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116TH CONGRESS
1ST SESSION

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.

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 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, testing, and evaluation of solar energy technologies. In

carrying out such program, the Secretary shall award grants under this section and sections 3, 4, and 5 on a competitive, merit-reviewed basis to eligible entities 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) 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) Solar heating and cooling systems, including distributed solar-powered air conditioning.

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

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

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

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

(9) Micro-grids using solar technology.

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

tions, 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.

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

(17) 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.

(18) Next generation demonstration facilities.

(19) Other subject areas determined by the Secretary.

(c) 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 infor-

mation-based advances in solar energy systems development and operations—

(1) technical assistance and analysis activities with eligible entities, including activities that support expanding access to solar energy for low-income individuals and communities; and

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

(d) 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.

(e) WILDLIFE IMPACT MITIGATION.—In carrying out the activities described in subsection (b), 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.

(f) STEWARDSHIP OF NATIONAL LABORATORY RESOURCES.—In awarding grants under this Act, the Sec-

retary shall steward relevant capabilities and programs of the National Laboratories.

(g) 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).

(h) 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 com-

munity 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; and

(11) 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.

(e) ORGANIC PHOTOVOLTAIC CELL TECHNOLOGIES.—At least 1 grant awarded under this section during fiscal year 2020 shall be for a project to demonstrate organic photovoltaic cell technologies.

SEC. 4. NEXT GENERATION SOLAR ENERGY MANUFACTURING INITIATIVE.

(a) IN GENERAL.—In carrying out the program established under section 2(a), the Secretary shall provide multi-year grants on a competitive, merit-reviewed basis to eligible entities for research, development, and demonstration projects 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 Nat-

ural 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 make grants 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 award, on a competitive, merit-reviewed basis, multiyear grants to eligible entities for research, development, and demonstration projects to create innovative and practical approaches to increase reuse and recycling of photovoltaic devices.

(b) PURPOSE.—The Secretary shall award grants 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 im-

pacts 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 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 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.

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