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REPORT
116–499

SOLAR ENERGY RESEARCH AND DEVELOPMENT ACT OF 2019

SEPTEMBER 11, 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. 3597]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 3597) to guide and authorize basic research programs in the United States for research, development, and demonstration of solar energy technologies, and for other purposes, having considered the same, reports favorably thereon with amendments and recommends that the bill as amended do pass.

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I. AMENDMENT

The amendment are as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Solar Energy Research and Development Act of 2019".

SEC. 2. SOLAR ENERGY TECHNOLOGY PROGRAM.

(a) IN GENERAL.—The Secretary shall carry out a solar energy program to conduct research, development, testing, and evaluation of solar energy technologies. In carrying out such program, the Secretary shall, in accordance with subsection (b), 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 solar energy generation.

(2) To optimize the design and adaptability of solar energy systems to the broadest practical range of geographic and atmospheric conditions.

(3) To reduce the cost of manufacturing, installation, operation, and maintenance of solar energy systems.

(4) To create and improve conversion of solar energy to useful forms.

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

(1) GRANTS.—In carrying out the program established under subsection (a), 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 established under subsection (a), 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 a grant or a contract or agreement under this Act shall submit to the Secretary an application at such time, in such manner, and containing such information as the Secretary may require.

(c) SOLAR 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) Photovoltaic devices and related electronic components, including converters, sensors, energy monitors, communication and control equipment, and protocols.

(2) Concentrated solar power, including solar thermal and concentrating solar photovoltaic technologies.

(3) Low cost, high-quality solar energy systems.

(4) Low cost, thin-film solar technologies, including the use of perovskite materials in solar cells.

(5) Solar heating and cooling systems, including distributed solar-powered air conditioning.

(6) Solar technology products that can be easily integrated into new buildings, existing buildings, agricultural and aquatic environments, and other infrastructure.

(7) Solar technology that is resilient to extreme weather events.

(8) Solar technology products integrated into transportation applications in coordination with vehicle technologies research and development activities supported by the Department of Energy.

(9) Storage technologies to address the transience and intermittency of solar energy resources, including batteries, supercapacitors, and thermal storage.

(10) Microgrids using solar technology.

(11) Solar technologies enabling safe grid operating conditions, such as fast-disconnect during an emergency.

(12) Distributed solar energy technologies, such as rooftop solar panels.

(13) Technologies and designs that enable a broad range of scales for solar power production.

(14) Advanced solar manufacturing technologies and best practices, including—

(A) materials and processes;

(B) development of industry standards;

(C) design and integration practices; and

(D) optimized packaging methods and new device designs.

(15) Advanced analytic and computing capabilities for better modeling and simulations of solar energy systems.

(16) Electrical grid integration, including—

(A) integration of solar technologies into smart grid, transmission, and distribution;

(B) coordination of solar with other distributed and large-scale energy resources;

(C) electrical power smoothing;

(D) microgrid integration;

(E) community solar;

(F) solar resource forecasting;

(G) regional and national electric system balancing and long distance transmission options, including direct current and superconducting transmission and long-term storage options;

(H) ways to address system operations over minutes, hours, days, weeks, and seasons with respect to the full range of project scales; and

(I) electric grid security, including cyber and physical security.

(17) Non-hardware and information-based advances in solar energy system design, installation, and operation.

(18) Solar energy technology as a part of strategies commonly referred to as "behind-the-meter strategies", including with respect to electricity generation, load, energy efficiency, controls, storage, and electric vehicles.

(19) Methods to reduce the total volume of water used in the manufacture, construction, operation, and maintenance of solar energy technologies.

(20) Next generation demonstration facilities.

(21) Other subject areas determined by the Secretary.

(d) TECHNICAL ASSISTANCE AND WORKFORCE DEVELOPMENT.—In carrying out the program established under subsection (a), the Secretary may also conduct, for purposes of supporting technical, non-hardware, and information-based advances in solar energy systems development and operations, including activities expanding access to solar energy for low-income individuals and communities—

(1) technical assistance and analysis activities with eligible entities; and

(2) workforce development and training activities, including activities that support the dissemination of standards and best practices for enabling solar power production.

(e) PROGRAM TARGETS.—The program established under subsection (a) shall address near-term (up to 2 years), mid-term (up to 7 years), and long-term (up to 15 years) challenges to the advancement of solar energy systems.

(f) SUSTAINABLE CHEMISTRY.—Each entity receiving a grant, contract, or cooperative agreement under this section shall endeavor, in carrying out activities under such grant, contract, or cooperative agreement, to incorporate, where appropriate, sustainable and green chemistry and engineering principles, practices, and methodologies.

(g) WILDLIFE IMPACT MITIGATION.—In carrying out the activities described in subsection (c), the program established under subsection (a) shall support wildlife impact mitigation technologies and strategies, including the use of distributed solar technologies, to reduce the potential negative impacts of solar energy systems on wildlife, including bird species and local flora and fauna.

(h) STEWARDSHIP OF NATIONAL LABORATORY RESOURCES.—In awarding grants and entering into contracts and cooperative agreements under this Act, the Secretary shall steward relevant capabilities and programs of the National Laboratories.

(i) CONFORMING REPEALS.—The following provisions of law are hereby repealed:

(1) The Solar Energy Research, Development, and Demonstration Act of 1974 (42 U.S.C. 5551 et seq.), except for section 10.

(2) The Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978 (42 U.S.C. 5581 et seq.).

(3) Paragraphs (2) and (3) of section 4(a) of the Renewable Energy and Energy Efficiency Technology Competitiveness Act of 1989 (42 U.S.C. 12003(a)).

(4) Subparagraph (A) of section 931(a)(2) of the Energy Policy Act of 2005 (42 U.S.C. 16231(a)(2)).

(5) Sections 606 and 607 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17174 and 17175).

(j) DEFINITIONS.—In this Act:

(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 "photovoltaic device" includes photovoltaic cells and the electronic and electrical components of such devices.
(5) The term "Secretary" means the Secretary of Energy.

SEC. 3. SOLAR ENERGY TECHNOLOGY DEMONSTRATION PROJECTS.

(a) IN GENERAL.—In carrying out the program established under section 2(a), the Secretary shall award grants on a competitive, merit-reviewed basis to eligible entities for demonstration projects to advance the development of solar energy technologies and systems production.
(b) PRIORITY.—In awarding grants under subsection (a), the Secretary shall give priority to projects that—
(1) are located in geographically diverse regions of the United States;
(2) can be replicated in a variety of regions and climates;
(3) demonstrate technologies that address intermittency, variability, storage challenges, behind-the-meter operations, and independent operational capability;
(4) coordinate solar technologies with other distributed and large-scale energy resources;
(5) facilitate identification of optimum approaches among competing solar energy technologies;
(6) include business commercialization plans that have the potential for production of solar energy equipment at high volumes;
(7) support the development of advanced manufacturing technologies that have the potential to improve United States competitiveness in the international solar energy manufacturing sector;
(8) provide the greatest potential to reduce energy costs, as well as promote accessibility and community implementation of demonstrated technologies, for consumers;
(9) increase disclosure and transparency of information to all market participants to help in making optimal decisions;
(10) promote overall electric infrastructure reliability and resilience should grid functions be disrupted or damaged;
(11) promote solar energy in low-income communities and those disproportionately burdened by environmental pollution; and
(12) satisfy any other criteria that the Secretary determines appropriate.
(c) USE OF FUNDS.—Grants under this section may be used, to the extent that funding is not otherwise available through other Federal programs or power purchase agreements, for—
(1) any necessary site engineering study;
(2) an economic assessment of site-specific conditions;
(3) appropriate feasibility studies to determine whether the demonstration can be replicated;
(4) installation of equipment, service, and support;
(5) operation for at least the minimum amount of time required to fully assess the project's results and objectives, as determined by a peer-reviewed process; and
(6) validation of technical, economic, and environmental assumptions and documentation of lessons learned.
(d) SOLICITATION.—Not later than 90 days after the date of enactment of this Act and annually thereafter, the Secretary shall conduct a national solicitation for applications for grants under this section.

SEC. 4. NEXT GENERATION SOLAR ENERGY MANUFACTURING INITIATIVE.

(a) IN GENERAL.—In carrying out the program established under section 2(a), the Secretary shall conduct research, development, and demonstration projects, in accordance with section 2(b), to advance new solar energy manufacturing technologies and techniques, including those that manufacture solar cells, hardware, and enabling devices.
(b) STRATEGIC VISION REPORT.—

(1) IN GENERAL.—Not later than September 1, 2020, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives, the Committee on Energy and Natural Resources of the Senate, and any other committees of Congress deemed appropriate by the Secretary a report on the results of a study that examines the viable market opportunities available for solar energy technology manufacturing in the United States, including solar cells, hardware, and enabling technologies.

(2) REPORT REQUIREMENTS.—The report under paragraph (1) shall include—

(A) a description of—

(i) the ability to competitively manufacture solar technology in the United States, including the manufacture of—

(I) new and advanced materials, such as cells made with new, cost-effective, high efficiency materials;

(II) solar module equipment and enabling technologies, including smart inverters, sensors, and tracking equipment;

(III) innovative solar module designs and applications, including those that can directly integrate with new and existing buildings and other infrastructure; and

(IV) other research areas as determined by the Secretary; and

(ii) opportunities and barriers within the United States and international solar energy technology supply chains;

(B) policy recommendations for enhancing solar energy technology manufacturing in the United States; and

(C) an aggressive 10-year target and plan, beginning in 2021, to enhance the competitiveness of solar energy technology manufacturing in the United States.

(c) PROGRAM IMPLEMENTATION.—In carrying out the research, development, and demonstration program under this section, to the extent practicable, the Secretary shall follow the recommendations included in the report under subsection (b) and award grants and enter into contracts and cooperative agreements for solar energy manufacturing projects that—

(1) reduce capital expenditures or provide lower-cost manufacturing option;

(2) eliminate manufacturing process steps;

(3) reduce energy, water, and material inputs;

(4) establish alternative supply chains for materials and components; and

(5) take advantage of rapid prototyping, small batch manufacturing, and roll-to-roll processing.

(d) PROGRAM EVALUATION.—Beginning not later than 3 years after the completion of the report under subsection (b), and every 4 years thereafter, the Secretary shall provide, and make available to the public and the relevant authorizing and appropriations committees of Congress, an independent review of the program authorized under this section to evaluate its progress toward meeting the policy recommendations and targets determined in the report.

SEC. 5. PHOTOVOLTAIC DEVICE RECYCLING RESEARCH, DEVELOPMENT, AND DEMONSTRATION.

(a) IN GENERAL.—In carrying out the program, the Secretary shall conduct research, development, and demonstration projects, in accordance with section 2(b), to create innovative and practical approaches to increase reuse and recycling of photovoltaic devices.

(b) PURPOSE.—The Secretary shall award grants and enter into contracts and cooperative agreements under subsection (a) for projects that address—

(1) technology to increase the efficiency of photovoltaic device recycling and maximize the recovery of valuable raw materials for use in new products while minimizing the life-cycle environmental impacts such as greenhouse gas emissions and water usage;

(2) expanded uses for materials from recycled photovoltaic devices;

(3) development and demonstration of environmentally responsible alternatives to the use of hazardous materials in photovoltaic devices and the production of such devices;

(4) development of methods to separate and remove hazardous materials from photovoltaic devices and to recycle or dispose of those materials in a safe manner;

(5) product design and construction to facilitate disassembly and recycling of photovoltaic devices;

(6) tools and methods to aid in assessing the environmental impacts of the production of photovoltaic devices and photovoltaic device recycling and disposal;

(7) product design and construction and other tools and techniques to extend the life cycle of photovoltaic devices, including methods to promote their safe reuse;

(8) strategies to increase consumer acceptance and practice of recycling of photovoltaic devices; and

(9) processes to reduce the costs and environmental impact of disposal of toxic materials used in photovoltaic devices.

(c) APPLICATIONS.—An eligible entity seeking a grant, contract, or cooperative agreement under this section shall submit to the Secretary an application that includes a description of—

(1) the project that will be undertaken and the contributions of each participating entity;

(2) the applicability of the project to increasing reuse and recycling of photovoltaic devices with the least environmental impacts as measured by life-cycle analyses, and the potential for incorporating the research results into industry practice; and

(3) how the project will promote collaboration among scientists and engineers from different disciplines, such as electrical engineering, materials science, and social science.

(d) DISSEMINATION OF RESULTS.—The Secretary shall publish the results of projects supported under this section through—

(1) development of best practices or training materials for use in the photovoltaics manufacturing, design, installation, refurbishing, or recycling industries;

(2) dissemination at industry conferences;

(3) coordination with information dissemination programs relating to recycling of electronic devices in general;

(4) demonstration projects; and

(5) educational materials for the public produced in conjunction with State, Tribal, and local governments or nonprofit organizations on the problems and solutions related to reuse and recycling of photovoltaic devices.

(e) PHOTOVOLTAIC MATERIALS PHYSICAL PROPERTY DATABASE.—

(1) IN GENERAL.—Not later than September 1, 2021, the Secretary shall establish a comprehensive physical property database of materials for use in photovoltaic devices. Such database shall include—

(A) identification of materials used in photovoltaic devices;

(B) a list of commercially available amounts of these materials and their country of origin;

(C) amounts of these materials projected to be available through mining or recycling of photovoltaic and other electronic devices; and

(D) a list of other significant uses for each of these materials.

(2) PRIORITIES.—Not later than September 1, 2020, the Secretary, working with private industry, shall develop a plan to establish priorities and requirements for the database under this subsection, including the protection of proprietary information, trade secrets, and other confidential business information.

(3) COORDINATION.—The Secretary shall coordinate with the Director of the National Institute of Standards and Technology, the Administrator of the Environmental Protection Agency, and the Administrator of the Department of Interior to facilitate the incorporation of the database under this subsection with any existing database for materials involved in electronic manufacturing and recycling.

SEC. 6. AUTHORIZATION OF APPROPRIATIONS.

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

(1) $270,000,000 for fiscal year 2020;

(2) $283,500,000 for fiscal year 2021;

(3) $297,675,000 for fiscal year 2022;

(4) $312,558,750 for fiscal year 2023; and

(5) $328,186,688 for fiscal year 2024.

SEC. 7. SENSE OF CONGRESS.

It is the sense of Congress that in order to reduce emissions and meet 100 percent of the power demand in the United States through clean, renewable, or zero-emission energy sources, the Secretary must prioritize research and development for all innovative energy technologies, including research to develop and improve the efficiency of fossil and nuclear power technologies.

Amend the title so as to read:

A bill to provide for a program of research, development, and demonstration of solar energy technologies, and for other purposes.

II. Purpose of the Bill

The purpose of H.R. 3597, the *Solar Energy Research and Development Act of 2019*, sponsored by Mr. McAdams and cosponsored by Mr. Fortenberry, Mr. Crist, Ms. Escobar, and Ms. Axne is to provide the Department of Energy (DOE) with effective guidance to carry out a solar energy research, development, and demonstration (RD&D) program that will improve solar energy systems' efficiency, manufacturing, reliability, integration, and affordability, amongst other qualities.

III. Background and Need for the Legislation

In 1977, DOE launched the Solar Energy Research Institute to explore ways to harness power from the sun. The Institute and its successor, the National Renewable Energy Laboratory (NREL), demonstrated some of the first concentrated solar power projects in the world and developed photovoltaic cells with record-setting conversion efficiencies. In 1994, NREL developed a solar photovoltaic cell that became the first to exceed 30% efficiency.[1 2] Over time, many of these technologies were matured and commercialized by the private sector, and in 2019, solar energy provided 1.8% of all U.S. electricity.[3] According to several assessments produced by DOE, despite the growth of the solar industry over the past 20 years, continued technology advancements are needed to reach DOE's SunShot Initiative goal of solar energy meeting 14% of U.S. electricity needs by 2030 and 27% by 2050. If these goals are achieved, DOE estimates that by 2050, carbon dioxide emissions would be 28% lower than in a "business-as-usual" scenario and the solar industry could support 390,000 more jobs.[4]

To date, authorizing language from the Energy Policy Act of 2005 (P.L. 109–58) and Energy Independence and Security Act of 2007 (P.L. 110–140) provide the most recent legislative direction for solar energy RD&D activities at DOE. H.R. 3597 is designed to build upon these prior authorizations to provide DOE tools and guidance that consider significant changes to the industry over the past 10+ years. It reauthorizes the Secretary of Energy to carry out a program of RD&D on a range of solar energy technologies. Specifically, the program prioritizes technologies, including photovoltaic and concentrating solar power systems, that improve:

(a) capacity and efficiency;
(b) manufacturing, operation, and maintenance;
(c) reliability, resilience, and security;
(d) grid integration; and
(e) affordability.

The bill also directs the Secretary to support high-value demonstration projects and pursue projects that improve the U.S. manufacturing, recycling, and environmental impact of solar energy technologies. It authorizes 5% annual funding increases over five

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[1] "The History of Solar." U.S. Department of Energy. https://www1.eere.energy.gov/solar/pdfs/solar_timeline.pdf.

[2] "Photovoltaics Research and Development." U.S. Department of Energy. https://www.energy.gov/eere/solar/photovoltaics-research-and-development.

[3] "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.

[4] "Sunshot Vision Study." U.S. Department of Energy. https://www.energy.gov/eere/solar/sunshot-vision-study.

years for solar RD&D activities, beginning with $270 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 RD&D needs for solar energy in support of a draft of H.R. 3597.

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. 3597 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 RD&D under the solar energy program. The amendment also included text to conduct RD&D of technologies that reduce the volume of water used in the manufacture and operation of solar energy systems. Moreover, it added language authorizing technical assistance and training activities that expand low-income communities' access to solar energy. *The amendment was agreed to by voice vote.*

Mr. Norman 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. 3597 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. 3597 on July 24, 2019.

