111TH CONGRESS
1ST SESSION

H. R. 3585

AN ACT

To guide and provide for United States 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 Technology Roadmap Act''.

SEC. 2. DEFINITIONS.

In this Act:

(1) SECRETARY.—The term ''Secretary'' means the Secretary of Energy.

(2) SOLAR TECHNOLOGY.—The term ''solar technology'' means—

(A) photovoltaic technologies, including technologies utilizing—

(i) crystalline silicon;

(ii) cadmium telluride;

(iii) semiconductor materials containing copper, indium, and selenium;

(iv) thin film silicon;

(v) gallium arsenide alloy and multi-junctions;

(vi) dye-sensitized and organic solar cell technologies;

(vii) concentrating photovoltaics; and

(viii) other photovoltaic methods identified by the Secretary;

(B) solar thermal power technology, including linear concentrator systems, dish/engine

systems, power tower systems, and other means;

(C) solar thermal water heating technology;

(D) solar heating and air conditioning technologies;

(E) passive solar design in architecture, including both heating and lighting applications; and

(F) related or enabling technologies, including thin films, semiconducting materials, transparent conductors, optics, and technologies that increase durability or decrease cost or weight.

TITLE I—SOLAR TECHNOLOGY RESEARCH, DEVELOPMENT, AND DEMONSTRATION

SEC. 101. PROGRAM.

(a) IN GENERAL.—The Secretary shall conduct a program of research, development, and demonstration for solar technology, including—

(1) photovoltaics and related electronic components, including inverters, charge controllers, and energy monitors;

(2) solar hot water and solar space heating and cooling;

(3) concentrating solar power, including both solar thermal and concentrating solar photovoltaic technologies;

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

(5) manufacturability of low cost, high-quality solar energy systems;

(6) development of solar technology products that can be easily integrated into new and existing buildings;

(7) development of solar technology products that are water efficient;

(8) development of storage technologies that can be used to increase the usefulness and value of solar technologies; and

(9) other areas as the Secretary considers appropriate.

(b) AWARDS.—The Secretary shall provide awards under this section to promote a diversity of research, development, and demonstration activities for solar technology on a merit-reviewed, competitive basis to—

(1) academic institutions, national laboratories, Federally-Funded Research and Development Centers, Federal research agencies, State research agencies, nonprofit research organizations, industrial entities, or consortia thereof for research, development, and demonstration activities; and

(2) industry-led consortia for research, development, and demonstration of advanced techniques for manufacturing a variety of solar energy products.

(c) SENSE OF CONGRESS.—It is the sense of Congress that at least 75 percent of funding for solar technology research, development, and demonstration activities conducted by the Department of Energy after fiscal year 2014 support a diversity of activities identified by and recommended under the Solar Technology Roadmap as described in section 102.

(d) SPECIAL CONSIDERATION.—As a criteria for providing awards under this Act, the Secretary shall consider areas with high unemployment.

(e) LIMITATION.—The Department of Energy shall provide awards to projects for research, development, and demonstration of solar technologies and solar manufacturing in the United States.

SEC. 102. SOLAR TECHNOLOGY ROADMAP.

(a) IN GENERAL.—Not later than 18 months after the date of enactment of this Act, the Solar Technology Roadmap Committee established under section 103 shall develop and transmit to the Secretary of Energy and the Congress a Solar Technology Roadmap that—

(1) presents the best current estimate of the near-term (up to 2 years), mid-term (up to 7 years), and long-term (up to 15 years) research, development, and demonstration needs in solar technology; and

(2) provides guidance to the solar technology research, development, and demonstration activities supported by the Federal Government for the purposes of meeting national priorities in energy security, United States competitiveness, mitigation of adverse environmental impacts, and energy diversification.

(b) CONTENTS.—The Solar Technology Roadmap shall—

(1) identify research, development, and demonstration needs for a diversity of solar technologies to address—

(A) the key solar energy production challenges of intermittency, transience, storage, and scaling, including determining—

(i) which solar-related technological solutions are appropriate for various applications, locations, and seasons;

(ii) how to store excess solar energy in batteries, supercapacitors, compressed air, flywheels, hydrogen, synthetic fuels, thermal storage, or superconductors, or through other means;

(iii) how and when to integrate solar energy into the electricity grid effectively, including—

(I) the integration of solar technologies with a Smart Grid;

(II) electrical power smoothing;

(III) microgrid integration;

(IV) solar resource forecasting;

(V) long distance transmission options, including direct current and superconducting transmission; and

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

(iv) how best to integrate solar technologies into buildings; and

(v) the technologies used to condition solar energy, including inverters, DC/DC converters, and battery chargers;

(B) modeling and simulation;

(C) the design, materials, and manufacture of solar technologies, as well as related factory sciences;

