aspects of research, development, and demonstration of advanced energy technology. All of these bills directly address the growing issue of climate change by focusing the Federal Government's energy research efforts toward cutting greenhouse gas emissions.

Our Committee has held five hearings this Congress on various topics related to climate change. We've heard firsthand of the dangers to our society from increases in extreme heat, extreme weather, droughts, rising oceans, and the many other dangers associated with climate change. These climate change impacts are not just problems in the future. Our communities are already being affected by climate change. If we don't take serious steps to address this problem, our people are going to needlessly suffer as the effects of

climate get worse. I say “needlessly suffer” because we have the power to address climate change before worse impacts occur.

Supporting the three energy research bills today is part of that effort. These bills support continuous investment in these critical areas of energy research: Solar power, wind power, and fossil fuel power. It is abundantly clear that we will need more renewable energy connected to our grid if we are going to reduce carbon emissions in America. H.R. 3597 and H.R. 3609 provide for sustained investments in solar and wind research and development (R&D) to help drive down the costs of these technologies, and to help get them into the market. I want to recognize the bills’ sponsors, Mr. McAdams and Mr. Tonko, for their hard work on these bills.

It is also abundantly clear that fossil energy will continue to be a part of our electric grid for some time to come. Without real and sustained investments in research and development to more cleanly utilize fossil fuels, it would be extremely difficult to meaningfully cut carbon dioxide emissions from our power sector.

H.R. 3607 calls for these investments, and I want to recognize my colleague from Texas, Mr. Veasey, for his efforts in moving this legislation forward.

These three bills are all endorsed by industry trade groups like the Chamber of Commerce, the Solar Industry Association, the Wind Energy Association, and the Carbon Utilization Research Council. And they’re also endorsed by environmental organizations like the Natural Resources Defense Council (NRDC) and the Environmental Defense Fund (EDF).

Finally, scientific societies like the American Chemical Society have also endorsed these bills. I hope folks can take a moment to realize how unusual it is to have these different organizations endorse the same bills. I’ll ask that the full list of endorsements be placed into the record.

[The information referred to follows:]



External Affairs & Communications

Glenn S. Ruskin
Vice President

July 23, 2019

The Honorable Eddie Bernice Johnson
Chair, House Committee on Science,
Space, and Technology
2321 Rayburn House Office Building
Washington, DC 20515

The Honorable Frank Lucas
Ranking Member, House Committee on
Science, Space and Technology
2321 Rayburn House Office Building
Washington, DC 20515

Dear Chairwoman Johnson and Ranking Member Lucas:

On behalf of the American Chemical Society (ACS), I am writing in support of H.R. 3597, the Solar Energy Research and Development Act of 2019, H.R. 3607, the Fossil Energy Research and Development Act of 2019 and H.R. 3609, the Wind Energy Research and Development Act of 2019. As the world's largest scientific society, with over 150,000 members, the ACS is committed to using chemistry to improve everyday life.

ACS believes in long-term, coordinated support for transformative energy technologies. A key component of this support is continued research to reduce the environmental impact of energy production and improve the efficiency of all energy resources. ACS also believes it is important to take into account the full lifetime costs for new technologies and ensure that research to mitigate waste from manufacturing and disposal accompanies new technology deployment.

In order to reduce the life cycle costs of new energy technologies, we strongly endorse Representative Lipinski's amendment to H.R. 3597, calling for the incorporation of sustainable chemistry principles as research and development of solar energy technology continues. We would also highlight the importance of Representative Foster's amendment to H.R. 3607, prioritizing research to improve isolation and separation of helium from fossil fuels. Helium is critical to researchers in chemistry and physics, and has numerous industrial applications. Developing new techniques to tap into sources of helium that currently go to waste is vital in the face of supply chain challenges that researchers and industries have experienced.

We thank you for your continued support of science and federal research and look forward to working with Congress to pass these bills. Should you have any questions, feel free to contact Carl Maxwell at c_maxwell@acs.org.

Sincerely,

A handwritten signature in black ink that reads 'Glenn S. Ruskin'.

Glenn S. Ruskin

<https://bpcaction.org/2019/07/solar-energy-research-and-development-act-of-2019-important-step-for-expanding-solar-energy-generation/>

22 Jul Solar Energy Research and Development Act of 2019 Important Step for Expanding Solar Energy Generation in Energy and Environment

BPC Action commends **Reps. McAdams (D-UT) and Fortenberry (R-NE)** for the introduction of the **Solar Energy Research and Development Act of 2019, H.R. 3597**. We applaud the congressional support for improving and expanding solar energy generation in the United States.

U.S. investment in energy innovation is needed to continue developing greater efficiencies and improved processes to meet the global clean energy demands of tomorrow. Research and development in solar energy will improve U.S. technological capabilities and support widescale economic growth. The Solar Energy Research and Development Act directs the Secretary of Energy to carry out a research, design, and development (RD&D) program that improves the capacity, efficiency, reliability, security, and affordability of solar energy technologies. Further, the legislation also establishes grants for solar energy technology demonstration projects that have the greatest potential to reduce energy costs and improve U.S. manufacturing capabilities, grid integration, and resilience.

BPC Action looks forward to working with Congress to pass this important bill.

<https://bpcaction.org/2019/07/bpc-action-applauds-fossil-energy-research-and-development-act/>

02 JUL BPC ACTION APPLAUDS FOSSIL ENERGY RESEARCH AND DEVELOPMENT ACT IN Energy and Environment

BPC Action applauds **Reps. Veasey (D-TX)** and **Schweikert (R-AZ)** for introducing the **Fossil Energy Research and Development Act**. The bill is an important step toward increasing carbon capture, removal, utilization and storage technology innovation to achieve economic growth and emission reductions. Its research, development and demonstration incentives will help stimulate technological advances, drive down costs, and boost efficiency. The bill also establishes a dedicated research program for carbon removal and authorizes a vital prize competition and test center for direct air capture technologies that remove carbon dioxide from ambient air.

Energy innovation in carbon capture, removal, utilization, and storage technologies is imperative for reducing carbon pollution and decarbonizing our economy. These technologies are needed since fossil fuels use is projected to retain a significant role in meeting growing global energy demand over the next several decades. To make our economy cleaner and more competitive worldwide, the U.S. must develop a portfolio of low-, zero-, and negative-carbon technologies.

<https://bpcaction.org/2019/07/bpc-action-applauds-introduction-wind-energy-research-development-act-2019/>

22 Jul BPC Action Applauds Introduction Wind Energy Research Development Act 2019 in Energy and Environment

BPC Action commends **Reps. Tonko (D-NY), Bacon (R-NE), Kennedy (D-MA), and Fortenberry (R-NE)** for the introduction of the **Wind Energy Research and Development Act of 2019, H.R. 3609**. We commend the Congressional support for improving and expanding wind energy generation in the United States.

As we look to increase the incorporation of clean energy in the grid, innovation is key to greater technical efficiency and economic growth. Wind power plays an important part in protecting our environment and producing economic benefits. The legislation authorizes the Department of Energy's (DOE) Office of Wind Energy for five years. Further, it directs the Secretary of Energy to improve the energy efficiency, reliability, and capacity of wind energy generation; optimize the design and control of wind energy systems; reduce the costs of permitting, construction, operation, and maintenance; improve the manufacturing and engineering of wind turbines; and better integrate wind power into hybrid energy systems. This legislation would also address grid integration challenges and permitting issues that stifle widespread adoption of wind power.

BPC Action looks forward to working with Congress to pass this important bill.

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CHAMBER OF COMMERCE
OF THE
UNITED STATES OF AMERICA

NEIL L. BRADLEY
EXECUTIVE VICE PRESIDENT &
CHIEF POLICY OFFICER

1615 H STREET, NW
WASHINGTON, DC 20062
(202) 463-5310

July 23, 2019

The Honorable Eddie Bernice Johnson
Chairwoman
Committee on Science, Space, and
Technology
U.S. House of Representatives
Washington, DC 20515

The Honorable Frank Lucas
Ranking Member
Committee on Science, Space, and
Technology
U.S. House of Representatives
Washington, DC 20515

Dear Chairman Johnson and Ranking Member Lucas:

The U.S. Chamber of Commerce applauds your bipartisan leadership on energy issues and writes in support of tomorrow's markup of bills that would drive innovation that enhances America's global competitiveness while reducing greenhouse gas emissions from the energy sector. Specifically, the Chamber strongly supports the consideration of the following bills that would facilitate innovation, as part of the committee's markup:

- **H.R. 3597, the Solar Energy Research and Development Act of 2019**, would help accelerate the next generation of solar energy technologies by expanding Department of Energy (DOE) efforts to improve the capacity, efficiency, manufacturing, reliability, and affordability of solar energy.
- **H.R. 3609, the Wind Energy Research and Development Act of 2019**, would extend and expand the wind energy technology, research, development and testing program at DOE.
- **H.R. 3607, the Fossil Energy Research and Development Act of 2019**, would reauthorize and expand the research, development, and demonstration of fossil energy technologies, including carbon capture technologies for both power plants and industrial sources, and establish an innovative new "Climate Solutions Challenges" prize competition at DOE.