Mr. Perlmutter offered an amendment to add low cost, thin film solar technologies to the list of prioritized research subject areas authorized under the Act. *The amendment was agreed to by voice vote.*

Mr. Lipinski offered an amendment to ensure sustainable chemistry principles, practices, and methodologies are used, to the extent practicable, in projects carried out under the Act. *The amendment was agreed to by voice vote.*

Mr. McNerney offered an amendment to require the Secretary of Energy to prioritize demonstration projects carried under the Act that promote solar energy in low-income communities and those

disproportionately burdened by pollution. *The amendment was agreed to by voice vote.*

Mr. Norman offered an amendment to reduce the amounts authorized to carry out the Act and require 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: 12–21.*

Mr. Norman 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 agreed to by voice vote.*

H.R. 3597 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

Reauthorizes the Secretary of Energy to carry out a program of RD&D on a range of solar energy technologies. Specifically, the program prioritizes technologies, including photovoltaic and concentrating solar power systems, that improve: capacity and efficiency; manufacturing, operation, and maintenance; reliability, resilience, and security; grid integration; and affordability. The bill also directs the Secretary to support high-value demonstration projects and pursue projects that improve the U.S. manufacturing, recycling, and environmental impact of solar energy technologies.

VII. Section-by-Section Analysis (By Title and Section)

Section 1. Short title

Solar Energy Research and Development Act of 2019

Section 2. Solar energy technology program

Directs the Secretary of Energy to carry out a program for research, development, and demonstration of solar energy technologies. The program prioritizes solar energy technologies, including photovoltaic and concentrating solar power systems, that improve:

(a) capacity and efficiency;
(b) manufacturing, operation, and maintenance;
(c) reliability, resilience and security;
(d) grid integration; and
(e) affordability.

Allows the Secretary to provide technical assistance and training activities to promote information-based advances to solar energy systems' development and operation. It also instructs the Secretary to develop near-term, mid-term, and long-term targets for solar energy technologies to ensure the program is addressing a wide range of research goals. Throughout all these activities, the Secretary must support technologies and strategies to reduce the potential negative impact of solar energy technologies on wildlife and incorporate sustainable chemistry practices and methodologies to the extent practicable.

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

Section 3. Solar energy technology demonstration projects

Directs the Secretary to award grants to demonstrate solar energy technologies. Projects will prioritize technologies that have the greatest potential to scale, reduce energy costs, and improve domestic manufacturing, capacity, grid integration, and resilience of solar technologies.

Section 4. Next generation solar energy manufacturing initiative

Directs the Secretary to produce a Strategic Vision Report that outlines the market opportunities, challenges, and recommendations for advancing domestic solar energy technology manufacturing. Based on the Report's results, the Secretary shall award grants to projects that improve the competitiveness of U.S. solar manufacturing. The Secretary must evaluate the program no later than three years after the Report is published and reevaluate it at least every four years thereafter.

Section 5. Photovoltaic device recycling research, development, and demonstration

Directs the Secretary to make awards to projects that improve the recycling of solar energy technologies and reduce their life-cycle environmental impact. Not later than September 2021, the Secretary must create a photovoltaic materials physical property database to identify materials in photovoltaic devices and their current and projected commercially available amounts.

Section 6. Authorization of appropriations

Authorizes 5% annual funding increases over five years for solar energy RD&D activities, beginning with $270 million in 2020, to carry out the Act.

Section 7. Sense of Congress

Adds 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.

VIII. Committee Views

The Committee recommends that the Secretary dedicate substantial resources to developing advanced solar manufacturing technologies and approaches, including through the research and development of perovskite and cadmium telluride photovoltaic technologies and through coordination with the Advanced Manufacturing Office, to improve the economic competitiveness of U.S. solar manufacturers and to strengthen domestic solar manufacturing capabilities. The Committee commends DOE's current efforts to advance U.S. solar manufacturing technologies through the American-Made Solar Prize.

It is also the view of the Committee that the Secretary continue to advance technologies that enable solar to integrate into new environments, such as agricultural, aquatic, and urban settings. Further, the Committee suggests that in carrying out research to improve the reuse and recycling of photovoltaic devices, the Secretary considers the cost-effectiveness of recycling techniques, the variety of materials needing recycling, and a diversity of potential uses for recycled materials. Lastly, the Committee recommends that the Secretary fund research and development activities to advance concentrating solar technologies for grid-scale energy storage and industrial heat applications.

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, August 28, 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. 3597, the Solar 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. 3597, Solar Energy Research and Development Act of 2019
As ordered reported by the House Committee on Science, 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	962	1,492

		Mandate Effects	
Statutory pay-as-you-go procedures apply?	No		
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. 3597 would authorize the appropriation of $1,492 million over the 2020–2024 period for the Department of Energy (DOE) to conduct research and development on solar energy systems and applications. Under the bill, DOE's research activities would focus on alternative production and manufacturing technologies as well as methods for integrating solar systems and products into transportation, building, and other types of infrastructure. Appropriated funds also could be used to cover some of the cost of demonstration projects, including some expenses for planning, equipment, and operations. Finally, the bill would authorize 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. 3597 would cost $962 million over the 2019–2024 period and $530 million after 2024. The costs of the legislation (detailed in Table 1) fall within budget function 270 (energy).

TABLE 1.—ESTIMATED INCREASES IN SPENDING SUBJECT TO APPROPRIATION UNDER H.R. 3597

	By fiscal year, millions of dollars—						
	2019	2020	2021	2022	2023	2024	2019–2024
Authorization	0	270	284	298	313	328	1,492
Estimated Outlays	0	54	138	212	263	295	962

Components may not sum to totals because of rounding.

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. 3597 contains no unfunded mandates.

XII. Committee Oversight Findings and Recommendations

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

XIII. Statement on General Performance Goals and Objectives

To guide and conduct research, development, testing and evaluation of solar energy technologies.

XIV. Federal Advisory Committee Statement

H.R. 3597 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. 3597 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. 3597 contains no earmarks, limited tax benefits, or limited tariff benefits.

XVII. APPLICABILITY TO THE LEGISLATIVE BRANCH

The Committee finds that H.R. 3597 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, new matter is printed in italics, and existing law in which no change is proposed is shown in roman):

SOLAR ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACT OF 1974

AN ACT To authorize a vigorous Federal program of research, development, and demonstration to assure the utilization of solar energy as a viable source for our national energy needs, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, [That this Act may be cited as the "Solar Energy Research, and Demonstration Act of 1974".

[DECLARATION OF FINDINGS AND POLICY

[SEC. 2. (a) The Congress hereby finds that—

[(1) the needs of a viable society depend on an ample supply of energy;

[(2) the current imbalance between domestic supply and demand for fuels and energy is likely to persist for some time;

[(3) dependence on nonrenewable energy resources cannot be continued indefinitely, particularly at current rates of consumption;

[(4) it is in the Nation's interest to expedite the long-term development of renewable and nonpolluting energy resources, such as solar energy;

[(5) the various solar energy technologies are today at widely differing stages of development, with some already near the stage of commercial application and others still requiring basic research;

[(6) the early development and export of viable equipment utilizing solar energy, consistent with the established preeminence of the United States in the field of high technology products, can make a valuable contribution to our balance of trade;

[(7) the mass production and use of equipment utilizing solar energy will help to eliminate the dependence of the United States upon foreign energy sources and promote the national defense;

[(8) to date, the national effort in research, development, and demonstration activities relating to the utilization of solar energy has been extremely limited; therefore

[(9) the urgency of the Nation's critical energy shortages and the need to make clean and renewable energy alternatives commercially viable require that the Nation undertake an intensive research, development, and demonstration program with an estimated Federal investment which may reach or exceed $1,000,000,000.

[(b) The Congress declares that it is the policy of the Federal Government to—

[(1) pursue a vigorous and viable program of research and resource assessment of solar energy as a major source of energy for our national needs; and

[(2) provide for the development and demonstration of practicable means to employ solar energy on a commercial scale.

[DEFINITIONS

[SEC. 3. For the purposes of this Act—

[(1) the term "solar energy" means energy which has recently originated in the Sun, including direct and indirect solar radiation and intermediate solar energy forms such as wind, sea thermal gradients, products of photosynthetic processes, organic wastes, and others;

[(2) the term "byproducts" includes, with respect to any solar energy technology or process, any solar energy products (including energy forms) other than those associated with or constituting the primary product of such technology or process;

[(3) the term "insolation" means the rate at which solar energy is received at the surface of the Earth;

[(4) the term "Project" means the Solar Energy Coordination and Management Project; and

[(5) the term "Chairman" means the Chairman of the Project.

[SOLAR ENERGY COORDINATION AND MANAGEMENT PROJECT

[SEC. 4. (a) There is hereby established the Solar Energy Coordination and Management Project.

[(b) (1) The Project shall be composed of six members as follows:

[(A) an Assistant Director of the National Science Foundation;

[(B) an Assistant Secretary of Housing and Urban Development;

[(C) a member of the Federal Power Commission;

[(D) an Associate Administrator of the National Aeronautics and Space Administration;

[(E) the General Manager of the Atomic Energy Commission; and

[(F) a member to be designated by the President.

[(2) The President shall designate one member of the Project to serve as Chairman of the Project.

[(3) If the individual designated under paragraph (1) (F) is an officer or employee of the Federal Government, he shall receive no additional pay on account of his service as a member of the Project. If such individual is not an officer or employee of the Federal Government, he shall be entitled to receive the daily equivalent of the annual rate of basic pay in effect for level IV of the Executive Schedule (5 U.S.C. 5315) for each day (including traveltime) during which he is engaged in the actual performance of duties vested in the Project.

[(c) The Project shall have overall responsibility for the provision or effective management and coordination with respect to a national solar energy research, development, and demonstration program, including—

[(1) the determination and evaluation of the resource base, including its temporal and geographic characteristics;

[(2) research and development on solar energy technologies; and

[(3) the demonstration of appropriate solar energy technologies.

[(d) (1) The Project shall carry out its responsibilities under this section in cooperation with the following Federal agencies:

[(A) the National Science Foundation, the responsibilities of which shall include research;

[(B) the National Aeronautics and Space Administration, the responsibilities of which shall include the provision of management capability and the development of technologies;

[(C) the Atomic Energy Commission, the responsibilities of which shall include the development of technologies;

[(D) the Department of Housing and Urban Development, the responsibilities of which shall include fostering the utilization of solar energy for the heating and cooling of buildings, pursuant to the Solar Heating and Cooling Demonstration Act of 1974 (P.L. 93–409; 88 Stat. 1069); and

[(E) the Federal Power Commission, the responsibilities of which shall include fostering the utilization of solar energy for the generation of electricity and for the production of synthetic fuels.

[(2) Upon request of the Chairman, the head of any such agency is authorized to detail or assign, on a reimbursable basis or otherwise, any of the personnel of such agency to the Project to assist it in carrying out its responsibilities under this Act.

[(e) The Project shall have exclusive authority with respect to the establishment or approval of programs or projects initiated under this Act, but the agency involved in any particular program or project shall be responsible for the operation and administration of such program or project.

[(f) The National Aeronautics and Space Administration is authorized to undertake and carry out those programs assigned to it by the Project.

[RESOURCE DETERMINATION AND ASSESSMENT

[SEC. 5. (a) The Chairman shall initiate a solar energy resource determination and assessment program with the objective of making a regional and national appraisal of all solar energy resources, including data on insolation, wind, sea thermal gradients, and potentials for photosynthetic conversion. The program shall emphasize identification of promising areas for commercial exploitation and development. The specific goals shall include—

[(1) the development of better methods for predicting the availability of all solar energy resources, over long time periods and by geographic location;

[(2) the development of advanced meteorological, oceanographic, and other instruments, methodology, and procedures necessary to measure the quality and quantity of all solar resources on periodic bases;

[(3) the development of activities, arrangements, and procedures for the collection, evaluation, and dissemination of information and data relating to solar energy resource assessment.

[(b) The Chairman, acting through the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, and other appropriate agencies, shall—

[(1) develop and carry out a general plan for inventorying all forms of solar energy resources associated with Federal lands and (where consistent with property rights) non-Federal lands;

[(2) conduct regional surveys based upon such general plan, using innovative meteorological, oceanographic, and space-related techniques, in sufficient numbers to lead to a national inventory of solar energy resources in the United States;

[(3) publish and make available maps, reports, and other documents developed from such surveys to encourage and facilitate the commercial development of solar energy resources; and

[(4) make such recommendations for legislation as may appear to be necessary to establish policies for solar resources involving Federal lands and waters, consistent with known inventories of various resource types, with the state of technologies for solar energy development, and with evaluation of the environmental impacts of such development.

[RESEARCH AND DEVELOPMENT

[SEC. 6. (a) The Chairman shall initiate a research and development program for the purpose of resolving the major technical problems inhibiting commercial utilization of solar energy in the United States.

[(b) In connection with or as a part of such program, the Chairman shall—

[(1) conduct, encourage, and promote scientific research and studies to develop effective and economical processes and equipment for the purpose of utilizing solar energy in an acceptable manner for beneficial uses;

[(2) carry out systems, economic, social, and environmental studies to provide a basis for research, development and demonstration planning and phasing; and

[(3) perform or cause to be performed technology assessments relevant to the utilization of solar energy.

[(c) The specific solar energy technologies to be addressed or dealt with in the program shall include—

[(1) direct solar heat as a source for industrial processes, including the utilization of low-level heat for process and other industrial purposes;

[(2) thermal energy conversion, and other methods, for the generation of electricity and the production of chemical fuels;

[(3) the conversion of cellulose and other organic materials (including wastes) to useful energy or fuels;

[(4) photovoltaic and other direct conversion processes;

[(5) sea thermal gradient conversion;

[(6) windpower conversion;

[(7) solar heating and cooling of housing and of commercial and public buildings; and

[(8) energy storage.

[DEMONSTRATION

[SEC. 7. (a) The Chairman is authorized to initiate a program to design and construct, in specific solar energy technologies (including, but not limited to, those listed in section (6)(c), facilities or powerplants of sufficient size to demonstrate the technical and economic feasibility of utilizing the various forms of solar energy. The specific goals of such programs shall include—

[(1) production of electricity from a number of powerplants, on the order of one to ten megawatts each;

[(2) production of synthetic fuels in commercial quantities;

[(3) large-scale utilization of solar energy in the form of direct heat;

[(4) utilization of thermal and all other byproducts of the solar facilities;

[(5) design and development of hybrid systems involving the concomitant utilization of solar and other energy sources; and

[(6) the continuous operation of such plants and facilities for a period of time.

[(b) For each of the technologies for which a successful and appropriate development program is completed, the Chairman shall make a determination to proceed to demonstration based on criteria including, but not necessarily limited to, the following:

[(1) the technological feasibility of the project;

[(2) the costs and benefits of the project, as determined by an economic assessment;

[(3) the immediate and the potential uses of the solar energy utilized in the project;

[(4) long-term national need for the technology;

[(5) environmental impact;

[(6) potential for technology transfer to other applications; and

[(7) the nature and extent of Federal participation, if any, in the project.

[(c) In carrying out his responsibilities under this section, the Chairman, acting through the appropriate Federal agencies, may provide for the establishment of one or more demonstration projects utilizing each form of solar energy, which shall include, as

appropriate, the specific research, development, pilot plant construction and operation, demonstration plant construction and operation, and other facilities and activities which may be necessary to show commercial viability of the specific solar technology.

[(d) The Chairman, acting through the appropriate Federal agencies, is authorized to investigate and enter into agreements for the cooperative development of facilities to demonstrate solar technologies. The responsible Federal agency may consider—

[(1) cooperative agreements with non-Federal entities for construction of facilities and equipment to demonstrate solar energy technologies; and

[(2) cooperative agreements with other Federal agencies for the construction of facilities and equipment and operation of facilities to produce energy for direct Federal utilization.

[(e) The Chairman, acting through appropriate Federal agencies is authorized to construct and operate demonstration projects without entering into cooperative agreements with respect to such projects, if the Chairman finds that—

[(1) the nature of the resource, the geographical location, the scale and engineering design of the facilities, the techniques of production, or any other significant factor of the specific demonstration project offers opportunities to make important contributions to the general knowledge of solar resources, the techniques of its development, or public confidence in the technology; and

[(2) there is no opportunity for cooperative agreements with any non-Federal entity willing and able to cooperate in the demonstration project under subsection (d)(1), and there is no opportunity for cooperative agreements with other Federal agencies under subsection (d)(2).

[(f) If the estimate of the Federal investment with respect to construction and operation costs of any demonstration project proposed to be established under this section exceeds $20,000,000, no amount may be appropriated for such project except as specifically authorized by legislation hereafter enacted by the Congress.

[(g)(1) At the conclusion of any demonstration project established under this section, or as soon thereafter as may be practicable, the responsible Federal agencies shall, by sale, lease, or otherwise, dispose of all Federal property interests which they have acquired pursuant to this section in accordance with existing law and the terms of the cooperative agreements involved.

[(2) The agency involved shall, under appropriate agreements or other arrangements, provide for the disposition of electricity, synthetic fuels, and other byproducts of the project administered by such agency.

[SOLAR ENERGY TECHNOLOGY UTILIZATION

[SEC. 8. (a)(1) In carrying out his functions under this Act the Chairman, utilizing the capabilities of the National Science Foundation, the National Aeronautics and Space Administration, the Department of Commerce, the Atomic Energy Commission, and other appropriate Federal agencies to the maximum extent possible, shall establish and operate a Solar Energy Information Data Bank (hereinafter in this subsection referred to as the "bank") for the purpose of collecting, reviewing, processing, and disseminating

information and data in all of the solar energy technologies referred to in section 7(c) in a timely and accurate manner in support of the objectives of this Act.