(D) the development of standards;

(E) the need for demonstration facilities;

(F) optimized packaging methods;

(G) environmental, safety, and health concerns including reuse, recycling, hazardous materials disposal, and photovoltaic waste issues;

(H) the development of solar technology products that are water efficient;

(I) ways to reduce regional disparity in the use of solar technologies; and

(J) other areas identified by the Secretary;

(2) identify opportunities for coordination with partner industries such as those for semiconductors, lighting, energy storage, Smart Grid, and wind that can benefit from similar advances;

(3) establish research, development, and demonstration goals with recommended timeframes with respect to solar technologies for—

(A) improving performance;

(B) decreasing cost of electricity generated;

(C) improving reliability;

(D) decreasing potential negative environmental impacts and maximizing the environmental benefits of solar technologies; and

(E) improving the cost effectiveness and quality control of domestic manufacturing of implements and devices used in the production of solar energy;

(4) identify best practices for Department of Energy national laboratories in their collaborations with institutions of higher education and private industry to more efficiently and effectively bring new solar technologies to the marketplace;

(5) include recommendations, as appropriate, to guide solar technology research, development, and demonstration activities;

(6) provide recommendations on the necessary steps required to strengthen the link between solar technology research and the commercialization of those technologies into full scale manufacturing, including the retooling and reworking of the Nation's existing technological and manufacturing base, as

well as coordinating the national strategy in regions where solar technology clusters currently exist;

(7) provide recommendations to Federal agencies on corresponding strategies to accelerate domestic commercialization of newly developed solar technologies; and

(8) outline the various technologies and practices considered by the Committee and the benefits and shortcomings of each, as appropriate.

(c) PUBLIC INPUT.—The Committee shall release a draft Roadmap to the public at least one month prior to publication in order to receive input from the public.

(d) REVISIONS AND UPDATES.—

(1) REVISIONS.—Once every 3 years after completion of the first Solar Technology Roadmap under this Act, the Solar Technology Roadmap Committee shall conduct a comprehensive review and revision of the Solar Technology Roadmap.

(2) UPDATES.—The Solar Technology Roadmap Committee shall update the Solar Technology Roadmap annually as necessary.

(e) CONSULTATION.—The Solar Roadmap Committee shall consult with the Department of the Interior, the National Park Service, the Department of Defense, and the

General Services Administration on the potential for solar demonstration projects on Federal lands.

SEC. 103. SOLAR TECHNOLOGY ROADMAP COMMITTEE.

(a) ESTABLISHMENT.—Not later than 4 months after the date of enactment of this Act, the Secretary shall establish, and provide support for as necessary, a Solar Technology Roadmap Committee.

(b) MEMBERSHIP.—

(1) IN GENERAL.—The Solar Technology Roadmap Committee shall consist of at least 11 members. Each member shall be appointed by the Secretary from among subject matter experts representing—

(A) different sectors of the domestic solar technology industry, including manufacturers, solar applications developers, and equipment suppliers;

(B) national laboratories;

(C) academia;

(D) relevant Federal agencies;

(E) relevant State and local government entities;

(F) private research institutions;

(G) minority-serving institutions; and

(H) other entities or organizations, as appropriate.

(2) TERMS.—

(A) IN GENERAL.—Except as provided in subparagraph (B), the term of a member of the Solar Technology Roadmap Committee shall be 3 years.

(B) ORIGINAL TERMS.—Of the members appointed originally to the Solar Technology Roadmap Committee, approximately ⅓ shall be appointed for a 2-year term, approximately ⅓ shall be appointed for a 3-year term, and approximately ⅓ shall be appointed for a 4-year term.

(3) LIMIT ON TERMS.—A member of the Solar Technology Roadmap Committee may serve more than 1 term, except that such member may not serve a subsequent term unless 2 years have elapsed since the end of a previous term.

(4) INDUSTRY PARTICIPATION.—At least ⅓ and not more than ½ of the members of the Solar Technology Roadmap Committee shall be individuals described in paragraph (1)(A).

(5) CHAIR.—The Secretary shall select a Chair from among the members of the Committee. The Chair shall not be an employee of the Federal Government.

(6) CONFLICTS OF INTEREST.—The Secretary, in appointing members to the Committee, shall make every effort to ensure that—

(A) no individual appointed to serve on the Committee has a conflict of interest that is relevant to the functions to be performed, unless such conflict is promptly and publicly disclosed and the Secretary determines that a waiver is appropriate;

(B) the Committee membership is fairly balanced as determined by the Secretary to be appropriate for the functions to be performed; and

(C) the final report of the Committee will be the result of the Committee's independent judgment.