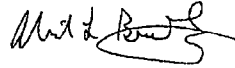
In addition, we encourage the Committee to move forward with efforts to reauthorize the Advanced Research Projects Agency – Energy (ARPA-E). ARPA-E aims to enhance the economic and energy security of the United States through high-potential, high-impact energy projects that are too early-stage for private investment. The Chamber urges Congress to advance legislation that would expand ARPA-E's efforts to reduce the cost and improve the performance of lower-emitting and more efficient technologies.

Collectively, these bills directly support the Chamber's ongoing priority to identify and advance policies that continue to make American energy cleaner and stronger. We commend the Committee for its important work, and urge it to favorably report the above bills to the full House.

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Sincerely,

A handwritten signature in black ink, appearing to read "Neil L. Bradley". The signature is fluid and cursive, with the first name "Neil" being the most prominent.

Neil L. Bradley

cc: Members of the Committee on Science, Space, and Technology



July 25, 2019

The Honorable Eddie Bernice Johnson
Chairwoman, Committee on Science, Space, and Technology
2321 Rayburn House Office Building Washington, DC 20515

Dear Chairwoman Johnson:

On behalf of ConservAmerica, I write in support legislation to reauthorize and update programs at the U.S. Department of Energy (DOE) related to the responsible use of fossil energy and renewable energy research and development. We are generally supportive of programs that support renewable energy and promote the creation and improvement of markets that provide consumers greater energy freedom. We support the following legislation to advance cleaner processes for using conventional energy resources, develop the next-generation of renewable energy technologies and hasten our transition to a lower-carbon economy.

H.R. 3597, the Solar Energy Research and Development Act of 2019, which authorizes basic research programs for the development and demonstration of next-generation solar energy technologies. We are especially supportive of the legislation's emphasis on requirements for disclosure and transparency of information for all market participants to make it easier for consumers to understand their energy choices.

H.R. 3607, the Fossil Energy Research and Development Act of 2019 will drive DOE's ongoing work on the reduction of carbon dioxide emissions through the advancement of carbon capture and storage technology.

H.R. 3609, the Wind Energy Research and Development Act of 2019 updates DOE's existing wind programs and authorizes funding for technology research incubators to advance the leading edge of wind research while reducing regulatory barriers to the renewable energy market.

Thank you for your continued leadership on these important issues and we look forward to House passage of these bills.

Sincerely,
Nan Hayworth
Chairwoman, ConservAmerica

1455 Pennsylvania Avenue NW, Suite 400, Washington, D.C. 20004(202) 285 6783 info@conservamerica.org



July 22, 2019

The Honorable Eddie Bernice Johnson
Chairwoman
Committee on Science, Space, and Technology
2321 Rayburn House Office Building
Washington, DC 20515

Dear Chairwoman Johnson:

On behalf of Citizens for Responsible Energy Solutions (CRES) I am writing in support of your legislation to reauthorize and update the solar, wind, and fossil energy research and development at the U.S. Department of Energy (DOE). CRES is a strong supporter of federal investment in renewable energy and the reduction of carbon emissions and is proud to support this package of bipartisan bills.

H.R. 3597, the Solar Energy Research and Development Act of 2019, would update the research and development agenda of the solar programs at the DOE, including a Next Generation Solar Energy Manufacturing Initiative. H.R. 3607, the Fossil Energy Research and Development Act of 2019 would drive DOE's work on the reduction of carbon emissions through carbon capture, direct air capture, and other technologies. Finally, H.R. 3609, the Wind Energy Research and Development Act of 2019, in addition to updating the wind programs at DOE, would also authorize funding for incubators on the leading edge of new wind technologies.

Thank you for your leadership on these issues, and we look forward to House passage of these bills.

Sincerely,

A handwritten signature in black ink that reads "Heather Reams".

Heather Reams
Executive Director

For Immediate Release
July 2, 2019

Contact: Mike Weiner, 202-298-1848
mrw@vnf.com

CURC Applauds Introduction of the Fossil Energy Research and Development Act of 2019

The Carbon Utilization Research Council (CURC) commends Representatives Marc Veasey (D-TX), David Schweikert (R-AZ), Conor Lamb (D-PA), Lizzie Fletcher (D-TX), and Eddie Bernice Johnson (D-TX) on the introduction of the Fossil Energy Research and Development Act of 2019 (H.R. 3607). Similar legislation was introduced during the last Congress, and CURC appreciates the continued leadership in the House in support of the public-private partnerships needed to accelerate innovative technology solutions for the responsible use of our domestic energy resources.

The Fossil Energy Research and Development Act of 2019 authorizes a new research, development and demonstration program at the Department of Energy (DOE) that would accelerate deployment of carbon capture, utilization, and storage and transformational advanced power cycles for coal and natural gas applications. The bill also encourages federal support of large-scale pilot and commercial demonstration testing, which is critical for private sector adoption of these new technologies. Each of these provisions align with the recommendations of the *2018 CURC-EPRI Advanced Fossil Energy Technology Roadmap*.

"The landscape for technologies like carbon capture has changed substantially in the time since DOE's Fossil Energy program was last authorized," said CURC-Co Chair Holly Krutka, Vice President of Coal Generation and Emission Technologies at Peabody. "The Fossil Energy Research and Development Act would provide a much-needed update to the program by aligning it with the current needs for technology development as projected in the *CURC-EPRI Roadmap* and authorizing funding to set these important technologies further on the path towards commercialization."

CURC is pleased to support provisions in the bill that align with the technology recommendations of the *2018 CURC-EPRI Roadmap* and we look forward to working further with the House Science, Space and Technology Committee to incorporate additional language that will address the effect of implementation of new technologies funded through this program for purposes of setting emission standards.

"The Fossil Energy Research and Development Act provides necessary direction and robust investment in RD&D for technologies like carbon capture that will ensure dispatchable sources of generation are developed, which are necessary to support the growth of renewables and maintain a diverse portfolio of electricity generation sources in the fleet of the future," said CURC Executive Director Shannon Angielski. "However, to ensure private sector adoption, it is important that these new technologies not serve as a basis for regulating emissions standards until they can be demonstrated to be economic and technically viable. CURC looks forward to continued dialogue with the Committee and other stakeholders to ensure the original intent of Congress is maintained in the newly authorized program."

https://www.edf.org/media/house-committee-moves-three-bills-supporting-clean-energy-technology-rd?utm_source=edf-press-release&utm_campaign=edf_none_upd_marcomm&utm_medium=email&utm_id=1562790354

House Committee Moves Three Bills Supporting Clean Energy Technology R&D

EDF Praises Action to Advance Diverse Clean Energy Solutions

July 10, 2019

(Washington, D.C. - July 10, 2019) Today, the House Committee on Science, Space and Technology (HSST)'s Energy Subcommittee held a markup on three bills reauthorizing funding for Solar, Wind and Fossil Energy Research and Development (R&D) in the Federal government through Fiscal Year 2024. Taken together, these bills – all of which have bipartisan support – outline an R&D agenda that will lead to significant carbon reductions in the power and industrial sectors, while recognizing the need for a diverse set of clean energy technologies.

“EDF applauds the House Science Committee for demonstrating support for clean energy innovation that will be essential to meet our climate goals,” said Elgie Holstein, EDF Senior Director, Strategic Planning. “While we know that innovation alone will be insufficient without an enforceable economy wide limit on carbon emissions, continued improvements in technology costs and performance – in zero emission technologies like wind and solar, and nascent negative emissions technologies like direct air capture – will help us reduce emissions as quickly and as cheaply as possible.”

The solar and wind energy R&D bills (H.R. 3597 and H.R. 3609 respectively) would authorize increased funding for the Department of Energy (DOE)'s successful solar and wind research and development programs, including for issues like resilience, grid integration, workforce development, and alternative materials and designs. Among other provisions, they would also direct DOE to award grants for advanced solar technology demonstration projects, and for improved materials, engineering and manufacturing processes for wind turbines, including supersized turbines that are at least 140 meters tall.

EDF recently testified before HSST in support of the Fossil Energy R&D (H.R. 3607) bill that would create and authorize funding for research, development, and demonstration of technologies that capture carbon at power plants and industrial facilities, including large-scale pilot projects. It also authorizes R&D activities in carbon storage and utilization and would establish programs to advance carbon dioxide removal technologies as well as methane leak detection and mitigation technologies and practices.

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July 09, 2019

The Honorable Eddie Bernice Johnson
Chair
Committee on Science, Space and Technology
U.S. House of Representatives
2321 Rayburn House Office Building
Washington, DC 20515

The Honorable Frank Lucas
Ranking Member
Committee on Science, Space and Technology
U.S. House of Representatives
2321 Rayburn House Office Building
Washington, DC 20515

Chairwoman Johnson and Ranking Member Lucas:

On behalf of the Natural Resources Defense Council and its more than three million members and activists, we write to offer general support for H.R. 3607, the Fossil Energy Research and Development Act of 2019. If paired with strong reauthorizations of clean energy research and development programs, this bill could create a responsible approach to researching, developing and demonstrating technologies to reduce and reverse emissions from fossil fuel use and contribute to meeting our greenhouse gas emission reduction goals.