[(2) Information and data compiled in the bank shall include—

[(A) technical information (including reports, journal articles, dissertations, monographs, and project descriptions) on solar energy research, development, and applications;

[(B) similar technical information on the design, construction, and maintenance of equipment utilizing solar energy;

[(C) general information on solar energy applications to be disseminated for popular consumption;

[(D) physical and chemical properties of materials required for solar energy activities and equipment; and

[(E) engineering performance data on equipment and devices utilizing solar energy.

[(3) In accordance with regulations prescribed under section 12, the Chairman shall provide retrieval and dissemination services with respect to the information described under paragraph (2) for—

[(A) Federal, State, and local government organizations that are active in the area of energy resources (and their contractors);

[(B) universities and colleges in their related research and consulting activities; and

[(C) the private sector upon request in appropriate cases.

[(4) In carrying out his functions under this subsection, the Chairman shall utilize, when feasible, the existing data base of scientific and technical information in Federal agencies, adding to such data base any information described in paragraph (2) which does not already reside in such base. He shall coordinate or merge this data bank with other Federal energy information data banks as necessary to assure efficient and effective operation.

[(b) In carrying out his functions under this Act the Chairman shall perform or cause to be performed studies and research on incentives to promote broader utilization and consumer acceptance of solar energy technologies.

[(c) The Chairman shall enter into such arrangements and take such other steps as may be necessary or appropriate to provide for the effective coordination of solar energy technology utilization with all other technology utilization programs within the Federal Government.

SCIENTIFIC AND TECHNICAL EDUCATION

[SEC. 9. The Chairman, acting through the National Science Foundation, is authorized and directed to support programs of education in the sciences and engineering to provide the necessary trained personnel to perform the solar energy research, development, and demonstration activities required under this Act. Such support may include fellowships, traineeships, technical training

programs, technologist training programs, and summer institute programs.]

* * * * * * *

[INTERNATIONAL COOPERATION

[SEC. 11. (a) The Chairman, in furtherance of the objectives of this Act, is authorized to cooperate and participate jointly with other nations, especially those with agreements for scientific cooperation with the United States, in the following activities:

[(1) interinstitutional, bilateral, or multilateral research projects in the field of solar energy; and

[(2) agreements and programs which will facilitate the exchange of information and data relating to solar energy resource assessment and solar energy technologies.

[(b) The National Science Foundation is authorized to encourage, to the maximum extent practicable and consistent with the other objectives of this Act, international participation and cooperation in the development and maintenance of programs of education to carry out the policy set forth in section 9.

[REGULATIONS

[SEC. 12. The Chairman, in consultation with the heads of the Federal agencies having functions under this Act and with other appropriate officers and agencies, shall prescribe such regulations as may be necessary or appropriate to carry out this Act promptly and efficiently. Each such officer or agency, in consultation with the Chairman, may prescribe such regulations as may be necessary or appropriate to carry out his or its particular functions under this Act promptly and efficiently.

[ANNUAL REPORTS

[SEC. 13. A summary of all actions taken under the provisions of this Act and action planned for the ensuing year shall be included in the annual report required by section 657 of the Department of Energy Organization Act (42 U.S.C. 7267).

[INFORMATION TO CONGRESS

[SEC. 14. Notwithstanding any other provision of law, the Chairman (or the head of any agency which assumes the functions of the Project pursuant to section 16) shall keep the appropriate committees of the House of Representatives and the Senate fully and currently informed with respect to all activities under this Act.

[COMPREHENISIVE PROGRAM DEFINITION

[SEC. 15. (a) The Chairman is authorized and directed to prepare a comprehensive program definition of an integrated effort and commitment for effectively developing solar energy resources. The Chairman, in preparing such program definition, shall utilize and consult with the appropriate Federal agencies, State and local government agencies, and private organizations.

[(b) The Chairman shall transmit such comprehensive program definition to the President and to each House of the Congress. An interim report shall be transmitted not later than March 1, 1975.

The comprehensive program definition shall be transmitted as soon as possible thereafter, but in any case not later than June 30, 1975.

[TRANSFER OF FUNCTIONS

[SEC. 16. Within sixty days after the effective date of the law creating a permanent Federal organization or agency having jurisdiction over the energy research and development functions of the United States (or within sixty days after the date of the enactment of this Act if the effective date of such law occurs prior to the date of the enactment of this Act), all of the authorities of the Project and all of the research and development functions (and other functions except those related to scientific and technical education) vested in Federal agencies under this Act along with related records, documents, personnel, obligations, and other items, to the extent necessary or appropriate, shall, in accordance with regulations prescribed by the Office of Management and Budget, be transferred to and vested in such organization or agency.

[AUTHORIZATION OF APPROPRIATIONS

[SEC. 17. To carry out the provisions of this Act, there are authorized to be appropriated——

[(1) for the fiscal year ending June 30, 1976, $75,000,000;

[(2) for subsequent fiscal years, only such sums as the Congress hereafter may authorize by law;

[(3) such amounts as may be authorized for the construction of demonstrations pursuant to section 7(f) of this Act; and

[(4) to the National Science Foundation for the fiscal year ending June 30, 1975, not to exceed $2,000,000 to be made available for use in the preparation of the comprehensive program definition under section 15.]

SOLAR PHOTOVOLTAIC ENERGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION ACT OF 1978

AN ACT To provide for an accelerated program of research, development, and demonstration of solar photovoltaic energy technologies leading to early competitive commercial applicability of such technologies to be carried out by the Department of Energy, with the support of the National Aeronautics and Space Administration, the National Bureau of Standards, the General Services Administration, and other Federal agencies

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, [That this Act may be cited as the "Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978".

FINDINGS AND POLICY

[SEC. 2. (a) The Congress hereby finds that——

[(1) the United States of America is faced with a finite and diminishing resource base of native fossil fuels, and as a consequence must develop as quickly as possible a diversified, pluralistic national energy capability and posture;

[(2) the current imbalance between supply and demand for fuels and energy in the United States is likely to grow for many years;

[(3) the early demonstration of the feasibility of using solar photovoltaic energy systems for the generation of electricity could help to relieve the demand on existing fuel and energy supplies;

[(4) the national security and economic well-being of the United States is endangered by its dependence on imported energy supplies which are subject to resource limitations, artificial pricing mechanisms which do not accurately reflect supply and demand relationships, and supply interruptions;

[(5) the early development and widespread utilization of photovoltaic energy systems could significantly expand the domestic energy resource base of the United States, thereby lessening its dependence on foreign supplies;

[(6) the establishment of sizable markets for photovoltaic energy systems will justify private investment in plant and equipment necessary to realize the economies of scale, and will result in significant reductions in the unit costs of these systems;

[(7) the use of solar photovoltaic energy systems for certain limited applications has already proved feasible;

[(8) there appear to be no insoluble technical obstacles to the widespread commercial use of solar photovoltaic energy technologies;

[(9) an aggressive research and development program should solve existing technical problems of solar photovoltaic systems; and, supported by an assured and growing market for photovoltaic systems during the next decade, should maximize the future contribution of solar photovoltaic energy to this Nation's future energy production;

[(10) it is the proper and appropriate role of the Federal Government to undertake research, development, and demonstration programs in solar photovoltaic energy technologies and to supplement and assist private industry and other entities and thereby the general public, so as to hasten the general commercial use of such technologies;

[(11) the high cost of imported energy sources impairs the economic growth of many nations which lack sizable domestic energy supplies or are unable to develop these resources;

[(12) photovoltaic energy systems are economically competitive with conventional energy resources for a wide variety of applications in many foreign nations at the present time, and will find additional applications with continued cost reductions;

[(13) the early development and export of solar photovoltaic energy systems, consistent with the established preeminence of the United States in the field of high technology products, can make a valuable contribution to the well-being of the people of other nations and to this Nation's balance of trade;

[(14) the widespread use of solar photovoltaic energy systems to supplement and replace conventional methods for the generation of electricity would have a beneficial effect upon the environment:

[(15) to increase the potential application of solar photovoltaic energy systems in remote locations, and to minimize the need for backup systems depending on fossil fuel, programs leading to the development of inexpensive and reliable systems for the

storage of electricity should be pursued as part of any solar photovoltaic energy research, development, and demonstration program;

[(16) evaluation of the performance and reliability of solar photovoltaic energy technologies can be expedited by testing of prototypes under carefully controlled conditions;

[(17) commercial application of solar photovoltaic energy technologies can be expedited by early commercial demonstration under practical conditions;

[(18) photovoltaic energy systems are currently adaptable on a life cycle, cost-justified basis for certain of the energy needs of the Federal Government, and will find additional applications as continued refinements improve performance and reduce unit costs;

[(19) the Federal Government can stimulate innovation and economic efficiency in the production of photovoltaic energy systems through the development and implementation of policies to promote diversity and maximum competition between firms engaged in the research, manufacture, installation, and/or maintenance of these systems;

[(20) innovation and creativity in the development of solar photovoltaic energy components and systems can be fostered through encouraging direct contact between the manufacturers of such systems and the architects, engineers, developers, contractors, and other persons interested in utilizing such systems; and

[(21) it is contemplated that the ten-year program established by this Act will require the expenditure of $1,500,000,000 by the Federal Government.

[(b) It is therefore declared to be the policy of the United States and the purpose of this Act to establish during the next decade an aggressive research, development, and demonstration program involving solar photovoltaic energy systems and in the long term, to have as an objective the production of electricity from photovoltaic systems cost competitive with utility-generated electricity from conventional sources. Further, it is declared to be the policy of the United States and the purpose of this Act that the objectives of this research, development, and demonstration program are—

[(1) to double the production of solar photovoltaic energy systems each year during the decade starting with fiscal year 1979, measured by the peak generating capacity of the systems produced, so as to reach a total annual United States production of solar photovoltaic energy systems of approximately two million peak kilowatts, and a total cumulative production of such systems of approximately four million peak kilowatts by fiscal year 1988;

[(2) to reduce the average cost of installed solar photovoltaic energy systems to $1 per peak watt by fiscal year 1988; and

[(3) to stimulate the purchase by private buyers of at least 90 per centum of all solar photovoltaic energy systems produced in the United States during fiscal year 1988.

[DEFINITIONS

[SEC. 3. For purposes of this Act—

[(1) a "solar photovoltaic energy system" is a system of components which generates electricity from incident sunlight by means of the photovoltaic effect, and which shall include all components, including energy storage devices where appropriate, necessary to provide electricity for individual, industrial, agricultural, or governmental use;

[(2) the term "solar photovoltaic energy system" may be used interchangeably with the term "photovoltaic system";

[(3) a "hybrid solar photovoltaic energy system" is a system of components that generates electricity from incident sunlight by means of the photovoltaic effect and, in conjunction with electronic and, if appropriate, optical, thermal and storage devices, provides electricity, as well as heat and/or light for individual, commercial, industrial, agricultural, or governmental use;

[(4) "photovoltaic effect" refers to the physical phenomenon exhibited under certain circumstances by some materials in which a portion of the light energy striking the material is directly converted to electrical energy;

[(5) "facility" means any building, agricultural, commercial or industrial complex or other device constructively employing photovoltaic systems; and

[(6) "Secretary" means the Secretary of Energy.

[RESEARCH, DEVELOPMENT, AND DEMONSTRATION OF SOLAR PHOTOVOLTAIC ENERGY SYSTEMS

[SEC. 4. The Secretary is directed to establish immediately and carry forth such research, development, and demonstration programs as may be necessary to meet the objectives of this Act as set forth in section 2(b), and as a part of any such program shall—

[(a) conduct, and promote the coordination and acceleration of, research, development, and demonstrations relating to solar photovoltaic energy systems and components thereof, and

[(b) conduct, and promote the coordination and acceleration of, research, development, and demonstrations for systems and components to be used in applications that are dependent for their energy on solar photovoltaic energy systems.

[SEC. 5. (a) In carrying out the provisions of section (4), the Secretary is authorized—

[(1) to establish procedures whereby any public or private entity wishing to install solar photovoltaic components and systems in any new or existing facility may apply for Federal assistance in purchasing and installing, in such facility, photovoltaic components or systems;

[(2) to select, as soon as he deems it feasible, a number of the applicants under paragraph (1) and enter into agreements with them for the design, purchase, fabrication, testing, installation, and demonstration of photovoltaic components and systems. Such selection shall be based on the need to obtain scientific, technological, and economic information from a variety of such systems under a variety of circumstances and conditions; and

[(3) to arrange, as part of any agreement entered into under paragraph (2), to provide up to 75 per centum of the purchase and installation costs of photovoltaic components or systems,

taking into account relevant considerations involving the relative stage of consumer and industry interest and development at the time of the financial assistance action. Such arrangements shall be contingent upon terms and conditions prescribed by the Secretary, including an express agreement that the entity with whom the agreement is entered into shall, in such manner and form and on such terms and conditions as the Secretary may prescribe, observe and monitor (or permit the Secretary or his agents to observe and monitor) the performance and operation of such system for a period of five years, and that such entity (including any subsequent owner of the property) shall regularly furnish the Secretary with such reports thereon as the agreement may require.

[(b) The Secretary shall, as he deems appropriate, undertake any projects or activities (including demonstration projects) to further the attainment of the objectives of this section.

[SEC. 6. (a) The Secretary is authorized to select on the basis of open competitions—

[(1) a number of readily available photovoltaic components and systems;

[(2) a number of design concepts for various types of applications which demonstrate adapability to the utilization of photovoltaic components and systems; and

[(3) a number of designs for applications selected under paragraph (2), so that each design includes specific provisions for the utilization of solar photovoltaic components and systems selected under paragraph (1).

[(b) The Secretary, in accordance with the applicable provisions of sections 7, 8, and 9 of the Federal Nonnuclear Energy Research and Development Act of 1974 (42 U.S.C. 5901 et seq.) and with such program guidelines as the Secretary may establish, shall—

[(1) enter into such contracts and grants as may be necessary or appropriate for the development for commercial production and utilization of photovoltaic components and systems, including any further planning and design which may be required to conform with the specifications set forth in any applicable criteria;

[(2) select, as being compatible with the design concepts chosen under subsection (a) (2) of this section, a reasonable number of photovoltaic components and systems; and

[(3) enter into contracts with a number of persons or firms for the procurement of photovoltaic components and systems, including adequate numbers of spare and replacement parts for such systems.

[(c) The Secretary is authorized to award contracts for the design integration between the application concepts and the photovoltaic systems procured by the Secretary under subsection (b) (3), and for the demonstration of prototype solar photovoltaic systems, and, when appropriate, for the utilization of such systems in existing facilities. Title to and ownership of the facilities so constructed and of photovoltaic systems installed hereunder may be conveyed to purchasers of such facilities under terms and conditions prescribed by the Secretary, including an express agreement that any such purchaser shall, in such manner and form and on such terms and conditions as the Secretary may prescribe, observe and monitor (or

permit the Secretary to observe and monitor) the performance and operation of such systems for a period of five years, and that such purchaser (including any subsequent owner) shall regularly furnish the Secretary with such reports thereon as the agreement may require.

[(d) The Secretary, in consultation with the Administrator of General Services or the Secretary of Defense or both (as may be appropriate) shall enter into arrangements with appropriate Federal agencies concurrently with the conduct of the programs under this section and section 7 of this Act, to carry out such projects and activities (including demonstration projects), with respect to Federal buildings and facilities, as may be appropriate for the demonstration of photovoltaic systems suitable and effective for use in such applications.

[(e) The Secretary shall, as he deems appropriate, undertake any projects or activities (including demonstration projects) to further the attainment of the objectives of this section.

[TEST PROCEDURES AND PERFORMANCE CRITERIA

[SEC. 7. (a) The Secretary shall conduct a testing program for photovoltaic systems to assist in the development and demonstration of prototype photovoltaic systems, including collectors, controls, power conditioning, and energy storage systems.

[(b) Data obtained from the testing program under subsection (a) shall be evaluated and used in establishing performance criteria. These performance criteria shall be used in the demonstration program described in sections 4, 5, and 6 of this Act.

[(c) The Secretary shall determine, prescribe, and publish in the Federal Register, at a time which he determines to be feasible and justified—

[(1) performance criteria for photovoltaic components and systems to be used in appropriate applications, and procedures whereby manufacturers of photovoltaic components and systems shall have their products tested in order to provide certification that such products conform to the performance criteria established under this paragraph; and

[(2) revised performance criteria for photovoltaic components and systems to be used in appropriate applications, and procedures whereby manufacturers of photovoltaic components and systems shall have their products tested in order to provide certification that such products conform to the performance criteria established under this paragraph. Such criteria may be annually revised by the Secretary, as he deems appropriate.

[(d) Any photovoltaic component or system procured or installed by the Federal Government or procured or installed with Federal assistance under section (5) or section (6) shall meet appropriate performance criteria prescribed under this section, if such performance criteria have been prescribed.

[COORDINATION MONITORING, AND LIAISON

[SEC. 8. (a) The Secretary, in coordination with such Government agencies as may be appropriate, shall—

[(1) monitor the performance and operation of photovoltaic systems installed under this Act;

[(2) collect and evaluate data and information on the performance and operation of photovoltaic systems installed under this Act; and

[(3) from time to time carry out such studies and investigations and take such other actions, including the submission of special reports to the Congress when appropriate, as may be necessary to assure that the programs for which the Secretary is responsible under this Act effectively carry out the policy of this Act.

[(b) In the development of the performance criteria and test procedures required under section 7 of this Act, the Secretary shall work closely with the appropriate scientific, technical, and professional societies and industry representatives in order to assure the best possible use of available expertise in this area.

[(c) The Secretary shall also maintain continuing liaison with related industries and interests, and with the scientific and technical community, during and after the period of the programs carried out under this Act, in order to assure that the projected benefits of such programs are and will continue to be realized.