The Secretary shall require that individuals that are appointed or intended to be to appointed to serve on the Committee inform the Department of Energy of any individual's conflicts of interest that are relevant to the functions to be performed.

(7) GEOGRAPHIC DISTRIBUTION.—The Secretary shall consider individuals that represent diverse geographic regions of the United States for membership of the Committee.

(c) EXPERT ADVICE.—In developing the Solar Technology Roadmap, the Solar Technology Roadmap Committee may establish subcommittees, working groups comprised of experts outside the membership of the Solar Technology Roadmap Committee, and other means of gathering expert advice on—

(1) particular solar technologies, applications, or technological challenges;

(2) crosscutting issues or activities relating to more than 1 particular solar technology or technological challenge; or

(3) any other area the Solar Technology Roadmap Committee considers appropriate.

(d) REPORTING.—Not later than 1 year after the date of enactment of this Act, and annually thereafter, the Committee shall submit a report to the Secretary and the Congress on its activities over the prior 12-month period.

(e) COMPENSATION AND EXPENSES.—A member of the Solar Technology Roadmap Committee shall not be compensated for service on the Committee, but may be allowed travel expenses, including per diem in lieu of subsistence, in accordance with subchapter I of chapter 57 of title 5, United States Code.

(f) LIMITATION.—The Committee shall provide guidance on technological goals and activities but, consistent with requirements for the selection of recipients of funding on a merit-reviewed, competitive basis under section 101(b), shall not recommend or select specific recipients of funds.

(g) FEDERAL ADVISORY COMMITTEE ACT.—The Federal Advisory Committee Act (5 U.S.C. App.) shall not apply to the Solar Technology Roadmap Committee.

SEC. 104. INTERAGENCY COORDINATION.

The Director of the Office of Science and Technology Policy shall review and coordinate Federal interagency activities identified in and related to the Solar Technology Roadmap as appropriate.

SEC. 105. SOLAR TECHNOLOGY DEMONSTRATION PROJECTS.

(a) ESTABLISHMENT OF PROGRAM.—The Secretary shall establish a program to provide grants for demonstration projects to support the development of solar energy production, consistent with the Solar Technology Roadmap as available.

(b) IMPLEMENTATION.—In carrying out the demonstration program under this section, to the extent practicable, the Secretary shall—

(1) include at least 10 photovoltaic technology projects that generate between 1 and 3 megawatts;

(2) include at least 3 but not more than 5 solar technology projects that generate greater than 30 megawatts;

(3) include at least 2 solar thermal technology projects, with thermal storage, that generate between 1 and 3 megawatts continuously for a 24-hour period from energy provided entirely by the sun; and

(4) make awards for projects that—

(A) are located in geographically dispersed regions of the country and are not concentrated in any single geographical region of the country;

(B) are located and can be replicated in a variety of regions and climates;

(C) demonstrate technologies that address intermittency, transience, storage challenges, and independent operational capability;

(D) facilitate identification of optimum techniques among competing alternatives;

(E) include business commercialization plans that have the potential for production of equipment at high volumes;

(F) improve United States competitiveness and lead to development of manufacturing technology;

(G) demonstrate positive environmental performance through life-cycle analysis;

(H) provide the greatest potential to reduce energy costs, as well as promote accessibility and community implementation of demonstrated technologies, for consumers;

(I) promote overall electric infrastructure reliability and sustainability should grid functions be disrupted or damaged; and

(J) satisfy other criteria that the Secretary considers necessary to carry out the program; and

(5) evaluate the potential to establish large photovoltaic facilities that produce at least 100 gigawatts, including an evaluation of the electrical grid, current, voltage, and energy storage requirements associated with large photovoltaic facilities.

(c) GRANT AWARDS.—Funding provided 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) a necessary and appropriate site engineering study;

(2) a detailed 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 a minimum of 3 years, using a monitoring methodology approved by Secretary; and

(6) validation of technical, economic, and environmental assumptions and documentation of lessons learned.

(d) GRANT SELECTION.—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. Grant recipients shall be selected on a merit-reviewed, competitive basis. The Secretary shall give preference to proposals that address multiple elements described in subsection (b).

(e) LIMITATIONS.—Funding shall not be provided under this section for more than 50 percent of the costs of the project for which assistance is provided. Not more than a total of $300,000,000 shall be provided under this

section for the period encompassing fiscal years 2011 through 2015.

(f) ORGANIC PHOTOVOLTAIC CELL TECHNOLOGIES.—At least 1 demonstration project awarded under this section during fiscal year 2011 shall be for the demonstration of organic photovoltaic cell technologies.

SEC. 106. PHOTOVOLTAIC PERFORMANCE STUDY.