Last fall's Intergovernmental Panel on Climate Change's (IPCC) Special Report has made clear that to avoid the worst effects of climate change the world must limit warming to no greater than 1.5° Celsius, and that requires shifting without delay to a trajectory to reach net-zero greenhouse gas emissions by 2050.

The build-up of carbon dioxide concentrations in the atmosphere has already caused about 1 °C warming. The human suffering and economic harms we are experiencing today from past emissions are already unacceptably high. The IPCC Special Report highlights the fact that we will need to remove carbon dioxide from the atmosphere in order to reduce current harms and human suffering and reach our climate goals. The Fossil Energy Research and Development Act of 2019 would, for the first time, fund much needed RD&D into carbon dioxide removal.

To meet the goal of achieving net-zero emissions by 2050, we need to prioritize a wide range of investments that will lower emissions, particularly energy efficiency, renewable energy, clean vehicles, and a stronger electricity grid. It is also essential to accelerate the decarbonization of remaining fossil fuel use. To this end, RD&D for technologies to reduce fossil emissions must align with our climate and environmental goals. Compared to current law, the Fossil Energy Research and Development Act of 2019 would create a better pathway for developing these technologies and is a step in the right direction toward a net-zero emissions trajectory.

NATURAL RESOURCES DEFENSE COUNCIL

1152 15TH STREET NW | WASHINGTON, DC | 20005 | T 202.289.5668 | F 202.289.1060 | NRDC.ORG

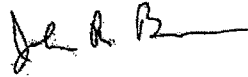
The Fossil Energy Research and Development Act would update several Department of Energy Office of Fossil Energy programs last authorized in 2005 to better align with the environmental and energy priorities of 2019 and beyond. It updates the office's objectives and programs to focus on environmental mitigation. Critically, it directs the Secretary to prioritize technologies and strategies with potential for meeting the emission reduction goals laid out in Paris Climate agreement.

The bill would update and expand RD&D of carbon capture technologies for power plants and industrial sources, reflecting the need to develop decarbonization solutions for applications beyond coal-fired power. The bill also authorizes research into carbon storage, carbon utilization, improvements in efficiency, and rare earth elements and for the first time, carbon dioxide removal from the atmosphere and methane leak detection and mitigation, as well as atmospheric carbon dioxide removal, as mentioned above. These are important areas in which to develop and demonstrate solutions for decarbonization. The bill wisely includes considerations of environmental and landowner impacts, in order to minimize conflicts and reach better outcomes. These provisions are critical to ensuring that the Fossil Energy office's programs reduce environmental harms, not lock them in for decades to come.

Fossil energy research and development will not produce real world results unless paired with pathways to market adoption. The bill should correct provisions in EPACT 2005 that could limit consideration of publicly funded technologies when setting emission standards under the Clean Air Act. Millions of taxpayer dollars have already been spent developing decarbonization technologies, yet without a successful post RD&D policy framework we have not seen the needed level of deployment. New frameworks could be created, but existing ones should not be closed off.

To achieve the levels of emissions reductions needed to stave off the worst effects of climate change, Congress must make dramatic changes to its approach to energy spending. Clean energy investments must come first and foremost. A reoriented fossil energy RD&D program can play an important role both in reducing fossil fuel impacts in the near term and preparing to reach net-zero carbon emissions by mid-century. This bill is an important step in that direction, and we look forward to working with the committee to implement further improvements.

Sincerely,



John Bowman

Managing Director of Government Affairs
Natural Resources Defense Council

NATURAL RESOURCES DEFENSE COUNCIL

1152 15TH STREET NW | WASHINGTON, DC | 20003 | T 202.289.8868 | F 202.289.1080 | NRDC.ORG

July 10, 2019



The Honorable Ben McAdams
U.S. House of Representatives
130 Cannon House Office Building
Washington, DC 20515

The Honorable Jeff Fortenberry
U.S. House of Representatives
1514 Longworth House Office Building
Washington, DC 20515

Dear Representative McAdams and Representative Fortenberry,

On behalf of the Solar Energy Industries Association (SEIA), I am writing to express our strong support for your legislation, H.R. 3597, the Solar Energy Research and Development Act of 2019. This legislation would drive critical research and development in the solar energy industry and help the solar industry achieve its goals for deployment over the next 10 years, what we are calling the Solar+ Decade. If we achieve our 20 percent goal for solar by 2030, our industry will add more than \$345 billion to the U.S. economy over the next 10 years, reaching \$53 billion annually. Continued federal funding and investment in solar technologies and research is crucial to both present and future deployment of this most viable, cost-effective, and clean energy source.

As I stated in my testimony before the House Science, Space and Technology Committee on May 15, federal investment in solar research and development has long paved the way for commercialization of technologies and has made the United States a global leader in solar energy development. Through competitions and aggressive milestones built into each project, federally supported research programs can bring together diverse partners while encouraging efficient and effective research.

We appreciate that your legislation targets short, mid, and long-term goals by bolstering research and development across a wide array of solar technologies by:

- Appropriating funds to advance security, reliability, efficiency, and scalability of solar technologies.
- Prioritizing projects that will improve advanced domestic manufacturing, storage and dispatch processes while ultimately optimizing the costs, reliability, and efficiency of solar energy across the supply chain.
- Emphasizing innovation in American solar manufacturing through the *"Next Generation Solar Initiative"* enabling the manufacturing sector with the opportunity to make strides towards a greater dominance within the global market by reducing costs and streamlining manufacturing processes.
- Providing extensive workforce development and industry training that would allow for the expansion of jobs within the solar industry.
- Recognizing the importance of the recycling photovoltaic materials that would ensure that the solar industry is able to take advantage of opportunities to lower costs while eliminating environmental impacts.

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July 10, 2019



Your legislation recognizes the growth in the solar industry nationwide and highlights the long-term benefits the solar industry can have on national security, the economy, and the environment. We look forward to working with you on this effort.

Sincerely,

A handwritten signature in black ink, appearing to read "Abigail Ross Hopper".

Abigail Ross Hopper, Esq.
President & CEO
Solar Energy Industries Association

Chairwoman JOHNSON. And finally, we are considering H.R. 335, which is sponsored by Mr. Mast from Florida. This bill addresses harmful algal blooms, and I support Mr. Mast's efforts to address the problem.

[The prepared statement of Chairwoman Johnson follows:]

Welcome to today's markup of four good bipartisan bills. The first three bills: H.R. 3597, H.R. 3607, and H.R. 3609, all deal with various aspects of research, development, and demonstration of advanced energy technology. All of these bills directly address the growing issue of climate change by focusing the Federal Government's energy research efforts toward cutting greenhouse gas emissions.

Our Committee has held five hearings this Congress on various topics related to climate change. We have heard first-hand of the dangers to our society from increases in extreme heat, extreme weather, droughts, rising oceans, and the many other dangers associated with climate change. These climate change impacts are not just problems in the future. Our communities are already being affected by climate change. If we don't take serious steps to address this problem, our people are going to needlessly suffer as the effects of climate get worse.

I say "needlessly suffer" because we have the power to address climate change before the worst impacts occur. Supporting the three energy research bills before us today is part of that effort. These bills support continued investment in three critical areas of energy research: solar power, wind power, and fossil fuel power.

It is abundantly clear that we will need more renewable energy connected to our grid if we are going to reduce carbon emissions in America. H.R. 3597 and H.R. 3609 provide for sustained investments in solar and wind research and development to help drive down the costs of these technologies, and help get them into the market. I want to recognize the bill sponsors, Mr. McAdams and Mr. Tonko for their hard work on these bills.

It is also abundantly clear that fossil energy will continue to be a part of our electric grid for some time to come. Without real and sustained investments in research and development to more cleanly utilize fossil fuels, it will be extremely difficult to meaningfully cut carbon dioxide emissions from our power sector. H.R. 3607 calls for these investments, and I want to recognize my colleague from Texas, Mr. Veasey, for his efforts in moving this legislation forward. These three bills are all endorsed by industry trade groups like the Chamber of Commerce, the Solar Industry Association, the Wind Energy Association, and the Carbon Utilization Research Council. They are also endorsed by environmental organizations like the Natural Resources Defense Council and the Environmental Defense Fund. Finally scientific societies like the American Chemical Society have also endorsed these bills. I hope folks can take a moment to realize how unusual it is to have those different organizations endorse the same bills. I'll ask that the full list of endorsements be placed into the record.

Finally, we are considering H.R. 335, which is sponsored by Mr. Mast from Florida. This bill addresses harmful algal blooms, and I support Mr. Mast's efforts to address the problem.

Chairwoman JOHNSON. I now recognize our Ranking Member for his opening statements.

Mr. LUCAS. Thank you, Chairwoman Johnson, for holding this markup.

Today, we consider four pieces of legislation, three of which are bills the Committee is, as of this moment, unable to reach a bipartisan agreement on. I'm disappointed that we haven't made more progress in reaching a bipartisan consensus, especially since this Committee has one of the best track records in Congress of passing productive, bipartisan legislation.