[SOLAR PHOTOVOLTAIC ENERGY ADVISORY COMMITTEE

[SEC. 9. (a) There is hereby established a Solar Photovoltaic Energy Advisory Committee, which shall study and advise the Secretary on—

[(1) the scope and pace of research and development with respect to solar photovoltaic energy systems;

[(2) the need for and timing of solar photovoltaic energy systems demonstration projects;

[(3) the need for change in any research, development, or demonstration program established under this Act; and

[(4) the economic, technological, and environmental consequences of the use of solar photovoltaic energy systems.

[(b) The Committee shall be composed of thirteen members, including eleven members appointed by the Secretary from industrial organizations, academic institutions, professional societies or institutions, and other sources as he sees fit, and two members of the public appointed by the President. The Chairman of the Committee shall be elected from among the members thereof.

[(c) The heads of the departments, agencies, and instrumentalities of the executive branch of the Federal Government shall cooperate with the Committee in carrying out the requirements of this section, and shall furnish to the Committee such information as the Committee deems necessary to carry out this section.

[(d) Section 624 of the Department of Energy Organization Act shall be applicable to the Committee, except as inconsistent with this section.

[DISSEMINATION OF INFORMATION AND OTHER ACTIVITIES TO PROMOTE PRACTICAL USE OF SOLAR PHOTOVOLTAIC TECHNOLOGIES

[SEC. 10 (a) The Secretary shall take all possible steps to assure that full and complete information with respect to the demonstrations and other activities conducted under this Act is made available to Federal, State, and local authorities, relevant segments of the economy, the scientific and technical community, and the public at large, both during and after the close of the programs under this

Act, with the objective of promoting and facilitating to the maximum extent feasible the early and widespread practical use of photovoltaic energy throughout the United States. Any trade secret or other proprietary information shall be exempted from such mandatory disclosure, as otherwise specified in law applicable to research, development and demonstration programs of the Department of Energy, including, but not limited to, section 17 of the Federal Non-Nuclear Energy Research and Development Act of 1974, Public Law 93–577, as amended.

[(b) The Secretary shall—

[(1) study the effect of the widespread utilization of photovoltaic systems on the existing electric utility system at varying levels of photovoltaic contribution to the system;

[(2) study and investigate the effect of utility rate structures, building codes, zoning ordinances, and other laws, codes, ordinances, and practices upon the practical use of photovoltaic systems;

[(3) determine the extent to which such laws, codes, ordinances, and practices should be changed to permit or facilitate such use and the methods by which any such changes may best be accomplished; and

[(4) determine the necessity of a program of incentives to accelerate the commercial application of photovoltaic technologies.

[(c) The Secretary is authorized and directed, within one year of the Policy date of enactment of this Act, to make recommendations to the President and to the Congress for Federal policies relating to barriers to the early and widespread utilization of photovoltaic systems in order to realize the goals set forth in section 2. These recommendations shall include but not be limited to—

[(1) the potential for integration of electricity derived from photovoltaic energy systems into the existing national grid system, including the potential of photovoltaic-generated electricity to meet. the peak-load energy needs of electric utilities, load management and reliability implications of the utilization of photovoltaic electricity by utilities, the implications of utility ownership of photovoltaic components leased to others primarily for decentralized applications, the impacts of utility use of electricity derived from photovoltaic energy systems on utility rate structures, and the potential for reducing or obviating the need for energy storage components for photovoltaic energy systems through utility interface;

[(2) the extent of competition between firms currently engaged in the fabrication and installation of photovoltaics components and systems as it affects the character and growth potential of the American photovoltaics industry, and the likelihood that small photovoltaic firms will have reasonable opportunities to compete and participate in the various programs authorized by this Act;

[(3) the need to identify legal alternatives to ensure access to direct sunlight for photovoltaic energy systems, the appropriate methods of encouraging the adoption of such alternatives, and the implications of widespread utilization of photovoltaic energy systems for land use and urban development;

[(4) the availability of private capital at reasonable interest rates for individuals, businesses and others desiring to establish commercial enterprises to manufacture, market, install, and/or maintain photovoltaic components and systems, or purchase and install such systems for private, industrial, agricultural, commercial or other uses;

[(5) the need for industry-wide warranty and reliability standards for photovoltaic energy components and systems for private sector applications, and, if appropriate, the mechanisms for establishing such standards; and

[(6) the attainability of the goals specified in subsection 2(b), and any modification of such goals which the Secretary proposes for consideration by Congress, with supporting analyses.

[(d) In carrying out his functions under this section, the Secretary shall consult with the appropriate government agencies, industry representatives, and members of the scientific and technical community having expertise and interest in this area. The Secretary also shall ensure that any study or report prepared pursuant to this section is fully coordinated with and reflective of any analyses or reports prepared pursuant to the requirements in section 208 of the Department of Energy Act of 1978—Civilian Applications, Public Law 95–238, and in the President's Solar Energy Domestic Policy Review. The Secretary, as appropriate, may merge any continuing or on-going studies under section 208 or the Domestic Policy Review with those required by this section or avoid any unnecessary duplication of effort or funding. The separate report requirements of section 208 and this section, however, shall remain in force.

[INTERNATIONAL PARTICIPATION AND COOPERATION

[SEC. 11. (a) Within one year after the date of the enactment of this Act, the Secretary, in consultation with the Secretary of State, the Administrator of the Agency for International Development, the Director of the Export/Import Bank and other appropriate Federal officials, shall submit to the House Committee on Science and Technology and the Senate Committee on Energy and Natural Resources a plan for demonstrating applications of solar photovoltaic energy systems and facilitating their widespread use in other nations, especially those with agreements for scientific cooperation with the United States.

[(b) The Secretary is authorized to encourage, to the maximum extent practicable, international participation and cooperation in the development and maintenance of programs established under this plan. The Secretary, in consultation and cooperation with the Federal officials specified in subsection (a), shall insure to the maximum extent possible that the plan submitted under subsection (a) and any other international activities under this section are consistent with and reflective of any similar activities or requirements under any other Federal statute, specifically including any of the several programs under other agencies and Departments involving United States international cooperation and assistance in nonnuclear energy technology, and will not duplicate activities under such programs. The plan required in subsection (a) shall specifically identify all such programs and statutes and describe how the activities under this section will be consistent with such programs,

will be coordinated with them, and will avoid duplication of activities under such programs.

[ENCOURAGEMENT AND PROTECTION OF SMALL BUSINESS

[SEC. 12. In carrying out his functions under this Act, the Secretary shall take steps to assure that small-business concerns will have realistic and adequate opportunities to participate in the programs under this Act to the maximum extent practicable, and the Secretary is directed to set aside at least 10 per centum of the funds authorized and appropriated for the participation of small business concerns.

[PRIORITIES

[SEC. 13. The Secretary shall set priorities, as far as possible consistent with the intent and operation of this Act, in accordance with the following criteria:

[(1) The applications utilizing photovoltaic systems which will be part of the research, development, and demonstration program and testing and demonstration programs referred to in sections 4, 5, 6, and 7 shall be located in a sufficient number of different geographic areas in the United States to assure a realistic and effective demonstration of the use of photovoltaic systems and of the applications themselves, in both rural and urban locations and under climatic conditions which vary as much as possible,

[(2) The projected costs of commercial production and maintenance of the photovoltaic systems utilized in the testing and demonstration programs established under this Act should be taken into account.

[(3) Encouragement should be given in the conduct of programs under this Act to those projects in which funds are appropriated by any State or political subdivision thereof for the purpose of sharing costs with the Federal Government for the purchase and installation of photovoltaic components and systems.

[SEC. 14. Nothing in this Act shall be construed to negate, duplicate, or otherwise affect the provisions of title V (Federal Initiatives), part 4 (Federal Photovoltaic Utilization), National Energy Conservation Policy Act, H.R. 5037, 95th Congress, if and when that Act becomes enacted by the Ninety-fifth Congress, and such part 4 shall be exempted fully from the provisions of this Act and any regulations, guidelines, or criteria pursuant thereto.

[AUTHORIZATION OF APPROPRIATIONS

[SEC. 15. There is hereby authorized to be appropriated to the Secretary, for the fiscal year ending September 30, 1979, $125,000,000, inclusive of any funds otherwise authorized for photovoltaic programs, (1) to carry out the functions vested in the Secretary by this Act, (2) to carry out the functions in fiscal year 1979, vested in the Secretary by part 4 of title V of H.R. 5037, 95th Congress, if enacted by the 95th Congress, and (3) for transfer to such other agencies of the Federal Government as may be required to enable them to carry out their respective functions under this Act. Funds appropriated pursuant to this section shall remain available

until expended: *Provided*, That any contract or agreement entered into pursuant to this Act shall be effective only to such extent or in such amounts as are provided in advance in appropriation Acts. Authorizations of appropriations for fiscal years after fiscal year 1979 shall be contained in the annual authorization for the Department of Energy, except for those funds authorized for fiscal years 1980 and 1981 contained in part 4 of title V of H.R. 5037, Ninety-fifth Congress, if enacted by the Ninety-fifth Congress.]

RENEWABLE ENERGY AND ENERGY EFFICIENCY TECHNOLOGY COMPETITIVENESS ACT OF 1989

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

(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) n 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 research 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;

(III) 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 GOALS.—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 4(b) of this Act.

(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.

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ENERGY POLICY ACT OF 2005

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TITLE IX—RESEARCH AND DEVELOPMENT

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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.

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ENERGY INDEPENDENCE AND SECURITY ACT OF 2007

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TITLE VI—ACCELERATED RESEARCH AND DEVELOPMENT

Subtitle A—Solar Energy

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[SEC. 606. SOLAR AIR CONDITIONING RESEARCH AND DEVELOPMENT PROGRAM.

[(a) ESTABLISHMENT.—The Secretary shall establish a research, development, and demonstration program to promote less costly and more reliable decentralized distributed solar-powered air conditioning for individuals and businesses.

[(b) AUTHORIZED ACTIVITIES.—Grants made available under this section may be used to support the following activities:

[(1) Advancing solar thermal collectors, including concentrating solar thermal and electric systems, flat plate and evacuated tube collector performance.

[(2) Achieving technical and economic integration of solar-powered distributed air-conditioning systems with existing hot water and storage systems for residential applications.

[(3) Designing and demonstrating mass manufacturing capability to reduce costs of modular standardized solar-powered distributed air conditioning systems and components.

[(4) Improving the efficiency of solar-powered distributed air-conditioning to increase the effectiveness of solar-powered absorption chillers, solar-driven compressors and condensors, and cost-effective precooling approaches.

[(5) Researching and comparing performance of solar-powered distributed air conditioning systems in different regions of the country, including potential integration with other onsite systems, such as solar, biogas, geothermal heat pumps, and propane assist or combined propane fuel cells, with a goal to develop site-specific energy production and management systems that ease fuel and peak utility loading.

[(c) COST SHARING.—Section 16352 of this title shall apply to a project carried out under this section.

[(d) AUTHORIZATION APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for carrying out this section $2,500,000 for each of the fiscal years 2008 through 2012.

[SEC. 607. PHOTOVOLTAIC DEMONSTRATION PROGRAM.

[(a) IN GENERAL.—The Secretary shall establish a program of grants to States to demonstrate advanced photovoltaic technology.

[(b) REQUIREMENTS.—

[(1) ABILITY TO MEET REQUIREMENTS.—To receive funding under the program under this section, a State must submit a proposal that demonstrates, to the satisfaction of the Secretary, that the State will meet the requirements of subsection (f).

[(2) COMPLIANCE WITH REQUIREMENTS.—If a State has received funding under this section for the preceding year, the State must demonstrate, to the satisfaction of the Secretary, that it complied with the requirements of subsection (f) in carrying out the program during that preceding year, and that it will do so in the future, before it can receive further funding under this section.

[(c) COMPETITION.—The Secretary shall award grants on a competitive basis to the States with the proposals the Secretary considers most likely to encourage the widespread adoption of photovoltaic technologies. The Secretary shall take into consideration the geographic distribution of awards.

[(d) PROPOSALS.—Not later than 6 months after December 19, 2007, and in each subsequent fiscal year for the life of the program, the Secretary shall solicit proposals from the States to participate in the program under this section.

[(e) COMPETITIVE CRITERIA.—In awarding funds in a competitive allocation under subsection (c), the Secretary shall consider—

[(1) the likelihood of a proposal to encourage the demonstration of, or lower the costs of, advanced photovoltaic technologies; and

[(2) the extent to which a proposal is likely to—

[(A) maximize the amount of photovoltaics demonstrated;

[(B) maximize the proportion of non-Federal cost share; and

[(C) limit State administrative costs.

[(f) STATE PROGRAM.—A program operated by a State with funding under this section shall provide competitive awards for the demonstration of advanced photovoltaic technologies. Each State program shall—

[(1) require a contribution of at least 60 percent per award from non-Federal sources, which may include any combination of State, local, and private funds, except that at least 10 percent of the funding must be supplied by the State;

[(2) endeavor to fund recipients in the commercial, industrial, institutional, governmental, and residential sectors;

[(3) limit State administrative costs to no more than 10 percent of the grant;

[(4) report annually to the Secretary on—

[(A) the amount of funds disbursed;

[(B) the amount of photovoltaics purchased; and

[(C) the results of the monitoring under paragraph (5);

[(5) provide for measurement and verification of the output of a representative sample of the photovoltaics systems demonstrated throughout the average working life of the systems, or at least 20 years; and

[(6) require that applicant buildings must have received an independent energy efficiency audit during the 6-month period preceding the filing of the application.

[(g) UNEXPENDED FUNDS.—If a State fails to expend any funds received under this section within 3 years of receipt, such remaining funds shall be returned to the Treasury.

[(h) REPORTS.—The Secretary shall report to Congress 5 years after funds are first distributed to the States under this section—

[(1) the amount of photovoltaics demonstrated;

[(2) the number of projects undertaken;

[(3) the administrative costs of the program;

[(4) the results of the monitoring under subsection (f)(5); and

[(5) the total amount of funds distributed, including a breakdown by State.

[(i) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary for the purposes of carrying out this section—

[(1) $15,000,000 for fiscal year 2008;

[(2) $30,000,000 for fiscal year 2009;

[(3) $45,000,000 for fiscal year 2010;

[(4) $60,000,000 for fiscal year 2011; and

[(5) $70,000,000 for fiscal year 2012.]

* * * * * * *

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 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

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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; 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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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.

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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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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.

H.R. 3597

Chairman LAMB. Thank you, Madam Chairwoman. We will now consider H.R. 3597, the *Solar Energy Research and Development Act of 2019*. The Clerk will report the bill.

The CLERK. H.R. 3597——

[The bill follows:]

.....

(Original Signature of Member)

116TH CONGRESS
1ST SESSION

H. R. _____

To guide and authorize basic research programs in the United States for research, development, and demonstration of solar energy technologies, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

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

A BILL

To guide and authorize basic research programs in the United States for research, development, and demonstration of solar energy technologies, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Solar Energy Research and Development Act of 2019".

SEC. 2. SOLAR ENERGY TECHNOLOGY PROGRAM.

(a) IN GENERAL.—The Secretary shall carry out a solar energy program to conduct research, development,

1 testing, and evaluation of solar energy technologies. In
2 carrying out such program, the Secretary shall award
3 grants under this section and sections 3, 4, and 5 on a
4 competitive, merit-reviewed basis to eligible entities for
5 each of the following purposes:

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

9 (2) To optimize the design and adaptability of
10 solar energy systems to the broadest practical range
11 of geographic and atmospheric conditions.

12 (3) To reduce the cost of manufacturing, instal-
13 lation, operation, and maintenance of solar energy
14 systems.

15 (4) To create and improve conversion of solar
16 energy to useful forms.

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

21 (1) Photovoltaic devices and related electronic
22 components including converters, sensors, energy
23 monitors, communication and control equipment,
24 and protocols.

1 (2) Concentrated solar power, including solar
2 thermal and concentrating solar photovoltaic tech-
3 nologies.
4 (3) Low cost, high-quality solar energy systems.
5 (4) Solar heating and cooling systems, including
6 distributed solar-powered air conditioning.
7 (5) Solar technology products that can be easily
8 integrated into new buildings, existing buildings, ag-
9 ricultural and aquatic environments, and other infra-
10 structure.
11 (6) Solar technology that is resilient to extreme
12 weather events.
13 (7) Solar technology products integrated into
14 transportation applications in coordination with vehi-
15 cle technologies research and development activities
16 supported by the Department of Energy.
17 (8) Storage technologies to address the tran-
18 sience and intermittency of solar energy resources,
19 including batteries, supercapacitors, and thermal
20 storage.
21 (9) Micro-grids using solar technology.
22 (10) Solar technologies enabling safe grid oper-
23 ating conditions, such as fast-disconnect during an
24 emergency.

(11) Distributed solar energy technologies, such as rooftop solar panels.

(12) Technologies and designs that enable a broad range of scales for solar power production.

(13) Advanced solar manufacturing technologies and best practices, including—

(A) materials and processes;

(B) development of industry standards;

(C) design and integration practices; and

(D) optimized packaging methods and new device designs.

(14) Advanced analytic and computing capabilities for better modeling and simulations of solar energy systems.