Now, I want to be clear. These three bills are well-intentioned. I believe there is still a chance for bipartisanship in the future. Matter of fact, I expect it. But the fact is, our job in Congress is to set priorities and focus our limited Federal funds where we can see the best return on investment. Unfortunately, the bills we'll consider today don't meet that standard. Instead, they offer aspirational funding levels that we simply cannot afford.

The first bill we'll consider today is H.R. 3597, the *Solar Energy Research and Development Act of 2019*. This legislation authorizes solar energy research conducted by the Department of Energy's (DOE's) Office of Energy Efficiency and Renewable Energy (EERE). EERE received almost \$2.4 billion in funding in 2019 and is DOE's largest applied research program. This legislation would authorize approximately \$1.5 billion for this work, reaching a 33 percent total increase in funding from enacted levels by 2024.

And while this legislation includes authorizations for some critical research priorities that I support like innovative energy storage, next-generation solar technologies, and advanced computer capacities, it focuses heavily on expanding the deployment of technology that already exists.

Our second bill this morning is H.R. 3607, the *Fossil Energy Research and Development Act of 2019*. This bill reauthorizes DOE's fossil energy research and development programs and brings total funding in this area to over \$1 billion by Fiscal Year 2024, a 36 percent increase from enacted levels. The bill is also singularly focused on emissions control technologies. While those technologies are certainly part of a balanced fossil energy portfolio, there's a lot more work to be done to maximize our Nation's fossil fuel resources.

Next, we'll consider H.R. 3609, the *Wind Energy Research and Development Act of 2019*. This authorizes wind energy research conducted under EERE and would provide over \$570 million more for this work. This amounts to a 37 percent increase from levels enacted in 2024. And while I support some elements of this legislation, like basic research in materials science and hybrid energy systems, its primary focus is again on reducing so-called market barriers for existing wind technologies.

I'm thrilled at the growth I've seen in wind and solar industries in the past decade. But American industry is already leading the way in developing these technologies, and we won't discover the next game-changing technology by duplicating their efforts.

Finally, the Committee will consider H.R. 335, the *South Florida Clean Coastal Waters Act of 2019*. The legislation requires the Interagency Task Force on Harmful Algal Blooms (HABs) and Hypoxia to produce an integrated assessment on the causes, consequences, and potential mitigation options to reduce HABs and hypoxia in south Florida. The legislation also calls for the task force to identify the current status and gaps in research, monitoring, and management efforts; and develop an action plan for reducing, mitigating, and controlling HABs and hypoxia in this same region. I'm supportive of this legislation, and I want to thank the Chairwoman for including it in today's markup.

Before I close, I want to make it clear I'm supportive of DOE funding for innovative research that will lead to new solar, wind, and fossil energy technologies. But as stewards of the taxpayers' resources, we must focus funding on projects that are truly cutting-edge; those that can't be undertaken by private industry like basic research in advanced computing, advanced manufacturing, and the development of new materials.

Our national debt is \$22 trillion and rising. We simply can't afford to increase spending on every program, and we'll have to make choices about where we invest.

I'd like to take this opportunity to extend an invitation to my good friends across the aisle. There is so much we agree on. I hope that in the future we can take the commonsense approach and work together to invest in the basic research we all support.

And I would offer one final observation to my friends on both sides of the dais. Having been a Ranking Member and a Chairman before on another standing committee, I always reminded all of my friends that the majority has the right and the responsibility to govern, but by the same token, the minority has the right and the responsibility to be heard. And today, we are going to offer suggestions on how to improve these bills.

And with that, I yield back the balance of my time, Chairwoman.
[The prepared statement of Mr. Lucas follows:]

Thank you, Chairwoman Johnson, for holding this markup.

Today we will consider four pieces of legislation - three of which are bills that this Committee was unable to reach a bipartisan agreement on. I'm disappointed that we haven't made more progress in reaching a bipartisan consensus, especially since this committee has one of the best track records in Congress for passing productive, bipartisan legislation.

Now, I want to be clear, these three bills are well-intentioned, and I believe there is still a chance for bipartisanship in the future. But the fact is, our job in Congress is to set priorities and focus our limited federal funds where we can see the best return on investment.

Unfortunately, the bills we will consider today don't meet that standard. Instead, they offer aspirational funding levels that we simply cannot afford.

The first bill we will consider today is H.R. 3597, the *Solar Energy Research and Development Act of 2019*.

This legislation authorizes solar energy research conducted by the Department of Energy (DOE)'s Office of Energy Efficiency and Renewable Energy EERE. EERE received almost \$2.4 billion dollars in funding in 2019 and is DOE's largest applied research program. This legislation would authorize approximately one and a half billion dollars for this work, reaching a 33% total increase in funding from enacted levels by 2024.

And while this legislation includes authorizations for some critical research priorities that I support like innovative energy storage, next generation solar technologies, and advanced computing capabilities, it focuses heavily on expanding the deployment of technology that already exists.

Our second bill this morning is H.R. 3607, the *Fossil Energy Research and Development Act of 2019*.

This bill reauthorizes DOE's Fossil Energy Research and Development programs and brings total spending in this area to over \$1 billion by FY 2024, a 36% increase from enacted levels. The bill is also singularly focused on emissions control technologies. While those technologies are certainly part of a balanced fossil energy portfolio, there's a lot more work to be done to maximize our nation's fossil fuel resources.

Next we will consider H.R. 3609, the *Wind Energy Research and Development Act of 2019* which authorizes wind energy research conducted under EERE and would provide over \$570 million for this work. This amounts to a 37% increase from enacted levels by 2024.

And while I support some elements of this legislation, like basic research in materials science and hybrid energy systems, its primary focus is again on reducing so-called "market barriers" for existing wind technologies.

I'm thrilled at the growth we've seen in the wind and solar industries in the past decade. But American industry is already leading the way on deploying these technologies - and we won't discover the next game changing technology by duplicating their efforts.

Finally, the Committee will consider H.R. 335, the *South Florida Clean Coastal Waters Act of 2019*.

The legislation requires the Interagency Task Force on Harmful Algal Blooms (HABs) and Hypoxia to produce an integrated assessment on the causes, con-

sequences, and potential mitigation options to reduce HABs and hypoxia in South Florida. The legislation also calls for the Task Force to identify the current status and gaps in research, monitoring, and management efforts, develop an action plan for reducing, mitigating, and controlling HABs and hypoxia in this same region.

I'm supportive of this legislation and I want to thank the Chairwoman for including it in today's markup.

Before I close, I want to be clear - I'm supportive of DOE funding for innovative research that will lead to new solar, wind, and fossil energy technologies. But as stewards of taxpayer resources, we must focus funding on projects that are truly cutting-edge - those that can't be undertaken by private industry, like basic research in advanced computing, advanced manufacturing, and the development of new materials.

With our national debt at \$22 trillion and rising, we simply can't afford to increase spending for every program - and we will have to make choices about where we invest.

I'd like to take this opportunity to extend an invitation to my good friends across the aisle. There is so much we agree on. So I hope that in the future we can take the commonsense approach, and work together to invest in the basic research we all support. I yield back the balance of my time.

Chairwoman JOHNSON. Thank you very much.

H.R. 3597

Chairwoman JOHNSON. We now will consider H.R. 3597, the *Solar Energy Research and Development Act of 2019*. The clerk will report the bill.

The CLERK. Committee print of H.R. 3597, a bill.

[The bill follows:]

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Committee Print116TH CONGRESS
1ST SESSION**H. R. 3609**

To provide for a program of wind energy research, development, and demonstration, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

Mr. TONKO (for himself, Mr. FORTENBERRY, Mr. KENNEDY, and Mr. BACON) introduced the following bill; which was referred to the Committee on Science, Space, and Technology

A BILL

To provide for a program of wind energy 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 “Wind Energy Research
5 and Development Act of 2019”.

6 **SEC. 2. WIND ENERGY TECHNOLOGY, RESEARCH, DEVELOP-**
7 **MENT AND TESTING PROGRAM.**

8 (a) IN GENERAL.—The Secretary of Energy (in this
9 Act, referred to as the “Secretary”) shall carry out a pro-

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2

1 gram to conduct research, development, testing, and eval-
2 uation of wind energy technologies. In carrying out such
3 program and in accordance with subsection (b), the Sec-
4 retary shall award grants and enter into contracts and co-
5 operative agreements under this section and sections 3,
6 4, and 5 for each of the following purposes:

7 (1) To improve the energy efficiency, reliability,
8 resilience, security, and capacity of wind energy gen-
9 eration.

10 (2) To optimize the design and control of wind
11 energy systems for the broadest practical range of
12 atmospheric conditions.

13 (3) To reduce the cost and risk of permitting,
14 construction, operation, and maintenance of wind
15 energy systems, including technologies to reduce en-
16 vironmental and community impacts, improve grid
17 integration and reduce regulatory barriers.

18 (4) To improve materials, engineering, and
19 manufacturing processes for turbines, including
20 supersized turbines.

21 (5) To optimize wind plant performance and in-
22 tegration within hybrid energy systems to enhance
23 cost efficiency and electric grid stability and resil-
24 ience.

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1 (b) GRANTS, CONTRACTS, AND COOPERATIVE
2 AGREEMENTS.—

3 (1) GRANTS.—In carrying out the program, the
4 Secretary shall award grants on a competitive,
5 merit-reviewed basis to eligible entities for projects
6 that the Secretary determines would best achieve the
7 goals of the program.

8 (2) CONTRACTS AND COOPERATIVE AGREE-
9 MENTS.—In carrying out the program, the Secretary
10 may enter into contracts and cooperative agreements
11 with eligible entities and Federal agencies for
12 projects that the Secretary determines would further
13 the purposes of the program.

14 (3) APPLICATION.—An entity seeking funding
15 or a contract or agreement under this subsection
16 shall submit to the Secretary an application at such
17 time, in such manner, and containing such informa-
18 tion as the Secretary may require.

19 (c) WIND ENERGY RESEARCH SUBJECT AREAS.—
20 The program established under subsection (a) shall focus
21 on the research, development, testing, and evaluation of
22 each of the following subject areas:

23 (1) Wind power plant performance and oper-
24 ations including—

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- 1 (A) wind flows and turbine-to-turbine
- 2 interactions;
- 3 (B) energy conversion potential;
- 4 (C) turbine and wind plant control para-
- 5 digms;
- 6 (D) turbine and wind plant security;
- 7 (E) turbine components; and
- 8 (F) integrated hybrid plant systems.
- 9 (2) New materials and designs related to
- 10 blades, rotors, towers and drivetrains including—
- 11 (A) higher tip speed rotor designs;
- 12 (B) low noise rotor designs;
- 13 (C) advanced drivetrain and generator con-
- 14 cepts;
- 15 (D) modular construction and onsite or
- 16 near-site manufacturing and assembly tech-
- 17 niques;
- 18 (E) sustainable and recyclable materials
- 19 and manufacturing systems;
- 20 (F) supersized turbine design and installa-
- 21 tion approaches; and
- 22 (G) lightweight materials.
- 23 (3) Offshore wind-specific projects including—
- 24 (A) fixed and floating substructure con-
- 25 cepts;

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5

1 (B) projects to assess and mitigate the im-
2 pacts of hurricane wind flow, freshwater ice,
3 and other United States-specific conditions;

4 (C) innovative operations and maintenance
5 strategies;

6 (D) analysis of offshore meteorological, ge-
7 ological, and oceanographic data collection; and

8 (E) offshore infrastructure monitoring.

9 (4) Recycling and reuse of wind energy compo-
10 nents.

11 (5) Wind power forecasting and atmospheric
12 measurement systems, including for turbines and
13 plant systems of varying height.

14 (6) The distributed wind energy sector.

15 (7) Advanced transportation mechanisms for
16 wind turbine components.

17 (8) Transformational technologies for har-
18 nessing wind energy, including airborne wind energy
19 concepts.

20 (9) Methods to extend the operational lifetime
21 of onshore and offshore wind turbines and systems.

22 (10) Storage technologies to address the tran-
23 sience and intermittency of wind energy resources.

24 (11) Other research areas as determined by the
25 Secretary.

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1 (d) REPORT.—

2 (1) IN GENERAL.—Not later than 180 days
3 after the date of the enactment of this Act, the Sec-
4 retary shall submit to the Committee on Science,
5 Space, and Technology of the House of Representa-
6 tives and the Committee on Energy and Natural Re-
7 sources of the Senate a report on the potential for,
8 and technical viability of, airborne wind energy sys-
9 tems to provide a significant source of energy in the
10 United States.

11 (2) CONTENTS.—The report under subsection
12 (a) shall include a summary of research, develop-
13 ment, and demonstration needs, including an esti-
14 mate of Federal funding requirements, to further ex-
15 amine and validate the technical and economic via-
16 bility of airborne wind energy concepts over the 10-
17 year period beginning on the date of the enactment
18 of this Act.

19 (e) COORDINATION.—To the maximum extent prac-
20 ticable, the Secretary shall coordinate activities under the
21 program established under subsection (a) with other rel-
22 evant programs and capabilities of the Department of En-
23 ergy and other Federal research programs.

24 (f) CONFORMING REPEALS.—

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1 (1) Section 931(a)(2) of the Energy Policy Act
2 of 2005 (42 U.S.C. 16231(a)(2)) is amended by
3 striking subparagraph (B).

4 (2) Section 4(a) of the Renewable Energy and
5 Energy Efficiency Technology Competitiveness Act
6 of 1989 (42 U.S.C. 12003(a)) is amended by strik-
7 ing paragraph (1).

8 (g) DEFINITIONS.—In this section:

9 (1) The term “eligible entity” means any of the
10 following entities:

11 (A) An institution of higher education.

12 (B) A National Laboratory.

13 (C) A Federal research agency.

14 (D) A State research agency.

15 (E) A nonprofit research organization.

16 (F) An industrial entity or a multi-institu-
17 tional consortium thereof.

18 (2) The term “institution of higher education”
19 has the meaning given such term in section 101 of
20 the Higher Education Act of 1965 (20 U.S.C.
21 1001).

22 (3) The term “National Laboratory” has the
23 meaning given such term in section 2(3) of the En-
24 ergy Policy Act of 2005 (42 U.S.C. 15801(3)).

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1 (4) The term “supersized turbine” means a 12
2 megawatt or greater wind turbine, typically with a
3 tower height greater than 140 meters and blades
4 greater than 75 meters.

5 **SEC. 3. WIND ENERGY TECHNOLOGY VALIDATION AND**
6 **MARKET TRANSFORMATION PROGRAM.**

7 (a) IN GENERAL.—In carrying out the program es-
8 tablished under section 2(a), the Secretary shall conduct
9 a wind energy technology validation and market trans-
10 formation program under which the Secretary shall award
11 grants on a competitive, merit-reviewed basis to eligible
12 entities to support activities that demonstrate and validate
13 new wind energy technologies with the potential to be cost-
14 competitive for land-based, offshore, and distributed appli-
15 cations.

16 (b) APPLICATION.—An eligible entity seeking a grant
17 under this section shall submit an application in such form
18 and manner as the Secretary may prescribe and that con-
19 tains—

20 (1) a certification that any demonstration
21 project carried out using grant funds are—

22 (A) conducted in collaboration with indus-
23 try and, as appropriate, with institutions of
24 higher education and other Federal research
25 programs; and

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1 (B) of sufficient size and geographic diver-
2 sity to measure wind energy system perform-
3 ance under the full productive range of wind
4 conditions in the United States; and

5 (2) such other information as the Secretary
6 may require.

7 (c) FACILITY FOR HYBRID ENERGY SYSTEM RE-
8 SEARCH AND DEMONSTRATION PROJECTS.—In carrying
9 out the program established under subsection (a), the Sec-
10 retary shall establish or support a facility to conduct re-
11 search and demonstration projects for wind turbines and
12 plants in hybrid energy systems that incorporate diverse
13 generation sources, loads, and storage technologies.

14 **SEC. 4. WIND ENERGY INCUBATOR FUNDING.**

15 In carrying out the program established under section
16 2(a), the Secretary shall conduct research, development,
17 testing, and evaluation activities, in accordance with sec-
18 tion 2(b), to support innovative technologies that are not
19 represented in a significant way in—

20 (1) the portfolio of wind energy research activi-
21 ties carried out by the Department of Energy as of
22 the date of the enactment of this Act; or

23 (2) technology roadmaps used by the Depart-
24 ment of Energy as of such date of enactment.

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1 **SEC. 5. MITIGATING REGULATORY AND MARKET BARRIERS.**

2 (a) **IN GENERAL.**—In carrying out the program es-
3 tablished under section 2(a), the Secretary shall to re-
4 search, develop, test, and evaluate, in accordance with sec-
5 tion 2(b), ways to reduce regulatory and market barriers
6 to the widespread adoption of wind power, including—

7 (1) grid transmission and integration chal-
8 lenges; and

9 (2) permitting issues associated with the poten-
10 tial impacts of wind power systems on wildlife, radar
11 systems, local communities, military operations, and
12 airspace.

13 (b) **WILDLIFE IMPACT MITIGATION.**—In carrying out
14 the activities described in subsection (a), the Secretary
15 shall support the development, testing, and evaluation of
16 wildlife impact mitigation technologies or strategies to re-
17 duce the potential impacts of wind energy facilities on—

18 (1) bald and golden eagles;

19 (2) bat species;

20 (3) marine wildlife; and

21 (4) other impacted species.

22 (c) **EDUCATION AND OUTREACH.**—In carrying out
23 the activities described in subsection (a), the Secretary
24 shall support education and outreach activities to dissemi-
25 nate information and promote public understanding of

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1 wind technologies and the wind energy workforce, includ-
2 ing the Collegiate Wind Competition.

3 **SEC. 6. AUTHORIZATION OF APPROPRIATIONS.**

4 There are authorized to be appropriated to the Sec-
5 retary to carry out this Act—

- 6 (1) \$103,692,000 for fiscal year 2020;
7 (2) \$108,876,600 for fiscal year 2021;
8 (3) \$114,320,430 for fiscal year 2022;
9 (4) \$120,036,452 for fiscal year 2023; and
10 (5) \$126,038,274 for fiscal year 2024.

Chairwoman JOHNSON. Without objection, the bill is considered as read.