(15) Electrical grid integration, including—

(A) integration of solar technologies into smart grid, transmission, and distribution;

(B) coordination of solar with other distributed and large-scale energy resources;

(C) electrical power smoothing;

(D) microgrid integration;

(E) community solar;

(F) solar resource forecasting;

(G) regional and national electric system balancing and long distance transmission op-

1 tions, including direct current and super-
2 conducting transmission and long-term storage
3 options;
4 (H) ways to address system operations
5 over minutes, hours, days, weeks, and seasons
6 with respect to the full range of project scales;
7 and
8 (I) electric grid security, including cyber
9 and physical security.
10 (16) Non-hardware and information-based ad-
11 vances in solar energy system design, installation,
12 and operation.
13 (17) Solar energy technology as a part of strat-
14 egies commonly referred to as "behind-the-meter
15 strategies", including with respect to electricity gen-
16 eration, load, energy efficiency, controls, storage,
17 and electric vehicles.
18 (18) Next generation demonstration facilities.
19 (19) Other subject areas determined by the Sec-
20 retary.
21 (c) TECHNICAL ASSISTANCE AND WORKFORCE DE-
22 VELOPMENT.—In carrying out the program established
23 under subsection (a), the Secretary may also conduct, for
24 purposes of supporting technical, non-hardware, and infor-

1 mation-based advances in solar energy systems develop-
2 ment and operations—
3 (1) technical assistance and analysis activities
4 with eligible entities, including activities that sup-
5 port expanding access to solar energy for low-income
6 individuals and communities; and
7 (2) workforce development and training activi-
8 ties, including to support the dissemination of stand-
9 ards and best practices for enabling solar power pro-
10 duction.
11 (d) PROGRAM TARGETS.—The program established
12 under subsection (a) shall address near-term (up to 2
13 years), mid-term (up to 7 years), and long-term (up to
14 15 years) challenges to the advancement of solar energy
15 systems.
16 (e) WILDLIFE IMPACT MITIGATION.—In carrying out
17 the activities described in subsection (b), the program es-
18 tablished under subsection (a) shall support wildlife im-
19 pact mitigation technologies and strategies, including the
20 use of distributed solar technologies, to reduce the poten-
21 tial negative impacts of solar energy systems on wildlife,
22 including bird species and local flora and fauna.
23 (f) STEWARDSHIP OF NATIONAL LABORATORY RE-
24 SOURCES.—In awarding grants under this Act, the Sec-

1 retary shall steward relevant capabilities and programs of
2 the National Laboratories.
3 (g) CONFORMING REPEALS.—The following provi-
4 sions of law are hereby repealed:
5 (1) The Solar Energy Research, Development,
6 and Demonstration Act of 1974 (42 U.S.C. 5551 et
7 seq.), except for section 10.
8 (2) The Solar Photovoltaic Energy Research,
9 Development, and Demonstration Act of 1978 (42
10 U.S.C. 5581 et seq.).
11 (3) Paragraphs (2) and (3) of section 4(a) of
12 the Renewable Energy and Energy Efficiency Tech-
13 nology Competitiveness Act of 1989 (42 U.S.C.
14 12003(a)).
15 (4) Subparagraph (A) of section 931(a)(2) of
16 the Energy Policy Act of 2005 (42 U.S.C.
17 16231(a)(2)).
18 (5) Sections 606 and 607 of the Energy Inde-
19 pendence and Security Act of 2007 (42 U.S.C.
20 17174 and 17175).
21 (h) DEFINITIONS.—In this Act:
22 (1) The term "eligible entity" means any of the
23 following entities:
24 (A) An institution of higher education.
25 (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 "photovoltaic device" includes photovoltaic cells and the electronic and electrical components of such devices.

(5) The term "Secretary" means the Secretary of Energy.

SEC. 3. SOLAR ENERGY TECHNOLOGY DEMONSTRATION PROJECTS.

(a) IN GENERAL.—In carrying out the program established under section 2(a), the Secretary shall award grants on a competitive, merit-reviewed basis to eligible entities for demonstration projects to advance the development of solar energy technologies and systems production.

1 (b) PRIORITY.—In awarding grants under subsection
2 (a), the Secretary shall give priority to projects that—
3 (1) are located in geographically diverse regions
4 of the United States;
5 (2) can be replicated in a variety of regions and
6 climates;
7 (3) demonstrate technologies that address
8 intermittency, variability, storage challenges, behind-
9 the-meter operations, and independent operational
10 capability;
11 (4) coordinate solar technologies with other dis-
12 tributed and large-scale energy resources;
13 (5) facilitate identification of optimum ap-
14 proaches among competing solar energy tech-
15 nologies;
16 (6) include business commercialization plans
17 that have the potential for production of solar en-
18 ergy equipment at high volumes;
19 (7) support the development of advanced manu-
20 facturing technologies that have the potential to im-
21 prove United States competitiveness in the inter-
22 national solar energy manufacturing sector;
23 (8) provide the greatest potential to reduce en-
24 ergy costs, as well as promote accessibility and com-

1 munity implementation of demonstrated tech-
2 nologies, for consumers;
3 (9) increase disclosure and transparency of in-
4 formation to all market participants to help in mak-
5 ing optimal decisions;
6 (10) promote overall electric infrastructure reli-
7 ability and resilience should grid functions be dis-
8 rupted or damaged; and
9 (11) satisfy any other criteria that the Sec-
10 retary determines appropriate.
11 (c) USE OF FUNDS.—Grants under this section may
12 be used, to the extent that funding is not otherwise avail-
13 able through other Federal programs or power purchase
14 agreements, for—
15 (1) any necessary site engineering study;
16 (2) an economic assessment of site-specific con-
17 ditions;
18 (3) appropriate feasibility studies to determine
19 whether the demonstration can be replicated;
20 (4) installation of equipment, service, and sup-
21 port;
22 (5) operation for at least the minimum amount
23 of time required to fully assess the project's results
24 and objectives, as determined by a peer-reviewed
25 process; and

1 (6) validation of technical, economic, and envi-
2 ronmental assumptions and documentation of les-
3 sons learned.

4 (d) SOLICITATION.—Not later than 90 days after the
5 date of enactment of this Act and annually thereafter, the
6 Secretary shall conduct a national solicitation for applica-
7 tions for grants under this section.

8 (e) ORGANIC PHOTOVOLTAIC CELL TECH-
9 NOLOGIES.—At least 1 grant awarded under this section
10 during fiscal year 2020 shall be for a project to dem-
11 onstrate organic photovoltaic cell technologies.

12 **SEC. 4. NEXT GENERATION SOLAR ENERGY MANUFAC-**
13 **TURING INITIATIVE.**

14 (a) IN GENERAL.—In carrying out the program es-
15 tablished under section 2(a), the Secretary shall provide
16 multi-year grants on a competitive, merit-reviewed basis
17 to eligible entities for research, development, and dem-
18 onstration projects to advance new solar energy manufac-
19 turing technologies and techniques, including those that
20 manufacture solar cells, hardware, and enabling devices.

21 (b) STRATEGIC VISION REPORT.—

22 (1) IN GENERAL.—Not later than September 1,
23 2020, the Secretary shall submit to the Committee
24 on Science, Space, and Technology of the House of
25 Representatives, the Committee on Energy and Nat-

1 ural Resources of the Senate, and any other commit-
2 tees of Congress deemed appropriate by the Sec-
3 retary a report on the results of a study that exam-
4 ines the viable market opportunities available for
5 solar energy technology manufacturing in the United
6 States, including solar cells, hardware, and enabling
7 technologies.
8 (2) REPORT REQUIREMENTS.—The report
9 under paragraph (1) shall include—
10 (A) a description of—
11 (i) the ability to competitively manu-
12 facture solar technology in the United
13 States, including the manufacture of—
14 (I) new and advanced materials,
15 such as cells made with new, cost-ef-
16 fective, high efficiency materials;
17 (II) solar module equipment and
18 enabling technologies, including smart
19 inverters, sensors, and tracking equip-
20 ment;
21 (III) innovative solar module de-
22 signs and applications, including those
23 that can directly integrate with new
24 and existing buildings and other infra-
25 structure; and

1 (IV) other research areas as de-
2 termined by the Secretary; and
3 (ii) opportunities and barriers within
4 the United States and international solar
5 energy technology supply chains;
6 (B) policy recommendations for enhancing
7 solar energy technology manufacturing in the
8 United States; and
9 (C) an aggressive 10-year target and plan,
10 beginning in 2021, to enhance the competitive-
11 ness of solar energy technology manufacturing
12 in the United States.
13 (c) PROGRAM IMPLEMENTATION.—In carrying out
14 the research, development, and demonstration program
15 under this section, to the extent practicable, the Secretary
16 shall follow the recommendations included in the report
17 under subsection (b) and make grants for solar energy
18 manufacturing projects that—
19 (1) reduce capital expenditures or provide
20 lower-cost manufacturing option;
21 (2) eliminate manufacturing process steps;
22 (3) reduce energy, water and material inputs;
23 (4) establish alternative supply chains for mate-
24 rials and components; and

1 (5) take advantage of rapid prototyping, small
2 batch manufacturing, and roll-to-roll processing.
3 (d) PROGRAM EVALUATION.—Beginning not later
4 than 3 years after the completion of the report under sub-
5 section (b), and every 4 years thereafter, the Secretary
6 shall provide, and make available to the public and the
7 relevant authorizing and appropriations committees of
8 Congress, an independent review of the program author-
9 ized under this section to evaluate its progress toward
10 meeting the policy recommendations and targets deter-
11 mined in the report.

12 **SEC. 5. PHOTOVOLTAIC DEVICE RECYCLING RESEARCH,**
13 **DEVELOPMENT, AND DEMONSTRATION.**

14 (a) IN GENERAL.—In carrying out the program, the
15 Secretary shall award, on a competitive, merit-reviewed
16 basis, multiyear grants to eligible entities for research, de-
17 velopment, and demonstration projects to create innova-
18 tive and practical approaches to increase reuse and recy-
19 cling of photovoltaic devices.
20 (b) PURPOSE.—The Secretary shall award grants
21 under subsection (a) for projects that address—
22 (1) technology to increase the efficiency of pho-
23 tovoltaic device recycling and maximize the recovery
24 of valuable raw materials for use in new products
25 while minimizing the life-cycle environmental im-

1 pacts such as greenhouse gas emissions and water
2 usage;
3 (2) expanded uses for materials from recycled
4 photovoltaic devices;
5 (3) development and demonstration of environ-
6 mentally responsible alternatives to the use of haz-
7 ardous materials in photovoltaic devices and the pro-
8 duction of such devices;
9 (4) development of methods to separate and re-
10 move hazardous materials from photovoltaic devices
11 and to recycle or dispose of those materials in a safe
12 manner;
13 (5) product design and construction to facilitate
14 disassembly and recycling of photovoltaic devices;
15 (6) tools and methods to aid in assessing the
16 environmental impacts of the production of photo-
17 voltaic devices and photovoltaic device recycling and
18 disposal;
19 (7) product design and construction and other
20 tools and techniques to extend the life cycle of pho-
21 tovoltaic devices, including methods to promote their
22 safe reuse;
23 (8) strategies to increase consumer acceptance
24 and practice of recycling of photovoltaic devices; and

1 (9) processes to reduce the costs and environ-
2 mental impact of disposal of toxic materials used in
3 photovoltaic devices.
4 (c) APPLICATIONS.—An eligible entity seeking a
5 grant under this section shall submit to the Secretary an
6 application that includes a description of—
7 (1) the project that will be undertaken and the
8 contributions of each participating entity;
9 (2) the applicability of the project to increasing
10 reuse and recycling of photovoltaic devices with the
11 least environmental impacts as measured by life-
12 cycle analyses, and the potential for incorporating
13 the research results into industry practice; and
14 (3) how the project will promote collaboration
15 among scientists and engineers from different dis-
16 ciplines, such as electrical engineering, materials
17 science, and social science.
18 (d) DISSEMINATION OF RESULTS.—The Secretary
19 shall publish the results of projects supported under this
20 section through—
21 (1) development of best practices or training
22 materials for use in the photovoltaics manufacturing,
23 design, installation, refurbishing, or recycling indus-
24 tries;
25 (2) dissemination at industry conferences;

1 (3) coordination with information dissemination
2 programs relating to recycling of electronic devices
3 in general;
4 (4) demonstration projects; and
5 (5) educational materials for the public pro-
6 duced in conjunction with State and local govern-
7 ments or nonprofit organizations on the problems
8 and solutions related to reuse and recycling of pho-
9 tovoltaic devices.
10 (e) PHOTOVOLTAIC MATERIALS PHYSICAL PROP-
11 ERTY DATABASE.—
12 (1) IN GENERAL.—Not later than September 1,
13 2021, the Secretary shall establish a comprehensive
14 physical property database of materials for use in
15 photovoltaic devices. Such database shall include—
16 (A) identification of materials used in pho-
17 tovoltaic devices;
18 (B) a list of commercially available
19 amounts of these materials and their country of
20 origin;
21 (C) amounts of these materials projected
22 to be available through mining or recycling of
23 photovoltaic and other electronic devices; and
24 (D) a list of other significant uses for each
25 of these materials.

1 (2) PRIORITIES.—Not later than September 1,
2 2020, the Secretary, working with private industry,
3 shall develop a plan to establish priorities and re-
4 quirements for the database under this subsection,
5 including the protection of proprietary information,
6 trade secrets, and other confidential business infor-
7 mation.

8 (3) COORDINATION.—The Secretary shall co-
9 ordinate with the Director of the National Institute
10 of Standards and Technology, the Administrator of
11 the Environmental Protection Agency, and the Ad-
12 ministrator of the Department of Interior to facili-
13 tate the incorporation of the database under this
14 subsection with any existing database for materials
15 involved in electronic manufacturing and recycling.

16 **SEC. 6. AUTHORIZATION OF APPROPRIATIONS.**

17 There are authorized to be appropriated to the Sec-
18 retary to carry out this Act—

19 (1) $270,000,000 for fiscal year 2020;
20 (2) $283,500,000 for fiscal year 2021;
21 (3) $297,675,000 for fiscal year 2022;
22 (4) $312,558,750 for fiscal year 2023; and
23 (5) $328,186,688 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. 3597, the *Solar Energy Research and Development Act of 2019*, reauthorizes the Department of Energy's Solar Energy Technology Office, and provides it with additional guidance that reflects the immense growth and change in the solar energy industry and research arena over the past 10 years. This bipartisan bill is sponsored by my colleague Mr. McAdams, and co-sponsored by Mr. Fortenberry. It is also endorsed by the Solar Energy Industries Association, which represents about 1,000 solar companies across the country, the Natural Resources Defense Council and the Environmental Defense Fund.

I now yield the remainder of my time to Mr. McAdams to speak on his bill.

Mr. MCADAMS. Thank you, Chair Lamb, and Ranking Member Weber, and Members of the Energy Subcommittee, Full Committee Chair Johnson, for this opening markup, and a chance for me to speak on the *Solar Energy Research and Development Act*. My bill would reauthorize, as explained, the Department of Energy to pursue solar energy research, development, and project demonstrations. This includes developing solar technologies that expand the capacity and efficiency of solar energy.

The bill focuses on the near-term, the mid-term, and long-term targets, ensuring our commitment to America's leadership in the global energy economy, and for the next generation of Americans. It also aids with developing solar as a reliable source of energy, lessening our dependence on foreign markets, and building a stronger and more secure grid. Solar innovation also continues to drive the cost of renewable energy lower, helping the environment, and helping consumers.

Utah is a national leader in solar development. We rank tenth in solar production in the country, and we are projected to produce 1,079 megawatts of solar energy in the next 5 years. The solar presence in my State of Utah is so strong, 320,000 homes are powered by solar energy. Even our soccer stadium, home of the Utah Royals and Real Salt Lake, also home of the—another stadium, home of the Utah Jazz, and yet one of—and another, one of our Olympic facilities, the Ice Sheet Olympic Arena, is powered by solar. Additionally, solar investments have contributed $2.63 billion to our State's economy. And in my district alone, solar energy supports 40 companies, employs 6,000 Utahns, powers 14,000 homes, and produces 72 megawatts of electricity.

So addressing the very serious threat of climate change is going to be difficult, however, it also presents us with an opportunity to create a renewable energy economy, with zero emissions, that will improve the cleanliness of the air we breathe and the water we drink. This bill combats climate change by creating jobs, securing our grid, and helps produce clean, reliable energy. I encourage my colleagues to vote yes on H.R. 3597. Thank you, and I yield back my time.

Chairman LAMB. 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 offered by the Chair, and the Clerk will report the amendment.

The CLERK. Amendment No. 1, amendment to H.R. 3597——

[The amendment of Chairman Lamb follows:]

AMENDMENT TO H.R. 3597

OFFERED BY Mr. Lamb

[Page and line numbers refer to solar_06 noticed by the Committee on Science, Space, and Technology with a timestamp of June 12, 2019 at 11:52AM.]

Page 2, line 2, strike "Secretary shall award grants" and all that follows through "eligible entities" on line 4 and insert the following: "Secretary shall, in accordance with subsection (b), award grants and enter into contracts and cooperative agreements under this section, and sections 3, 4, and 5".

Page 2, after line 16, insert the following:

1 (b) GRANTS, CONTRACTS, AND COOPERATIVE
2 AGREEMENTS.—
3 (1) GRANTS.—In carrying out the program es-
4 tablished under subsection (a), the Secretary shall
5 award grants on a competitive, merit-reviewed basis
6 to eligible entities for projects that the Secretary de-
7 termines would best achieve the goals of the pro-
8 gram.
9 (2) CONTRACTS AND COOPERATIVE AGREE-
10 MENTS.—In carrying out the program established
11 under subsection (a), the Secretary may enter into
12 contracts and cooperative agreements with eligible

1 entities and Federal agencies for projects that the
2 Secretary determines would further the purposes of
3 the program.
4 (3) APPLICATION.—An entity seeking a grant
5 or a contract or agreement under this Act shall sub-
6 mit to the Secretary an application at such time, in
7 such manner, and containing such information as
8 the Secretary may require.

Page 5, after line 18, insert the following:

9 (19) Methods to reduce the total volume of
10 water used in the manufacture, construction, oper-
11 ation, and maintenance of solar energy technologies.

Page 6, line 2, insert ", including activities expanding access to solar energy for low-income individuals and communities" after "operations".

Page 6, strike lines 3 through 10 and insert the following:

12 (1) technical assistance and analysis activities
13 with eligible entities; and
14 (2) workforce development and training activi-
15 ties, including activities that support the dissemina-
16 tion of standards and best practices for enabling
17 solar power production.

Page 6, line 17, strike "subsection (b)" and insert "subsection (c)".

Page 6, line 24, insert "and entering into contracts and cooperative agreements" after "grants".

Page 11, beginning on line 8, strike subsection (e).

Page 11, line 15, strike "shall provide" and all that follows through "projects" on line 18, and insert the following: "shall conduct research, development, and demonstration projects in accordance with section 2(b)".

Page 13, line 17, strike "make grants" and insert "award grants and enter into contracts and cooperative agreements".

Page 14, line 15, strike "award" and all that follows through "projects" on line 17 and insert the following: "conduct research, development, and demonstration projects, in accordance with section 2(b),".

Page 14, line 20, insert "and enter into contracts and cooperative agreements" after "award grants".

Page 16, line 5, insert ", contract, or cooperative agreement" after "grant".

Page 17, line 6, strike "State and local" and insert "State, Tribal, and local".

Amend the title so as to read: "A bill to provide for a program of research, development, and demonstration of solar energy technologies, and for other purposes.".

☒

Chairman LAMB. I ask unanimous consent to dispense with the reading. Without objection, so ordered. I now recognize myself to briefly 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. Additionally, based on feedback from minority staff, the amendment clarifies the effect of the funding allocations in the bill.

Is there further discussion on the amendment?

All in favor say aye.

Those opposed, say no.

In the opinion of the Chair, the ayes have it and the amendment is agreed to.

Next amendment on the roster is an amendment offered by the gentleman from South Carolina. He is recognized to offer an amendment.

Mr. NORMAN. Thank you, Chairman Lamb. I'll briefly explain my amendment. It's pretty well what the title says. It limits funding to within existing appropriational levels.

H.R. 3597, the *Solar Energy Research and Development Act of 2019*, my amendment adds a requirement that no additional funds are authorized to carry out this legislation. Instead, my amendment 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.

What's worth noting is that DOE's Office of Energy Efficiency and Renewable Energy is the largest applied energy program at the Department by a long shot. In FY 2019, EERE is funded at almost $2.4 billion, which is more than all of the R&D funding for DOE's applied offices in nuclear energy, fossil energy, electricity delivery, and cybersecurity, and emergency response combined. DOE's solar energy research already receives over 246 million in annual funding from within this program, and this bill wants to increase that funding?

Here in Congress some of us are aware of the fact that we don't live a in world with unlimited resources, so we must work to prioritize the resources we have, and make sure we are investing limited Federal dollars in programs that benefit the American taxpayer. We can fund basic research in materials, computing, and advanced manufacturing that will lead to new solar energy technologies without increasing EERE spending. By making smart investments in the fundamental science that will drive innovation in solar energy technologies, we can help create a diverse clean energy portfolio without more reckless spending. We don't need to drive up the national debt, which is already exceeding $23 trillion.

And, as a side note, if you had to count our national debt starting one, two, three, and go up to the 23 trillion, it'll take you 682,000 years to finish it. I'll be 45 at that time. We can help create a diverse energy portfolio without reckless spending. We don't need to drive up the national debt and subsidize industry to support renewable industry technology. I encourage my colleagues to support this amendment. I yield back.

Chairman LAMB. Thank you, and the Clerk will report the amendment.

The CLERK. Amendment No. 2, amendment to H.R. 35——
[The amendment of Mr. Norman follows:]

AMENDMENT TO H.R. 3597

OFFERED BY M__. _____

[Page and line numbers refer to solar_06 noticed by the Committee on Science, Space, and Technology with a timestamp of June 12, 2019 at 11:52AM.]

Page 18, line 17, strike "There are" and insert the following:

1 (a) IN GENERAL.—There are

Page 18, after line 23, 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. I'd like to make some brief comments about the amendment.

First, this is an authorization bill, not an appropriations bill, so it's our job to provide long-term guidance to the annual appropriations process for areas under our jurisdiction. It's the Appropriations Committee's job to balance this, and other Committees' guidance, on an annual basis within an overall spending limit. This amendment, I believe, would undercut the value of this Committee's role in providing that guidance.

Additionally, I find this amendment too restrictive. While I would expect that most, if not all, of the activities in this bill would actually be carried out by the Office of Energy Efficiency and Renewable Energy, I don't see a reason to legislate a rigid restriction. For example, this bill authorizes storage and grid integration R&D activities, some of which may be better handled by the Office of Electricity, or even ARPA-E (Advanced Research Projects Agency-Energy), so I don't believe that we should prevent the Secretary from doing that.

We also believe that stating that no additional funds are authorized would be contradictory to parts of the bill that authorize additional funds for solar activity. R&D, for example, we have a modest 5 percent increase, starting with a level in 2020, that the House just passed a few weeks ago. So, all those things considered, plus the need to take on climate change, and more aggressively pursue research in this area, I will be opposing the amendment.

Is there any further discussion on the amendment?

Mr. WEBER. Mr. Chairman?

Chairman LAMB. I recognize the Ranking Member.

Mr. WEBER. Thank you. If Mr. Norman's amendment will help us all be 45 in the time he described, I think we should all vote for it. And with that, I yield back.

Chairman LAMB. And I do wonder how long it would take just to count the trillion and a half that was added at the end of 2017 to that same national debt. If we had only counted that long before taking that vote.

Any further discussion on the amendment? Mr. Foster.

Mr. FOSTER. Yes. No, I move to strike the last word. I'd just like to point out in this discussion that the household net worth, the net worth of American families, is $107 trillion, so there is enough money to pay off our national debt. We simply have chosen not to do that, is point one. The other point is that household net worth is up by over $50 trillion since the start of the Obama Recovery, so that—again, there is enough money that has been generated recently by our economy had we decided to pay off the national debt, we could have done so. That's it, and——

Chairman LAMB. Thank you, Mr. Foster. With that, we will move to vote.

All in favor say aye.

Those opposed, say no.

In the opinion of the Chair, the noes have it. The amendment is not agreed to.

Are there any more amendments? All right. A reporting quorum being present, I move that the Energy Subcommittee report H.R.

3597 to the Full Committee on Science, Space, and Technology, 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. Recognize the Ranking Member.

Mr. WEBER. I request a recorded vote.

Chairman LAMB. Further proceeding on this amendment will be postponed.

[Recess.]

Chairman LAMB. All right, the hearing will come to order. The question is on the motion to favorably report H.R. 3597, 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. 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 supplemental, minority, or additional views on the measure.

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

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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:]

ACS
Chemistry for Life®

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,

Glenn S. Ruskin

American Chemical Society
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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.

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.

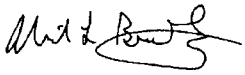
- **H.R. 3609, the Wind Energy Research and Development Act of 2019**, would extend and expand the wind energy technology, research, development and testing program at DOE.

- **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.

Sincerely,



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,

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.

NRDC

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 202.289.6868 | F 202.289.1060 | NRDC.ORG

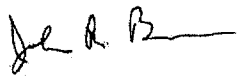
The Fossil Energy Research and Development Act would update several Department of Energy Office of Fossil Energy programs last authorized in 2005 to better align with the environmental and energy priorities of 2019 and beyond. It updates the office's objectives and programs to focus on environmental 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 : 20005 : T 202.289.6868 : F 202.289.1060 : 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.

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,

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 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:]

Committee Print

116TH CONGRESS
1ST SESSION

H. R. 3597

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

IN THE HOUSE OF REPRESENTATIVES

JUNE 28, 2019

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

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A BILL

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

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Solar Energy Research and Development Act of 2019".

SEC. 2. SOLAR ENERGY TECHNOLOGY PROGRAM.

(a) IN GENERAL.—The Secretary shall carry out a solar energy program to conduct research, development,

1 testing, and evaluation of solar energy technologies. In
2 carrying out such program, the Secretary shall, in accord-
3 ance with subsection (b), award grants and enter into con-
4 tracts and cooperative agreements under this section, and
5 sections 3, 4, and 5 for each of the following purposes:
6 (1) To improve the energy efficiency, reliability,
7 resilience, security, and capacity of solar energy gen-
8 eration.
9 (2) To optimize the design and adaptability of
10 solar energy systems to the broadest practical range
11 of geographic and atmospheric conditions.
12 (3) To reduce the cost of manufacturing, instal-
13 lation, operation, and maintenance of solar energy
14 systems.
15 (4) To create and improve conversion of solar
16 energy to useful forms.
17 (b) GRANTS, CONTRACTS, AND COOPERATIVE
18 AGREEMENTS.—
19 (1) GRANTS.—In carrying out the program es-
20 tablished under subsection (a), the Secretary shall
21 award grants on a competitive, merit-reviewed basis
22 to eligible entities for projects that the Secretary de-
23 termines would best achieve the goals of the pro-
24 gram.

1 (2) CONTRACTS AND COOPERATIVE AGREE-
2 MENTS.—In carrying out the program established
3 under subsection (a), the Secretary may enter into
4 contracts and cooperative agreements with eligible
5 entities and Federal agencies for projects that the
6 Secretary determines would further the purposes of
7 the program.
8 (3) APPLICATION.—An entity seeking a grant
9 or a contract or agreement under this Act shall sub-
10 mit to the Secretary an application at such time, in
11 such manner, and containing such information as
12 the Secretary may require.
13 (c) SOLAR ENERGY RESEARCH SUBJECT AREAS.—
14 The program established under subsection (a) shall focus
15 on the research, development, testing, and evaluation of
16 each of the following subject areas:
17 (1) Photovoltaic devices and related electronic
18 components including converters, sensors, energy
19 monitors, communication and control equipment,
20 and protocols.
21 (2) Concentrated solar power, including solar
22 thermal and concentrating solar photovoltaic tech-
23 nologies.
24 (3) Low cost, high-quality solar energy systems.

1 (4) Solar heating and cooling systems, including
2 distributed solar-powered air conditioning.
3 (5) Solar technology products that can be easily
4 integrated into new buildings, existing buildings, ag-
5 ricultural and aquatic environments, and other infra-
6 structure.
7 (6) Solar technology that is resilient to extreme
8 weather events.
9 (7) Solar technology products integrated into
10 transportation applications in coordination with vehi-
11 cle technologies research and development activities
12 supported by the Department of Energy.
13 (8) Storage technologies to address the tran-
14 sience and intermittency of solar energy resources,
15 including batteries, supercapacitors, and thermal
16 storage.
17 (9) Micro-grids using solar technology.
18 (10) Solar technologies enabling safe grid oper-
19 ating conditions, such as fast-disconnect during an
20 emergency.
21 (11) Distributed solar energy technologies, such
22 as rooftop solar panels.
23 (12) Technologies and designs that enable a
24 broad range of scales for solar power production.

1 (13) Advanced solar manufacturing technologies
2 and best practices, including—
3 (A) materials and processes;
4 (B) development of industry standards;
5 (C) design and integration practices; and
6 (D) optimized packaging methods and new
7 device designs.
8 (14) Advanced analytic and computing capabili-
9 ties for better modeling and simulations of solar en-
10 ergy systems.
11 (15) Electrical grid integration, including—
12 (A) integration of solar technologies into
13 smart grid, transmission, and distribution;
14 (B) coordination of solar with other dis-
15 tributed and large-scale energy resources;
16 (C) electrical power smoothing;
17 (D) microgrid integration;
18 (E) community solar;
19 (F) solar resource forecasting;
20 (G) regional and national electric system
21 balancing and long distance transmission op-
22 tions, including direct current and super-
23 conducting transmission and long-term storage
24 options;

1 (H) ways to address system operations
2 over minutes, hours, days, weeks, and seasons
3 with respect to the full range of project scales;
4 and
5 (I) electric grid security, including cyber
6 and physical security.
7 (16) Non-hardware and information-based ad-
8 vances in solar energy system design, installation,
9 and operation.
10 (17) Solar energy technology as a part of strat-
11 egies commonly referred to as "behind-the-meter
12 strategies", including with respect to electricity gen-
13 eration, load, energy efficiency, controls, storage,
14 and electric vehicles.
15 (18) Methods to reduce the total volume of
16 water used in the manufacture, construction, oper-
17 ation, and maintenance of solar energy technologies.
18 (19) Next generation demonstration facilities.
19 (20) Other subject areas determined by the Sec-
20 retary.
21 (d) TECHNICAL ASSISTANCE AND WORKFORCE DE-
22 VELOPMENT.—In carrying out the program established
23 under subsection (a), the Secretary may also conduct, for
24 purposes of supporting technical, non-hardware, and infor-
25 mation-based advances in solar energy systems develop-

1 ment and operations, including activities expanding access
2 to solar energy for low-income individuals and commu-
3 nities—
4 (1) technical assistance and analysis activities
5 with eligible entities; and
6 (2) workforce development and training activi-
7 ties, including activities that support the dissemina-
8 tion of standards and best practices for enabling
9 solar power production.
10 (e) PROGRAM TARGETS.—The program established
11 under subsection (a) shall address near-term (up to 2
12 years), mid-term (up to 7 years), and long-term (up to
13 15 years) challenges to the advancement of solar energy
14 systems.
15 (f) WILDLIFE IMPACT MITIGATION.—In carrying out
16 the activities described in subsection (c), the program es-
17 tablished under subsection (a) shall support wildlife im-
18 pact mitigation technologies and strategies, including the
19 use of distributed solar technologies, to reduce the poten-
20 tial negative impacts of solar energy systems on wildlife,
21 including bird species and local flora and fauna.
22 (g) STEWARDSHIP OF NATIONAL LABORATORY RE-
23 SOURCES.—In awarding grants and entering into con-
24 tracts and cooperative agreements under this Act, the Sec-

1 retary shall steward relevant capabilities and programs of
2 the National Laboratories.
3 (h) CONFORMING REPEALS.—The following provi-
4 sions of law are hereby repealed:
5 (1) The Solar Energy Research, Development,
6 and Demonstration Act of 1974 (42 U.S.C. 5551 et
7 seq.), except for section 10.
8 (2) The Solar Photovoltaic Energy Research,
9 Development, and Demonstration Act of 1978 (42
10 U.S.C. 5581 et seq.).
11 (3) Paragraphs (2) and (3) of section 4(a) of
12 the Renewable Energy and Energy Efficiency Tech-
13 nology Competitiveness Act of 1989 (42 U.S.C.
14 12003(a)).
15 (4) Subparagraph (A) of section 931(a)(2) of
16 the Energy Policy Act of 2005 (42 U.S.C.
17 16231(a)(2)).
18 (5) Sections 606 and 607 of the Energy Inde-
19 pendence and Security Act of 2007 (42 U.S.C.
20 17174 and 17175).
21 (i) DEFINITIONS.—In this Act:
22 (1) The term "eligible entity" means any of the
23 following entities:
24 (A) An institution of higher education.
25 (B) A National Laboratory.

1 (C) A Federal research agency.
2 (D) A State research agency.
3 (E) A nonprofit research organization.
4 (F) An industrial entity or a multi-institu-
5 tional consortium thereof.
6 (2) The term "institution of higher education"
7 has the meaning given such term in section 101 of
8 the Higher Education Act of 1965 (20 U.S.C.
9 1001).
10 (3) The term "National Laboratory" has the
11 meaning given such term in section 2(3) of the En-
12 ergy Policy Act of 2005 (42 U.S.C. 15801(3)).
13 (4) The term "photovoltaic device" includes
14 photovoltaic cells and the electronic and electrical
15 components of such devices.
16 (5) The term "Secretary" means the Secretary
17 of Energy.

18 **SEC. 3. SOLAR ENERGY TECHNOLOGY DEMONSTRATION**
19 **PROJECTS.**

20 (a) IN GENERAL.—In carrying out the program es-
21 tablished under section 2(a), the Secretary shall award
22 grants on a competitive, merit-reviewed basis to eligible
23 entities for demonstration projects to advance the develop-
24 ment of solar energy technologies and systems production.

1 (b) PRIORITY.—In awarding grants under subsection
2 (a), the Secretary shall give priority to projects that—
3 (1) are located in geographically diverse regions
4 of the United States;
5 (2) can be replicated in a variety of regions and
6 climates;
7 (3) demonstrate technologies that address
8 intermittency, variability, storage challenges, behind-
9 the-meter operations, and independent operational
10 capability;
11 (4) coordinate solar technologies with other dis-
12 tributed and large-scale energy resources;
13 (5) facilitate identification of optimum ap-
14 proaches among competing solar energy tech-
15 nologies;
16 (6) include business commercialization plans
17 that have the potential for production of solar en-
18 ergy equipment at high volumes;
19 (7) support the development of advanced manu-
20 facturing technologies that have the potential to im-
21 prove United States competitiveness in the inter-
22 national solar energy manufacturing sector;
23 (8) provide the greatest potential to reduce en-
24 ergy costs, as well as promote accessibility and com-

1 munity implementation of demonstrated tech-
2 nologies, for consumers;
3 (9) increase disclosure and transparency of in-
4 formation to all market participants to help in mak-
5 ing optimal decisions;
6 (10) promote overall electric infrastructure reli-
7 ability and resilience should grid functions be dis-
8 rupted or damaged; and
9 (11) satisfy any other criteria that the Sec-
10 retary determines appropriate.
11 (c) USE OF FUNDS.—Grants under this section may
12 be used, to the extent that funding is not otherwise avail-
13 able through other Federal programs or power purchase
14 agreements, for—
15 (1) any necessary site engineering study;
16 (2) an economic assessment of site-specific con-
17 ditions;
18 (3) appropriate feasibility studies to determine
19 whether the demonstration can be replicated;
20 (4) installation of equipment, service, and sup-
21 port;
22 (5) operation for at least the minimum amount
23 of time required to fully assess the project's results
24 and objectives, as determined by a peer-reviewed
25 process; and

1 (6) validation of technical, economic, and envi-
2 ronmental assumptions and documentation of les-
3 sons learned.
4 (d) SOLICITATION.—Not later than 90 days after the
5 date of enactment of this Act and annually thereafter, the
6 Secretary shall conduct a national solicitation for applica-
7 tions for grants under this section.