I'll recognize Mr. Tonko for comments on his bill.

Mr. TONKO. Madam Chair, I move to strike the last word.

Chairwoman JOHNSON. The gentleman is recognized.

Mr. TONKO. Thank you, Madam Chair. And I want to thank you and Chairman Lamb for bringing up this bipartisan legislation to support wind energy innovation. I'm proud to have worked on numerous iterations of this bill going back to my freshman term in Congress.

Since that time, the average cost of wind energy has dropped significantly due, in large part, to sustained Federal R&D investments. If progress continues, the Department of Energy predicts wind energy could provide 35 percent of America's electricity needs by 2050 and create 357,000 American jobs by 2030.

The development of a domestic wind industry has been an amazing energy success story. Wind turbine technician is often cited as the second-fastest-growing job in the United States today. Private and public investments have enabled wind energy to capture market share and become cost competitive at a rapid pace, making wind one of the fastest-growing sources of new electricity capacity in the United States.

Today, wind power delivers some 6.6 percent of all U.S. utility scale power generation, supporting over 114,000 American jobs and providing \$1 billion of annual revenue for States, for communities, and for landowners.

From 1999 to 2016, the height of wind turbines in the United States increased by 49 percent, and the blade length grew by 127 percent, enabling more efficient wind energy generation. Continued improvements in the technology will enable more regions of our Nation to be strong candidates for developing wind resources in a cost-competitive fashion. Despite all of this recent success, it is clear that a sustained Federal commitment to wind R&D is still critical.

H.R. 3609, the *Wind Energy Research and Development Act of 2019*, supports wind energy research that will result in the accelerated development of innovative technologies, education of local communities, creation of more American jobs, and increased economic activity, especially in our rural communities. The bill would codify much of the work already being done by DOE's Office of Wind Energy under EERE. It authorized DOE's Office of Wind Energy for 5 years, beginning at the level included in the Fiscal Year 2020 House energy and water appropriations bill and rising by some 5 percent annually.

Under this legislation, the Secretary of Energy is directed to tackle many of the challenges and barriers identified by the industry to advance further wind deployment. This includes improving the efficiency, reliability, and capacity of wind generation. It includes reducing costs of permitting, construction, operation, and maintenance of wind systems; conducting a wind energy technology validation and market transformation program; reducing barriers to widespread adoption of wind power, including grid integration and permitting issues tied to potential impacts on wildlife, radar

systems, and airspace; and finally, developing new wildlife impact mitigation technologies.

DOE has maintained an industry-driven R&D roadmap based on its Wind Vision report. And I believe this bill reflects many of the industry-identified research priorities. U.S. wind industry has made amazing progress over the past decade, but in many ways, it is still a developing industry. It faces technology, regulatory, and market barriers that will make it more difficult to reach its full potential. Offshore, distributed, and other emerging wind energy technologies clearly need investments, which would be provided by this legislation.

A wide range of stakeholders agree. That is why a diverse coalition, including the American Wind Energy Association, the Distributed Wind Energy Association, EDF, NRDC, Bipartisan Policy Center Action, the U.S. Chamber of Commerce, the American Chemical Society, and Citizens for Responsible Energy Solutions have all expressed support for this legislation.

I encourage Members to support this bill to enable America's energy innovators to develop the technology improvements and other breakthroughs needed to drive further wind energy cost reductions. If we do that, I know we can achieve ambitious deployment targets.

With that, I thank you, Madam Chair, and I yield back.

Chairwoman JOHNSON. Thank you very much.

We're going to proceed right to the amendments in the order on the roster.

And our first amendment on the roster is an amendment offered by the gentleman from Virginia, Mr. Beyer, and he is recognized to offer that amendment.

Mr. BEYER. Thank you, Madam Chair, and I have an amendment at the desk.

Chairwoman JOHNSON. The clerk will report the amendment.

The CLERK. Amendment No. 1 offered by Mr. Beyer.

[The amendment of Mr. Beyer follows:]

AMENDMENT TO H.R. 3609
OFFERED BY Mr. Beyer

Page 5, line 7, strike “and”.

Page 5, line 8, strike the comma and insert “; and”.

Page 5, after line 8, insert the following:

1 (F) analysis of corrosion and fatigue for
 2 the purpose of extending the design life of off-
 3 shore wind turbine substructures.

Section 3, add at the end the following:

4 (d) OFFSHORE RESEARCH FACILITY.—In carrying
 5 out the program established under subsection (a), the Sec-
 6 retary shall establish a facility to conduct research, devel-
 7 opment, and demonstration projects for ocean and atmos-
 8 pheric resource characterization relevant to offshore wind
 9 energy development in coordination with the ocean and at-
 10 mospheric science communities. The facility shall be an
 11 offshore area used to evaluate, test, and advance atmos-
 12 pheric, oceanic, biologic, and geologic monitoring tech-
 13 nologies that improve offshore wind energy development,
 14 including the generation of benchmark data sets for test-

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1 ing offshore wind energy technologies and informing how
2 such technologies can be financed, insured, and regulated.

3 (c) OFFSHORE SUPPORT STRUCTURE TESTING FA-
4 CILITY.—In carrying out the program established under
5 subsection (a), the Secretary shall create a facility to con-
6 duct research, development, and demonstration projects
7 for large-scale and full-scale offshore wind energy support
8 structure components and systems.



Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I recognize the gentleman for 5 minutes to explain his amendment.

Mr. BEYER. Thank you, Madam Chair. I'm pleased to offer this amendment so that we may more effectively deploy offshore wind. I was proud and excited that Virginia was the first State to bid for an offshore wind lease in Federal waters. However, Dominion Energy and BOEM (Bureau of Ocean Energy Management) were slow to get actual turbines up and running, and that was just for a test pilot. So the slowness of offshore wind development in Virginia is the perfect example of why this amendment is needed.

Virginia has complicated multi-ocean uses—important marine ecosystems for our economy, fisheries, NASA, and of course the U.S. Navy out of Norfolk. Virginia also gets hurricanes, so we need to know what works, when, and how, and how to make wind energy more cost-effective. This amendment would do that. It would establish a facility to conduct research, development, and demonstration projects for offshore wind energy development, working with the ocean and atmospheric science communities.

There are only three aspects to the bill. The first is that the facility would be based in an offshore area to evaluate and test advanced monitoring technologies to improve wind energy.

Second, it is actually going to test the offshore wind energy technologies so they can figure out how to finance them, insure them, and regulate them.

And third, it will make sure that this research and development are for large-scale and full-scale offshore wind energy structures. We need cost-effective offshore wind where it makes sense, and this amendment would make that a reality, so I urge my colleagues to vote yes, and I yield back.

Chairwoman JOHNSON. Thank you very much.

Any further discussion on the amendment?

If no, the vote occurs on the amendment.

All in favor, say aye.

All opposed, nay.

The ayes have it. The amendment is agreed to.

The next amendment is Mr. Perlmutter. And the gentleman is recognized.

Mr. PERLMUTTER. Thank you. I have an amendment at the desk.

Chairwoman JOHNSON. The clerk will report the amendment.

The CLERK. Amendment No. 2 offered by Mr. Perlmutter.

[The amendment of Mr. Perlmutter follows:]

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AMENDMENT TO H.R. 3609
OFFERED BY Mr. Perlmutter

Amend section 2(e)(6) to read as follows:

- 1 (6) Distributed wind-specific projects, includ-
2 ing—
3 (A) cost-effective turbine designs, compo-
4 nents, and manufacturing; and
5 (B) micro-grid applications.



Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I recognize the gentleman for 5 minutes to explain his amendment.

Mr. PERLMUTTER. Thank you, Madam Chair.

I want to applaud Representative Tonko for his work on this bill and the Committee for taking up this bill focusing on DOE's wind energy research program.

The growth in wind energy in the United States over the last couple of decades has been tremendous. We've seen a dramatic reduction in the cost of wind turbines, which has enabled utilities to deploy hundreds of windfarms all across the country. The National Renewable Energy Lab is the home of the National Wind Technology site, which is working with industry to improve manufacturing processes and materials to improve efficiencies and further reduce cost.

In addition to the large windfarms we're all familiar with, DOE is also doing work with companies on smaller, distributed wind technologies. One such company is Primus Wind Power located in my district. Primus manufactures small-scale wind turbines, including 30 and 40 kilowatt-hour turbines for use off the grid in remote locations, on boats, and more.

My amendment clarifies the underlying bill's efforts to encourage research on distributed wind energy by specifying turbine designs, components, and manufacturing, in addition to microgrid applications as eligible research areas for distributed wind under the bill. This will ensure the most pressing distributed wind research areas are also addressed.

I urge all my colleagues to support my amendment and the underlying bill. And with that, I yield back.

Chairwoman JOHNSON. Thank you very much.

Any request to be recognized? Are you asking for time?

Mr. LUCAS. Yes. I would just simply note to my colleague if he would yield or if I am allowed time, the golden rule of the majority. Stop while you're ahead. I yield back.

Chairwoman JOHNSON. The vote occurs on the amendment.

All those in favor, say aye.

Any opposers, vote no.

The ayes have it. The amendment is adopted.

The first amendment on—the next amendment on the roster is an amendment offered by the gentleman from Texas, Mr. Weber. You're recognized.

Mr. WEBER. Thank you, Madam Chair. I have an amendment at the desk.

Chairwoman JOHNSON. The clerk will read the amendment.

The CLERK. Amendment No. 3 offered by Mr. Weber.

[The amendment of Mr. Weber follows:]

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AMENDMENT TO H.R. 3609

OFFERED BY M . _____

[Page and line numbers refer to CP_H3609 with timestamp of July 18, 2019 (5:14 p.m.) as forwarded by the Subcommittee on Energy of the Committee on Science, Space, and Technology.]

Page 11, strike lines 3 through 10 and insert the following:

1 SEC. 6. AUTHORIZATION OF APPROPRIATIONS.

2 (a) IN GENERAL.—There are authorized to be appro-
3 priated to the Secretary to carry out this Act—

4 (1) \$92,000,000 for fiscal year 2020;

5 (2) \$94,923,000 for fiscal year 2021;

6 (3) \$97,846,000 for fiscal year 2022;

7 (4) \$100,769,000 for fiscal year 2023; and

8 (5) \$103,692,000 for fiscal year 2024.

9 (b) DERIVATION OF FUNDS.—Amounts made avail-
10 able to carry out this section shall be derived from
11 amounts appropriated or otherwise made available to the
12 Department of Energy.

13 (c) SPENDING LIMITATION.—No additional funds are
14 authorized to be appropriated to carry out this Act and
15 the amendments made by this Act, and this Act and such

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1 amendments shall be carried out using amounts otherwise

2 available for such purpose.



Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I recognize the gentleman for 5 minutes to explain his amendment.

Mr. WEBER. I thank you, Chairwoman Johnson.

My amendment to H.R. 3609, the *Wind Energy Research and Development Act of 2019*, would modify the bill to allocate more moderate funding levels offering a realistic approach to funding wind energy R&D, which by now we all know is essential.

My amendment also has a requirement that no additional funds are authorized to carry out this legislation. Instead, it directs the Department of Energy to fund the work authorized under this legislation using amounts already appropriated to the Department for energy R&D without increasing overall spending.

As my colleague Mr. Norman mentioned in his statement, EERE is funded at almost \$2.4 billion with a B. It is a budget that dwarfs those of the other applied research programs at the Department. While there are significant opportunities for new and exciting research in areas like materials science and computing that can improve wind energy technologies, it is our job here in Congress to focus Federal agencies on the absolute best use of limited Federal funding. And let me add that Americans believe that that's essential. But we just can't magically increase overall spending every time we establish priorities for Federal research programs. We have to focus the resources that we do have on work that industry cannot support.

Now, I've said before that I think a case can be made for supporting aspects of the research programs authorized in this underlying legislation, which is why my amendment includes modest growth in funds allocated for wind energy over time. But it's very clear that DOE already receives ample funding to maintain this and its other energy technology programs without another topline spending increase. We have to stop pretending that DOE can get a 30 to 40 percent increase for every program. It's just not realistic, and it's making promises to stakeholders that, quite frankly, we can't afford to keep. So instead, let's prioritize the fundamental research we all support and make modest investments to help innovative technologies succeed in the commercial market.

I believe this is a commonsense, fiscally responsible proposal, and I encourage my colleagues to support this amendment. And, Madam Chair, I yield back.

Chairwoman JOHNSON. Thank you very much.

I'm going to recognize myself to speak on the amendment.

I oppose this amendment for largely the same reasons that I opposed the extremely similar amendment in the *Solar Energy R&D Act*. This amendment contradicts the funding levels set by the House-passed appropriations bill, and it effectively cuts wind energy innovation funding compared to the 2019-enacted levels because the annual funding increases over 5 years are below research inflation levels. The proposed funding levels in this amendment do not sufficiently reflect the immense challenge that climate change poses and the need for well-funded clean energy research to ensure that the United States is a leader in the growing sector.

Ignoring the funding levels provided in this amendment, the amendment still does not make sense in the context of the bill. Section 6 clearly authorizes additional funds for wind energy R&D activities and at a relatively modest pace of a 5 percent increase annually. I might add, particularly given the potential for wind energy, stating that no additional funds are authorized to be appropriated is frankly contradictory to the clear direction of the bill.

This is an authorization bill, not an appropriations bill. It is the job of this Committee to provide long-term guidance to the annual appropriations process for areas under our jurisdiction. It is the Appropriation Committee's job to balance this and other Committees' legislative guidance on an annual basis within an overall spending limit. The amendment undercuts the value of this Committee's role in even providing such guidance.

Is there any further discussion on this amendment?

Mr. LUCAS. Madam Chair?

Chairwoman JOHNSON. Mr. Lucas.

Mr. LUCAS. Thank you, Madam Chair.

I believe that we discussed these issues rather thoroughly in the previous two bills. I suspect we all know where we stand on the subject matter. I would suggest to my colleagues that I will ask for a recorded vote on this amendment, and that would be the last recorded vote that I would ask for in this markup and suggest to all my good friends that we just proceed with wrapping up our business today, and yield back, Madam Chair.

Chairwoman JOHNSON. Thank you very much. We will put that on the list for recorded votes that will occur later.

The next amendment on the roster is the amendment offered by the same gentleman from Texas, Mr. Weber, and he is recognized for his amendment.

Mr. WEBER. Thank you, Madam Chair. I have an amendment at the desk.

Chairwoman JOHNSON. The clerk will report the amendment.

The CLERK. Amendment No. 4 offered by Mr. Weber.

[The amendment of Mr. Weber follows:]

G:\CMTE\SC\16\ENERGY\3609 (WIND ENERGY)\FCR-AMD_03.XML

AMENDMENT TO H.R. 3609

OFFERED BY _____

At the end of the bill add the following:

1 SEC. 7. SENSE OF CONGRESS.

2 It is the sense of Congress that in order to reduce
3 emissions and meet 100 percent of the power demand in
4 the United States through clean, renewable, or zero-emis-
5 sion energy sources, the Secretary must prioritize research
6 and development for all innovative energy technologies, in-
7 cluding research to develop and improve the efficiency of
8 fossil and nuclear power technologies.



Chairwoman JOHNSON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I recognize the gentleman for 5 minutes to explain his amendment.

Mr. WEBER. Thank you, ma'am. This amendment would add a simple, straightforward sense of Congress to this legislation. It will highlight the need for investing in research that will lead to a balanced energy portfolio, as I mentioned earlier.

We spend a lot of time in Congress discussing the need to make investments in clean energy technology. But more often than not, this conversation focuses on only renewable energy. The fact is that nuclear power remains the only reliable zero emissions baseload power which is deployed in the market today. And the boom in cleaner, more affordable American natural gas is driving down emissions all around the world. Advanced nuclear power and more efficient methods for producing and using natural gas will reduce our energy emissions even further, all the while reducing costs to the American consumer.

Nuclear power and fossil energy are absolutely critical for our Nation's future. Yes, renewable power is constantly improving, and with next-generation battery technologies, we will be able to use more of this power than ever before. But we cannot power our economy with only one form of energy.

I would think we could and should all agree that we need to invest in innovation across a balanced energy portfolio, prioritizing the basic and early-stage research that will only happen with Federal Government support. So I'd like to encourage my colleagues to support this amendment, and, Madam Chair, I yield back the balance of my time.

Chairwoman JOHNSON. Thank you very much, Mr. Weber.

I will recognize myself to speak on this amendment.

I'll just add that I support an all-of-the-above clean energy strategy. An example of that commitment is the fossil fuel energy R&D bill that we just marked up today. That bill includes the goal of improving fossil energy efficiency. Hopefully, my Republican colleagues will also demonstrate their support for fossil energy by voting for that bill and not just a sense of Congress.

Is there any further discussion on this amendment?

Ms. Bonamici?

Ms. BONAMICI. I move to strike the last word.

Chairwoman JOHNSON. The gentlelady is—

Ms. BONAMICI. Thank you. And with all due respect to the gentleman offering the amendment, I'm going to raise the same concern about this amendment that Mr. Casten raised about the similar amendment to the solar bill. This is a bill about wind energy research, so regardless of where you stand on the merits of the amendment, it just doesn't belong in this bill. And I yield back the balance of my time.

Chairwoman JOHNSON. Thank you very much.

Any other requests for time?

Hearing none, then the vote occurs on the amendment.

All those in favor, say aye.

Those opposed, no.

The noes have it, and the amendment is not agreed to.

The CLERK. Chairwoman, the ayes are 22 and the noes are 13.
 Chairwoman JOHNSON. The bill is reported favorably. Without objection, the motion to reconsider is laid upon the table. I ask unanimous consent that the staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered.

Members will have 2 subsequent calendar days in which to submit supplementary minority or additional views on this measure. The bill is passed.

The next question is on the Weber amendment to 3609. The clerk will call the roll.

The CLERK. Chairwoman Johnson?

Chairwoman JOHNSON. No.

The CLERK. Chairwoman Johnson, no.

Ms. Lofgren?

Ms. LOFGREN. No.