8 **SEC. 4. NEXT GENERATION SOLAR ENERGY MANUFAC-**
9 **TURING INITIATIVE.**

10 (a) IN GENERAL.—In carrying out the program es-
11 tablished under section 2(a), the Secretary shall conduct
12 research, development, and demonstration projects, in ac-
13 cordance with section 2(b), to advance new solar energy
14 manufacturing technologies and techniques, including
15 those that manufacture solar cells, hardware, and enabling
16 devices.
17 (b) STRATEGIC VISION REPORT.—
18 (1) IN GENERAL.—Not later than September 1,
19 2020, the Secretary shall submit to the Committee
20 on Science, Space, and Technology of the House of
21 Representatives, the Committee on Energy and Nat-
22 ural Resources of the Senate, and any other commit-
23 tees of Congress deemed appropriate by the Sec-
24 retary a report on the results of a study that exam-
25 ines the viable market opportunities available for

1 solar energy technology manufacturing in the United
2 States, including solar cells, hardware, and enabling
3 technologies.
4 (2) REPORT REQUIREMENTS.—The report
5 under paragraph (1) shall include—
6 (A) a description of—
7 (i) the ability to competitively manu-
8 facture solar technology in the United
9 States, including the manufacture of—
10 (I) new and advanced materials,
11 such as cells made with new, cost-ef-
12 fective, high efficiency materials;
13 (II) solar module equipment and
14 enabling technologies, including smart
15 inverters, sensors, and tracking equip-
16 ment;
17 (III) innovative solar module de-
18 signs and applications, including those
19 that can directly integrate with new
20 and existing buildings and other infra-
21 structure; and
22 (IV) other research areas as de-
23 termined by the Secretary; and

1 (ii) opportunities and barriers within
2 the United States and international solar
3 energy technology supply chains;
4 (B) policy recommendations for enhancing
5 solar energy technology manufacturing in the
6 United States; and
7 (C) an aggressive 10-year target and plan,
8 beginning in 2021, to enhance the competitive-
9 ness of solar energy technology manufacturing
10 in the United States.
11 (c) PROGRAM IMPLEMENTATION.—In carrying out
12 the research, development, and demonstration program
13 under this section, to the extent practicable, the Secretary
14 shall follow the recommendations included in the report
15 under subsection (b) and award grants and enter into con-
16 tracts and cooperative agreements for solar energy manu-
17 facturing projects that—
18 (1) reduce capital expenditures or provide
19 lower-cost manufacturing option;
20 (2) eliminate manufacturing process steps;
21 (3) reduce energy, water and material inputs;
22 (4) establish alternative supply chains for mate-
23 rials and components; and
24 (5) take advantage of rapid prototyping, small
25 batch manufacturing, and roll-to-roll processing.

1 (d) PROGRAM EVALUATION.—Beginning not later
2 than 3 years after the completion of the report under sub-
3 section (b), and every 4 years thereafter, the Secretary
4 shall provide, and make available to the public and the
5 relevant authorizing and appropriations committees of
6 Congress, an independent review of the program author-
7 ized under this section to evaluate its progress toward
8 meeting the policy recommendations and targets deter-
9 mined in the report.

10 **SEC. 5. PHOTOVOLTAIC DEVICE RECYCLING RESEARCH,**
11 **DEVELOPMENT, AND DEMONSTRATION.**

12 (a) IN GENERAL.—In carrying out the program, the
13 Secretary shall conduct research, development, and dem-
14 onstration projects, in accordance with section 2(b), to
15 create innovative and practical approaches to increase
16 reuse and recycling of photovoltaic devices.

17 (b) PURPOSE.—The Secretary shall award grants
18 and enter into contracts and cooperative agreements under
19 subsection (a) for projects that address—

20 (1) technology to increase the efficiency of pho-
21 tovoltaic device recycling and maximize the recovery
22 of valuable raw materials for use in new products
23 while minimizing the life-cycle environmental im-
24 pacts such as greenhouse gas emissions and water
25 usage;

1 (2) expanded uses for materials from recycled
2 photovoltaic devices;
3 (3) development and demonstration of environ-
4 mentally responsible alternatives to the use of haz-
5 ardous materials in photovoltaic devices and the pro-
6 duction of such devices;
7 (4) development of methods to separate and re-
8 move hazardous materials from photovoltaic devices
9 and to recycle or dispose of those materials in a safe
10 manner;
11 (5) product design and construction to facilitate
12 disassembly and recycling of photovoltaic devices;
13 (6) tools and methods to aid in assessing the
14 environmental impacts of the production of photo-
15 voltaic devices and photovoltaic device recycling and
16 disposal;
17 (7) product design and construction and other
18 tools and techniques to extend the life cycle of pho-
19 tovoltaic devices, including methods to promote their
20 safe reuse;
21 (8) strategies to increase consumer acceptance
22 and practice of recycling of photovoltaic devices; and
23 (9) processes to reduce the costs and environ-
24 mental impact of disposal of toxic materials used in
25 photovoltaic devices.

1 (c) APPLICATIONS.—An eligible entity seeking a
2 grant, contract, or cooperative agreement under this sec-
3 tion shall submit to the Secretary an application that in-
4 cludes a description of—
5 (1) the project that will be undertaken and the
6 contributions of each participating entity;
7 (2) the applicability of the project to increasing
8 reuse and recycling of photovoltaic devices with the
9 least environmental impacts as measured by life-
10 cycle analyses, and the potential for incorporating
11 the research results into industry practice; and
12 (3) how the project will promote collaboration
13 among scientists and engineers from different dis-
14 ciplines, such as electrical engineering, materials
15 science, and social science.
16 (d) DISSEMINATION OF RESULTS.—The Secretary
17 shall publish the results of projects supported under this
18 section through—
19 (1) development of best practices or training
20 materials for use in the photovoltaics manufacturing,
21 design, installation, refurbishing, or recycling indus-
22 tries;
23 (2) dissemination at industry conferences;

1 (3) coordination with information dissemination
2 programs relating to recycling of electronic devices
3 in general;
4 (4) demonstration projects; and
5 (5) educational materials for the public pro-
6 duced in conjunction with State, Tribal, and local
7 governments or nonprofit organizations on the prob-
8 lems and solutions related to reuse and recycling of
9 photovoltaic devices.
10 (e) PHOTOVOLTAIC MATERIALS PHYSICAL PROP-
11 ERTY DATABASE.—
12 (1) IN GENERAL.—Not later than September 1,
13 2021, the Secretary shall establish a comprehensive
14 physical property database of materials for use in
15 photovoltaic devices. Such database shall include—
16 (A) identification of materials used in pho-
17 tovoltaic devices;
18 (B) a list of commercially available
19 amounts of these materials and their country of
20 origin;
21 (C) amounts of these materials projected
22 to be available through mining or recycling of
23 photovoltaic and other electronic devices; and
24 (D) a list of other significant uses for each
25 of these materials.

1 (2) PRIORITIES.—Not later than September 1,
2 2020, the Secretary, working with private industry,
3 shall develop a plan to establish priorities and re-
4 quirements for the database under this subsection,
5 including the protection of proprietary information,
6 trade secrets, and other confidential business infor-
7 mation.
8 (3) COORDINATION.—The Secretary shall co-
9 ordinate with the Director of the National Institute
10 of Standards and Technology, the Administrator of
11 the Environmental Protection Agency, and the Ad-
12 ministrator of the Department of Interior to facili-
13 tate the incorporation of the database under this
14 subsection with any existing database for materials
15 involved in electronic manufacturing and recycling.
16 **SEC. 6. AUTHORIZATION OF APPROPRIATIONS.**
17 There are authorized to be appropriated to the Sec-
18 retary to carry out this Act—
19 (1) $270,000,000 for fiscal year 2020;
20 (2) $283,500,000 for fiscal year 2021;
21 (3) $297,675,000 for fiscal year 2022;
22 (4) $312,558,750 for fiscal year 2023; and
23 (5) $328,186,688 for fiscal year 2024.

Chairwoman JOHNSON. Without objection, the bill is considered as read and open to amendment at any point. I recognize Mr. McAdams on his bill.

Mr. MCADAMS. Thank you, Chairwoman Johnson and Ranking Member Lucas, for the opportunity to speak on my bill H.R. 3597, the *Solar Energy Research and Development Act of 2019*. I'd like to also thank Mr. Fortenberry of Nebraska for his leadership on this legislation. It's been a pleasure to work with him.

This legislation would authorize the Department of Energy to pursue solar energy research, development, and demonstration (RD&D) on a range of solar energy technologies, including photovoltaic and concentrating solar panel systems. This legislation enables the Department of Energy the ability to expand capacity and efficiency within the solar energy sector while also pushing for new innovative ways solar panels and solar power can be integrated into our existing infrastructure.

H.R. 3597 focuses on the near-term, the mid-term, and the long-term targets, ensuring our commitment to America's leadership in the global energy economy and ensuring sustainable energy for the next generation of Americans. It also aids with developing solar as a reliable source of energy, lessening our dependence on foreign markets, and builds a stronger and a more secure grid. Solar innovation also continues to drive the cost of renewable energy lower, helping the environment and also helping consumers.

My State of Utah is a national leader in solar development. We rank 10th in the country for solar production—on our way to producing 1,079 megawatts of solar energy in the next 5 years. Our sports stadiums are powered by solar, and solar has invested nearly $2.63 billion into the Utah economy alone. In my district the solar energy industry supports 40 companies, employs 6,000 individuals, powers 14,000 homes, and produces 72 megawatts of electricity.

Additionally, this bill enjoys the support of the Solar Energy Industry Association, the Natural Resources Defense Council, the Environmental Defense Fund, the U.S. Chamber of Commerce, and the American Chemical Society.

Climate change presents us with very real threats. However, it also presents an opportunity to create a renewable energy economy. This bill addresses climate change while creating jobs, securing our grid, and helps to produce clean, reliable energy.

I look forward to a discussion with my colleagues today and welcome input on how this legislation might be improved to garner broader consensus, and I urge a yes vote on H.R. 3597.

Thank you, and I yield back my time.

Chairwoman JOHNSON. Thank you, Mr. McAdams.

Does anyone wish to be heard on it and be recognized for comment?

If not, then we'll proceed with the amendments in order of the roster.

Amendment No. 1 offered by Mr. Perlmutter.

Mr. PERLMUTTER. Madam Chair, I have an amendment at the desk.

Chairwoman JOHNSON. The clerk will report the amendment.

The CLERK. Amendment No. 1 offered by Mr. Perlmutter of Colorado.

[The amendment of Mr. Perlmutter follows:]

AMENDMENT TO H.R. 3597

OFFERED BY MR. PERLMUTTER OF COLORADO

[Page and line numbers refer to CPlH3597 with timestamp of July 18, 2019 (5:30 p.m.) as forwarded by the Subcommittee on Energy of the Committee on Science, Space, and Technology.]

Page 3, after line 24, insert the following (and make such conforming changes as may be necessary):

1 (4) Low cost, thin-film solar technologies, in-
2 cluding the use of perovskite materials in solar cells.

Chairwoman JOHNSON. I ask unanimous consent to dispose of the reading, and without objection, so ordered.

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

Mr. PERLMUTTER. Thank you. And I want to applaud Representative McAdams for his work introducing this bill and to the Science Committee for putting together a strong bipartisan reauthorization for DOE's solar energy research programs.

I represent Golden, Colorado, and the National Renewable Energy Lab (NREL). NREL is the premier energy efficiency and renewable energy lab in the world. The lab first opened as the Solar Energy Research Institute in 1977 after passage of the *Solar Energy Research, Development, and Demonstration Act of 1974*. From time to time, I put up this chart. Back when NREL was opened, it was $76 per watt for solar—silicon-based solar. Today, it's 30 cents. So there has been tremendous development and tremendous strides made in connection with solar energy research and the opportunity that it provides for us to the energy grid.

Since it's opened its doors, NREL has pushed the boundaries of our understanding of solar energy technologies and helped dramatically reduce the cost of manufacturing, installation, and integration of solar technology into the grid. And that's why I'm pleased the Science Committee is taking steps to modernize and reauthorize DOE's solar research programs.

My amendment is very simple. It clarifies the research areas in the bill to ensure low-cost, thin-film solar technologies are included in DOE's research.

NREL has excelled at materials science and understanding how new materials like perovskite can be used to open new doors for commercial applications of solar technologies. One company taking advantage of these opportunities is Ascent Solar, which is in my district. They manufacture flexible solar panels in the United States with a wide range of applications, and they partner with NREL and DOE to better understand the fundamental materials science and the impacts of various techniques and processes on efficiency and reliability.

I'd say to my friend from Oklahoma, based upon his opening, that we need to continue this research, and I appreciate his desire to keep an eye on the budget. We all must do that. But I would say to my friend that particularly in solar and wind, it isn't what's the percentage above what it was in 2019. It's whether we were underfunded in these areas to begin with, which we have been because of the state of our budget over the last number of years.

And I'd say to my friend that we're going to be looking at a defense bill of $750 billion for 1 year. In this addition under this bill, the authority would be 750 years' worth of that. And as to the tax cut we had a couple years ago where it hits the deficit for about $2 trillion, that's 2,000 years.

So, to my friend, I appreciate his budget-hawk approach, but here we've underfunded from the beginning. We've seen tremendous strides, and this country faces some real issues with its climate. And solar is one of the best places we can make advances in terms of energy production, as well as maintaining—dispensing with pollution into our atmosphere.

And with that I'd yield——

Mr. LUCAS. Would the gentleman yield?

Mr. PERLMUTTER. Of course I'd yield to my friend from Oklahoma.

Mr. LUCAS. I would simply note to my dear friend that I intend to vote with him on his amendment, and I'm proud that he was listening when I observed that there are only so many resources, and we have to be careful on allocations.

Mr. PERLMUTTER. I'd say to my——

Mr. LUCAS. I suspect we'll have more discussions as the morning goes along.

Mr. PERLMUTTER. Reclaiming my time, I always listen to my friend from Oklahoma. So I never disregard anything he——

Mr. LUCAS. So would the gentleman yield one more time? Stop while you're ahead my friend.

Mr. PERLMUTTER. I'd yield back to—I thank you. I urge passage of my amendment, and I yield back to the Chair.

Chairwoman JOHNSON. Thank you very much.

I ask unanimous—is there further discussion on this amendment?

Mr. MCADAMS. Madam Chair, I move to strike the last word. I want to thank the gentlemen——

Chairwoman JOHNSON. You're recognized.

Mr. MCADAMS. I want to thank the gentleman from Colorado for his amendment expanding research to include thin-film solar technologies. I urge a yes vote on this amendment.

Chairwoman JOHNSON. Any other comments?

If no, the vote occurs on the amendment.

All in favor, say aye.

Those opposed, no.

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

OK. The next amendment is Mr. Lipinski's amendment. And——

Mr. LIPINSKI. Madam Chair, I have an amendment at the desk.

Chairwoman JOHNSON. The clerk will read the amendment.

The CLERK. Amendment No. 2 offered by Mr. Lipinski of Illinois.

[The amendment of Mr. Lipinski follows:]

AMENDMENT TO H.R. 3597

OFFERED BY MR. LIPINSKI OF ILLINOIS

[Page and line numbers refer to committee print CP_H3597 with time stamp of July 18, 2019 at 5:30PM noticed by the Committee on Science, Space, and Technology]

Page 7, after line 14, insert the following (and make such conforming changes as may be necessary):

1 (f) SUSTAINABLE CHEMISTRY.—Each entity receiv-
2 ing a grant, contract, or cooperative agreement under this
3 section shall endeavor, in carrying out activities under
4 such grant, contract, or cooperative agreement, to incor-
5 porate, where appropriate, sustainable and green chem-
6 istry and engineering principles, practices, and methodolo-
7 gies.

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. LIPINSKI. Thank you, Madam Chair. I want to begin by thanking Mr. McAdams for introducing this important legislation today.

Tomorrow in the Research and Technology Subcommittee, we'll be holding a hearing on innovations in sustainable chemistry where we'll be hearing from witnesses about a bill that I introduced, H.R. 2051, the *Sustainable Chemistry Research and Development Act of 2019*. As we consider this bill today on solar energy research, I'm offering an amendment which encourages the Department of Energy's partners to incorporate green engineering and sustainable chemistry principles when carrying out research activities described in this bill.

The solar industry is generally good for the environment. As solar energy utilization grows, we see a reduction in emissions contributing to climate change. However, as the U.S. Energy Information Administration indicates, some of the materials currently used in solar panels are toxic. In addition, some solar energy systems rely on hazardous fluids to transfer heat, which often contains heavy metals. This means we need to be concerned about the disposal of solar panels and energy storage materials once they reach the end of their usefulness.

As the Department of Energy continues to support research on new solar energy materials, I want to ensure that researchers consider the environmental impacts of the materials they use and, where appropriate, prioritize the use of environmentally friendly alternatives or consider technologies to recover and recycle materials. Additionally, we must encourage research into minimizing inefficiencies and waste in the manufacturing process for these panels. This amendment will provide flexibility for the Department of Energy to further research in all of these areas, as appropriate.

I want to thank the Committee for considering this amendment, ask my colleagues to support it, 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.

Those opposed, say nay.

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

The next amendment is Mr. McNerney's amendment offered from the gentleman from California.

Mr. MCNERNEY. I thank the Chair, and I want to introduce——

Chairwoman JOHNSON. The clerk will report the——

Mr. MCNERNEY. I have an amendment—excuse me. Thank you. I have an amendment at the desk.

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

[The amendment of Mr. McNerney follows:]

AMENDMENT TO H.R. 3597

OFFERED BY Mr. McNerney

Page 11, line 8, strike "and".

Page 11, line 9, strike "(11)" and insert "(12)".

Page 11, after line 8, insert the following:

1 (11) promote solar energy in low-income com-
2 munities and those disproportionately burdened by
3 environmental pollution; and

☒

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

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

Mr. MCNERNEY. I thank the Chair.

For millions of Americans, solar energy is helping households make ends meet, and driving down energy costs, but for many working families, buying rooftop solar is out of reach because they live in apartments, rent their homes, or can't afford the upfront investment. Community solar extends economic assistance of solar power to everyone by allowing communities to coinvest in a solar array and share the benefits. Some community solar projects have reduced energy bills by as much as 80 percent.

By extending the solar energy to more families, we are bolstering renewable energy that reduces carbon emissions while helping families save money on their monthly bills. This is a win-win for the climate and for the economy.

This amendment that I'm proposing will prioritize grants that promote solar in low-income communities and those disproportionately burdened by pollution. This amendment will ensure that clean energy and community solar energy projects are available for communities that need it the most.

I also want to introduce for the record a letter from Representative Ben Ray Lujan, who has been a leader on this issue, to the Chair and Ranking Member requesting that the language be included in the underlying bill.

Chairwoman JOHNSON. Without objection.

[The information referred to follows:]

BEN RAY LUJAN
3RD DISTRICT, NEW MEXICO

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2231 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, D.C. 20515
PHONE: 202-225-6190
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ENERGY AND COMMERCE COMMITTEE

SUBCOMMITTEE ON COMMUNICATIONS AND TECHNOLOGY

SUBCOMMITTEE ON HEALTH

Congress of the United States
House of Representatives
Washington, DC 20515

The Honorable Eddie Bernice Johnson
Chair
Committee on Science, Space,
and Technology
2306 Rayburn House Office Building
Washington, DC 20515

The Honorable Frank Lucas
Ranking Member
Committee on Science, Space
and Technology
2405 Rayburn House Office Building
Washington, DC 20515

The Honorable Ben McAdams
130 Cannon House Office Building
Washington, DC 20515

The Honorable Jeff Fortenberry
1514 Longworth House Office Building
Washington, DC 20515

Dear Chairwoman Johnson, Ranking Member Lucas, Representative McAdams, and Representative Fortenberry,

I appreciate your hard work and leadership on the development of the Solar Energy Research and Development Act of 2019. Your commitment to advancing American-made renewable energy is commendable and will grow our economy while reducing emissions. As you markup the Solar Energy Research and Development Act of 2019, I write to respectfully request the following the following language be included under section 3(b):

> *"Promote solar energy in low-income communities and those disproportionately burdened by environmental pollution."*

Solar energy is driving down energy costs for consumers, lowering carbon emissions, and reducing the environmental impact of energy production. Solar power, however, is not available to all communities. For those who rent property, live in apartments, or cannot afford solar on their own, community solar programs can extend the benefits of solar energy to all. Community solar organizations have successfully partnered with government, business, and non-profits to reduce the barriers to installing solar energy.

This is an issue that is important to my constituents. The Navajo Nation has utilized community solar programs to switch from fossil fuels and reduce the burden of energy bills. In the Navajo community of Ojo Encion, community solar organizations teamed up with Navajo Technical University to install community solar systems that are estimated to reduce energy costs by 60 to 70 percent.

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NEW MEXICO HIGHLANDS UNIVERSITY
803 UNIVERSITY AVENUE LAS VEGAS, NM

PRINTED ON RECYCLED PAPER

With this amendment, the government will play a larger role in extending cheap renewable energy to everyone. Thank you in advance for considering my request and your ongoing support for clean energy research and development.

Sincerely,

Ben Ray Luján
Member of Congress

Mr. MCNERNEY. I thank the Chair, and I yield back.

Chairwoman JOHNSON. Is there further discussion on the amendment?

If no, the vote occurs on the amendment.

All in favor, say aye.

Those opposed, nay.

The ayes have it, and the amendment is adopted.

Next is a Norman amendment.

Mr. NORMAN. Thank you, Madam Chairwoman. I have an amendment at the desk.

Chairwoman JOHNSON. The clerk will read the amendment.

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

[The amendment of Mr. Norman follows:]

AMENDMENT TO H.R. 3597

OFFERED BY M.R. Norman

[Page and line numbers refer to CP_H3597 with timestamp of July 18, 2019 (5:30 p.m.) as forwarded by the Subcommittee on Energy of the Committee on Science, Space, and Technology.]

Page 19, strike lines 16 through 23 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) $246,500,000 for fiscal year 2020;

5 (2) $252,375,000 for fiscal year 2021;

6 (3) $258,250,000 for fiscal year 2022;

7 (4) $264,125,000 for fiscal year 2023; and

8 (5) $270,000,000 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

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, and without objection, so ordered.

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

Mr. NORMAN. Thank you, Chairwoman Johnson.

I believe by adopting my amendment, this Committee could move forward in bipartisan legislation today. My amendment moderates the spending levels included in the underlying bill offering a realistic approach to funding critical R&D.

My amendment also 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 fund its research and development programs.

The DOE's Office of Energy Efficiency and Renewable Energy, EERE, is the largest applied energy program at the Department funded at almost $2.4 billion in Fiscal Year 2019, which is more than all of the R&D funding for DOE's other applied energy offices combined. DOE's solar energy research already receives over $246 million in annual funding from within this program.

I'm supportive of solar energy research, and I would welcome the opportunity to support a bill that takes a targeted, more gradual approach, but a 33 percent increase in spending is not only unreasonable, it's irresponsible. Our job here in Congress is to spend limited tax dollars wisely, just like so many of our constituents do every day. We don't have unlimited resources, and we can't promise to spend more money we don't have.

Instead, let's prioritize what we have and make sure we're investing limited Federal dollars in programs that benefit the American taxpayer. By making smart investments in the fundamental science that will drive innovation and solar energy technologies and funding gradual limited growth and applied research, we can help create a diverse clean energy portfolio without more reckless spending. We don't need to drive up the national debt and subsidize industry to support renewable energy technology.

I encourage my colleagues to support this commonsense amendment so we can work together to support the next generation of solar technologies. I yield back.

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

I recognize myself to make some brief comments on the amendment.

I oppose this amendment because it contradicts the funding levels set by the House-passed appropriations bill and effectively cuts solar energy innovation funding compared to 2019-enacted levels when considering the annual cost of research inflation.

Also, stating that no additional funds are authorized to be appropriated is contradictory to the clear direction of the bill, which authorizes a modest 5 percent annual increase and funds for solar energy R&D activities.

I really believe that this legislation would get the support from my Republican colleagues, and many of my friends across the aisle have recently been touting innovation as the best way for us to address climate change. So here we are with a bipartisan bill authorizing fairly modest growth in solar energy innovation. It's been en-

dorsed by the leading industrial and environmental organizations of this field.

I would note that if my friends can't support this bill as one small element in an agenda to address our changing climate and grow a strong, clean energy industry in the United States, then I'm at a loss as to what can we support. Nonetheless, I will continue to work with my Republican colleagues to find common ground on these important areas.

Is there further discussion on this amendment?

If not, then the vote occurs on the amendment.

All in favor—Mr. Perlmutter is recognized.

Mr. PERLMUTTER. Thank you. I appreciate the Chairwoman's comments.

And to my friend Mr. Norman I would just say, look, I believe we've underfunded this entire area for a very long time. And to say, well, it's an increase, and therefore, you know, we ought to be able to do it under the same numbers. We've been underfunding this area despite the great strides we've seen in savings to all Americans. So it isn't just a question of is this an increase to the Federal budget. You also got to look at the decrease in the cost of energy production to all of us and the associated help to the climate that we see with this kind of technology.

So I would say to my friend, you know, we've got a lot of work to do on battery storage. There's a lot of applied science that remains to continue to reduce these costs to benefit all of us and to benefit our environment generally.

So I respectfully oppose my friend's amendment to hold this to level funding because I think that's a very big mistake. And I'll yield back.

Chairwoman JOHNSON. Thank you very much.

Mr. BAIRD. Madam——

Chairwoman JOHNSON. The Chair recognizes Mr. Baird.

Mr. BAIRD. Thank you, Madam Chair.

I just wanted to support my colleague's amendment. You know, I'm a strong supporter of research and development. And, as mentioned here earlier, we've reduced the cost per watt from, what, $79 down to 30 cents over that period of time. So my thought is that 33 percent increase over the 5 years is pretty significant. And Mr. Norman's amendment approaches that in what I think is a more reasonable and a more practical rationale for increasing that research and development. So I thank you.

Chairwoman JOHNSON. Thank you very much.

Mr. MCADAMS. Madam Chairwoman?

Chairwoman JOHNSON. Mr. McAdams.

Mr. MCADAMS. Yes, thank you, Madam Chair. I just also want to underline the point that you made. I thank the gentleman from South Carolina for his amendment. And I understand his commitment to fiscal responsibility. That's also something that's incredibly important to me, and I think we need to do a better job as a Congress of being aware of and reducing the deficit.

But I'd also like to remind the Committee that this legislation is authorizing, not appropriating, funds. And I believe this legislation is important because how else do we show our commitment to a diverse energy platform if we're not willing to invest in it? This legis-

lation will have a positive economic impact for consumers in the short-, medium-, and long-term and also for the American economy as it creates jobs and stimulates growth in renewable energy. Thank you, and I yield back.

Chairwoman JOHNSON. Thank you. Mr. Norman.

Mr. NORMAN. Thank you, Madam Chair.

Let me just say that, you know, there's nobody more committed to solar energy's progression in research and use than I am. I'm a developer. We attract industry to not only South Carolina but hopefully all over. And you've got to remember, you know, the solar research is already receiving $246 million. And if we pass this, what we are doing is sending a strong message to the private sector you need to get involved. It's in your best interest because they're going to let government and not shoulder the responsibility they have to. And a lot of this will be an internal cut that, if we pass this, will be administrative. It's not going to harm the program. If it did, I would never put this up.

I yield back.

Mr. PERLMUTTER. Would the gentleman yield? Would the gentleman yield?

Mr. NORMAN. Yes, sir.

Mr. PERLMUTTER. Thank you. I just would point out to my friend that much of this research that is underway today is public-private in nature, so it isn't simply the National Renewable Energy Lab or DOE doing it, but it is in partnership with various businesses and, you know, technology companies as a way to continue to drive down the price for all Americans, for all consumers. And so I'd just say to my friend I understand you like to see the private sector involved, and I would say they are as part of this whole process. That's the applied element of this. This is both straight science and hard science, as well as applied science, which then benefits us because it comes to market.

And with that, I'd yield back to my friend.

Mr. NORMAN. I yield back.

Chairwoman JOHNSON. Thank you. Anyone seeking recognition on this amendment?

If not, the vote occurs on the amendment.

All in favor, say aye.

Those opposed, say no.

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

Mr. LUCAS. Madam Chair, could I request a recorded vote on that amendment?

Chairwoman JOHNSON. Yes. We'll roll the recorded votes until later when we will have a recorded vote.

Amendment No. 2 is also Mr. Norman's. It's an amendment offered from the gentleman from South Carolina. He's recognized.

Mr. NORMAN. Thank you, Chairwoman Johnson. I have an amendment at the desk.

Chairwoman JOHNSON. The clerk will report the amendment.

The CLERK. Amendment No. 5 offered by Mr. Norman.

[The amendment of Mr. Norman follows:]

AMENDMENT TO H.R. 3597

OFFERED BY Mr. Norman

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.

The Chair recognizes the gentleman for 5 minutes to explain the amendment.

Mr. NORMAN. Thank you, Chairwoman Johnson. My amendment would add a simple, straightforward sense of Congress to this legislation, highlighting the need for a balanced energy portfolio. We heard a lot from my colleagues today about the need for more Federal investments in clean energy technology, but while most Americans think of renewable power when we talk about clean energy, the truth is that growth in cheaper, cleaner natural gas power has been the driving force in reducing emissions. And nuclear power is the only baseload, zero-emissions technology on the market today.

We can't power our economy with just one form of energy, and we aren't going to stop using fossil fuels or nuclear power anytime soon. So let's invest in a balanced energy portfolio prioritizing the early-stage research that requires Federal Government support.

I encourage my colleagues to support my amendment, and I yield back the balance of my time.

Chairwoman JOHNSON. Thank you very much.

I recognize myself to briefly speak on the amendment.

And I want to note that I support an all-of-the-above clean energy innovation strategy, which is why we're going to mark up the fossil and wind energy R&D bills today as well.

The Committee has also held hearings that together cover a wide range of energy innovation topics, including a hearing in April on domestic nuclear energy. Going forward, the Committee's committed to addressing the research needs of all promising clean energy technologies and sources.

Is there any other discussion on this amendment?

Hearing none, then——

Mr. CASTEN. Madam Chair?

Chairwoman JOHNSON. Yes.

Mr. CASTEN. Request to strike the last word?

Chairwoman JOHNSON. Yes, you're recognized, Mr. Casten.

Mr. CASTEN. So I want to thank Mr. Norman for the amendment, and I agree with the principle of this, that we need to—as Hamlet said or Horatio, whoever it was, there's more complexity than is dreamt of in our philosophies here. We need to invest in a whole lot of technologies. If this were a bill about getting to zero CO2, I would quite support the idea that we need to not be prescriptive on paths but rather very clear on goals and let markets figure out how to allocate resources.

But since this is a bill solely about solar research, and since the people who are tasked with discerning our will are going to look back to the language to try to understand our intent, I don't understand why in this bill we are saying something about other nonsolar technologies.

And so while I certainly support the idea of doing research into solar and a whole host of fossil energy efficiency programs, it seems to me that this is not germane to the bill, and so I would oppose putting in here but would look forward to working to make sure we include this in other research priorities.

And with that, I yield back.

Chairwoman JOHNSON. Any further discussion on this amendment?

Mr. MCADAMS. Madam Chair?

Chairwoman JOHNSON. Mr. McAdams.

Mr. MCADAMS. Thank you. I would just echo the sentiments that have already been expressed, I want to thank the gentleman from South Carolina for his amendment. I don't believe his amendment is inconsistent with the goals of this legislation. I agree, in fact,,,,, that we do need—in order to get to a renewable energy economy, we need an all-of-the-above energy portfolio. So I don't believe that this amendment is harmful per se, but I do believe that the topic is being addressed in related legislation that will be discussed today.

Thank you. I yield back.

Chairwoman JOHNSON. Thank you very much.

Any other recognition sought? If not, the vote occurs on the amendment.

All those in favor, say aye.

Those opposed, say no.

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

Are there any other amendments?

Further proceedings on this is postponed until after we have the votes.

H.R. 3607

Chairwoman JOHNSON. We will now consider H.R. 3607, the *Fossil Energy Research and Development Act of 2019*. The clerk will report the bill.

The CLERK. Committee print of H.R. 3607, a bill.

[The bill follows:]

tides of the west and east coasts of Florida. I appreciate the minority staff that worked with us to make this happen, and I support the amendment.

Any further discussion?

If not, the vote occurs on the amendment.

All in favor, say aye.

Those opposed, say nay.

The amendment is adopted.

Now, are there more amendments?

If not, then a reporting quorum being present, I move that the Committee on Science, Space, and Technology report H.R. 335, as amended, to the House with the recommendation that the bill be approved.

Those in favor of the motion will signify by saying aye.

Those opposed, no.

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

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

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

Now, we're at a point where we will ask for a 10-minute break, a recess, and we'll come back and vote the postponed votes. And I would ask all Members to please return for the markup. Thank you.

[Recess.]

Chairwoman JOHNSON. The Committee will come to order.

We will start with the Norman amendment on bill H.R. 3597. And does everybody remember what the Norman amendment was? If not, vote anyway. 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. Aye.
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. Yes.

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. Essentially 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?
[No response.]
Chairwoman JOHNSON. Are there Members who haven't voted or would like to change their vote?
The clerk will report.
The CLERK. Chairwoman Johnson, the noes are 21, and the ayes are 12.
Chairwoman JOHNSON. The amendment is not adopted.
Now, a reporting quorum being present, I move that the Committee on Science, Space, and Technology report H.R. 3597, as amended, to the House with the recommendation the bill be approved.
Those in favor of the motion will signify by saying aye.
Those opposed, no.
The ayes have it, and the bill is favorably reported.
Mr. LUCAS. Madam Chair, I request a recorded vote.
Chairwoman JOHNSON. A requested vote is recognized. The clerk will call the roll.
The CLERK. Chairwoman Johnson?
Chairwoman JOHNSON. Aye.
The CLERK. Chairwoman Johnson, aye.
Ms. Lofgren?
Ms. LOFGREN. Yes.

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. Yes.
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. 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 GONZALEZ-COLON. No.
The CLERK. Miss González-Colón, no.

Chairwoman JOHNSON. Have all Members voted? Anyone wishing to change a vote?

The clerk will report.

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

Chairwoman JOHNSON. Thank you very much. The ayes have it, and it's a reporting quorum being present, I move that the Committee on Science, Space, and Technology move that bill with the recommendation that it be approved.

Without objection, the motion to reconsider is laid on the table, and 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.

Our next vote will occur on the Weber amendment No. 1 on H.R. 3607. 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.

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