The CLERK. Ms. Lofgren, no.

Mr. Lipinski?

Mr. LIPINSKI. No.

The CLERK. Mr. Lipinski, no.

Ms. Bonamici?

Ms. BONAMICI. No.

The CLERK. Ms. Bonamici, no.

Mr. Bera?

Mr. BERA. No.

The CLERK. Mr. Bera, no.

Mr. Lamb?

Mr. LAMB. No.

The CLERK. Mr. Lamb, no.

Mrs. Fletcher?

Mrs. FLETCHER. No.

The CLERK. Mrs. Fletcher, no.

Ms. Stevens?

Ms. STEVENS. No.

The CLERK. Ms. Stevens, no.

Ms. Horn?

Ms. HORN. No.

The CLERK. Ms. Horn, no.

Ms. Sherrill?

Ms. SHERRILL. No.

The CLERK. Ms. Sherrill, no.

Mr. Sherman?

Mr. SHERMAN. No.

The CLERK. Mr. Sherman, no.

Mr. Cohen?

[No response.]

The CLERK. Mr. McNerney?

Mr. MCNERNEY. No.

The CLERK. Mr. McNerney, no.

Mr. Perlmutter?

Mr. PERLMUTTER. No.

The CLERK. Mr. Perlmutter, no.

Mr. Tonko?

Mr. TONKO. No.

The CLERK. Mr. Tonko, no.
 Mr. Foster?
 Mr. FOSTER. No.
 The CLERK. Mr. Foster, no.
 Mr. Beyer?
 Mr. BEYER. No.
 The CLERK. Mr. Beyer, no.
 Mr. Crist?
 Mr. CRIST. No.
 The CLERK. Mr. Crist, no.
 Mr. Casten?
 Mr. CASTEN. No.
 The CLERK. Mr. Casten, no.
 Ms. Hill?
 Ms. HILL. No.
 The CLERK. Ms. Hill, no.
 Mr. McAdams?
 Mr. MCADAMS. No.
 The CLERK. Mr. McAdams, no.
 Ms. Wexton?
 Ms. WEXTON. No.
 The CLERK. Ms. Wexton, no.
 Mr. Lucas?
 Mr. LUCAS. Yes.
 The CLERK. Mr. Lucas, aye.
 Mr. Brooks?
 Mr. BROOKS. Aye.
 The CLERK. Mr. Brooks, aye.
 Mr. Posey?
 Mr. POSEY. Aye.
 The CLERK. Mr. Posey, aye.
 Mr. Weber?
 Mr. WEBER. Aye.
 The CLERK. Mr. Weber, aye.
 Mr. Babin?
 Mr. BABIN. Aye.
 The CLERK. Mr. Babin, aye.
 Mr. Biggs?
 [No response.]
 The CLERK. Mr. Marshall?
 [No response.]
 The CLERK. Mr. Norman?
 [No response.]
 The CLERK. Mr. Cloud?
 Mr. CLOUD. Aye.
 The CLERK. Mr. Cloud, aye.
 Mr. Balderson?
 Mr. BALDERSON. Aye.
 The CLERK. Mr. Balderson, aye.
 Mr. Olson?
 Mr. OLSON. Aye.
 The CLERK. Mr. Olson, aye.
 Mr. Gonzalez?
 Mr. GONZALEZ. Aye.

The CLERK. Mr. Gonzalez, aye.
 Mr. Waltz?
 Mr. WALTZ. Aye.
 The CLERK. Mr. Waltz, aye.
 Mr. Baird?
 Mr. BAIRD. Aye.
 The CLERK. Mr. Baird, aye.
 Ms. Herrera Beutler?
 Ms. HERRERA BEUTLER. Yes.
 The CLERK. Ms. Herrera Beutler, aye.
 Miss González-Colón?
 Miss GONZÁLEZ-COLÓN. Yes.
 The CLERK. Miss González-Colón, aye.
 Chairwoman JOHNSON. Are there Members who have not voted or would like to change their vote?
 The clerk will report.
 The CLERK. Chairwoman, the ayes are 13 and the noes are 21.
 Chairwoman JOHNSON. The amendment is not adopted.
 If not, the reporting quorum is present, I move that the Committee on Science, Space, and Technology report H.R. 3609, as amended, to the House with the recommendation that the bill be approved. Those in favor of the motion will signify by saying aye, and those opposed, no.
 The clerk will call the roll.
 The CLERK. Chairwoman Johnson?
 Chairwoman JOHNSON. Aye.
 The CLERK. Chairwoman Johnson, aye.
 Ms. Lofgren?
 Ms. LOFGREN. Aye.
 The CLERK. Ms. Lofgren, aye.
 Mr. Lipinski?
 Mr. LIPINSKI. Aye.
 The CLERK. Mr. Lipinski, aye.
 Ms. Bonamici?
 Ms. BONAMICI. Aye.
 The CLERK. Ms. Bonamici, aye.
 Mr. Bera?
 Mr. BERA. Aye.
 The CLERK. Mr. Bera, aye.
 Mr. Lamb?
 Mr. LAMB. Aye.
 The CLERK. Mr. Lamb, aye.
 Mrs. Fletcher?
 Mrs. FLETCHER. Aye.
 The CLERK. Mrs. Fletcher, aye.
 Ms. Stevens?
 Ms. STEVENS. Aye.
 The CLERK. Ms. Stevens, aye.
 Ms. Horn? Ms. Horn?
 Ms. HORN. Aye.
 The CLERK. Ms. Horn, aye.
 Ms. Sherrill?
 Ms. SHERRILL. Aye.
 The CLERK. Ms. Sherrill, aye.

Mr. Sherman?
 Mr. SHERMAN. Aye.
 The CLERK. Mr. Sherman, aye.
 Mr. Cohen?
 [No response.]
 The CLERK. Mr. McNerney?
 Mr. MCNERNEY. Aye.
 The CLERK. Mr. McNerney, aye.
 Mr. Perlmutter?
 Mr. PERLMUTTER. Aye.
 The CLERK. Mr. Perlmutter, aye.
 Mr. Tonko?
 Mr. TONKO. Aye.
 The CLERK. Mr. Tonko, aye.
 Mr. Foster?
 Mr. FOSTER. Aye.
 The CLERK. Mr. Foster, aye.
 Mr. Beyer?
 Mr. BEYER. Aye.
 The CLERK. Mr. Beyer, aye.
 Mr. Crist?
 Mr. CRIST. Aye.
 The CLERK. Mr. Crist, aye.
 Mr. Casten?
 Mr. CASTEN. Aye.
 The CLERK. Mr. Casten, aye.
 Ms. Hill?
 Ms. HILL. Aye.
 The CLERK. Ms. Hill, aye.
 Mr. McAdams?
 Mr. MCADAMS. Aye.
 The CLERK. Mr. McAdams, aye.
 Ms. Wexton?
 Ms. WEXTON. Aye.
 The CLERK. Ms. Wexton, aye.
 Mr. Lucas?
 Mr. LUCAS. No.
 The CLERK. Mr. Lucas, no.
 Mr. Brooks?
 Mr. BROOKS. No.
 The CLERK. Mr. Brooks, no.
 Mr. Posey?
 Mr. POSEY. No.
 The CLERK. Mr. Posey, no.
 Mr. Weber?
 Mr. WEBER. No.
 The CLERK. Mr. Weber, no.
 Mr. Babin?
 Mr. BABIN. No.
 The CLERK. Mr. Babin, no.
 Mr. Biggs?
 [No response.]
 The CLERK. Mr. Marshall?
 [No response.]

The CLERK. Mr. Norman?

[No response.]

The CLERK. Mr. Cloud?

Mr. CLOUD. No.

The CLERK. Mr. Cloud, no.

Mr. Balderson?

Mr. BALDERSON. No.

The CLERK. Mr. Balderson, no.

Mr. Olson?

Mr. OLSON. No.

The CLERK. Mr. Olson, no.

Mr. Gonzalez?

Mr. GONZALEZ. No.

The CLERK. Mr. Gonzalez, no.

Mr. Waltz?

Mr. WALTZ. No.

The CLERK. Mr. Waltz, no.

Mr. Baird?

Mr. BAIRD. No.

The CLERK. Mr. Baird, no.

Ms. Herrera Beutler?

Ms. HERRERA BEUTLER. No.

The CLERK. Ms. Herrera Beutler, no.

Miss González-Colón?

Miss GONZÁLEZ-COLÓN. No.

The CLERK. Miss González-Colón, no.

Chairwoman JOHNSON. Have all Members voted? Any Member wish to change their vote?

The clerk will report.

The CLERK. Chairwoman, the ayes are 21 and the noes are 13.

Chairwoman JOHNSON. The bill is favorably reported. Without objection, the motion to reconsider is laid upon the table, and I ask unanimous consent that staff be authorized to make any necessary technical and conforming changes to the bill. Without objection, so ordered.

Members will have 2 subsequent calendar days in which to submit supplemental minority or additional views on this measure.

I want to thank the Members for their attendance and participation, and hopefully, we can continue to work toward getting these bills to the floor and getting them passed. Our markup is concluded.

[Whereupon, at 1:10 p.m., the Committee was adjourned.]