(a) IN GENERAL.—Not later than one year after the date of enactment of this Act, the Secretary shall transmit to the Congress and the Solar Technology Roadmap Committee the results of a study that analyzes the performance of photovoltaic installations in the United States. The study shall assess the current performance of photovoltaic installations and identify opportunities to improve the energy productivity of these systems. Such study shall include—

(1) identification of the average energy productivity of current commercial and residential installations;

(2) assessment of areas where energy productivity is reduced, including wire loss, module mismatch, shading, dust, and other factors;

(3) identification of technology development and technical standards that improve energy productivity;

(4) analysis of the potential cost savings and energy productivity gains to the Federal, State, and local governments, utilities, private enterprise, and consumers available through the adoption, installation, and use of high-performance photovoltaic technologies and practices;

(5) an overview of current government incentives at the Federal, State, and local levels that encourage the adoption of highly efficient photovoltaic systems and practices; and

(6) assessment of current financing models available to consumers used to offset high upfront costs by accounting for the long term economic benefits of solar energy.

(b) PUBLIC INPUT.—The Secretary shall ensure that interested stakeholders, including affected industry stakeholders and energy efficiency advocates, have a meaningful opportunity to provide comments, data, and other information on the scope, contents, and conclusions of the study. All forums for the Department to receive this input from interested stakeholders shall be announced in the Federal Register.

SEC. 107. REPORT.

Not later than 180 days after the date of enactment of this Act, the Secretary shall commence a study evalu-

ating potential applications of micro power stations using solar power technology in underserved communities lacking in basic electric or traditional power infrastructure, and make recommendations to Congress for increasing access to and implementation of solar energy technology in such underserved communities.

SEC. 108. SOLAR ENERGY PROGRAM REAUTHORIZATION.

(a) IN GENERAL.—There are authorized to be appropriated to the Secretary to carry out section 101(a)—

(1) $350,000,000 for fiscal year 2011;

(2) $400,000,000 for fiscal year 2012;

(3) $450,000,000 for fiscal year 2013;

(4) $500,000,000 for fiscal year 2014; and

(5) $550,000,000 for fiscal year 2015.

(b) ROADMAP IDENTIFIED ACTIVITIES.—The Secretary shall dedicate a percentage of funding received pursuant to subsection (a) for research, development, and demonstration activities identified by and recommended under the Solar Technology Roadmap in the following percentages:

(1) For fiscal year 2012, at least 30 percent.

(2) For fiscal year 2013, at least 45 percent.

(3) For fiscal year 2014, at least 60 percent.

(4) For fiscal year 2015, at least 75 percent.

(c) SOLAR TECHNOLOGY ROADMAP.—The Secretary may use up to $2,000,000 of the funds appropriated pursuant to subsection (a) for each fiscal year to support the establishment and maintenance of the Solar Technology Roadmap.

(d) EXTENSION OF AUTHORIZATIONS.—Of funds authorized by subsection (a), there are authorized to be appropriated to the Secretary to carry out—

(1) section 602 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17171) $12,000,000 for each of the fiscal years 2013 through 2015;

(2) section 604 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17172) $10,000,000 for each of the fiscal years 2013 through 2015;

(3) section 605 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17173) $3,500,000 for each of the fiscal years 2013 through 2015; and

(4) section 606 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17174) $2,500,000 for each of the fiscal years 2013 through 2015.

SEC. 109. EXISTING PROGRAMS.

Except as otherwise specified in this Act, this Act shall supersede any duplicative solar research, development, and demonstration programs within the Department of Energy.

SEC. 110. REPEALS.

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

SEC. 111. SOLAR TECHNOLOGY EQUIPMENT THEFT.

(a) PILOT PROGRAM.—Not later than 1 year after the date of enactment of this Act, the Secretary of Energy shall establish a pilot program to make grants for projects to protect against solar technology equipment theft, including projects for mapping of large-scale solar projects and equipment serial number registries.

(b) REPORT TO CONGRESS.—Not later than 1 year after the establishment of the pilot program under sub-

section (a), the Secretary of Energy shall transmit to the Congress a report on the effectiveness of projects supported under this section, which shall include recommendations for the continuation or alteration of the program under this section or any other appropriate Federal legislation.

TITLE II—PHOTOVOLTAIC RECYCLING

SEC. 201. PHOTOVOLTAIC DEVICE RECYCLING RESEARCH, DEVELOPMENT, AND DEMONSTRATION.

(a) DEFINITION.—In this section, the term ''photovoltaic device'' includes photovoltaic cells and the electronic and electrical components of such devices.

(b) IN GENERAL.—In order to address the issues described in section 102(b)(1)(G), the Secretary shall award multiyear grants for research, development, and demonstration activities to create innovative and practical approaches to increase reuse and recycling of photovoltaic devices and, through such activities, to contribute to the professional development of scientists, engineers, and technicians in the fields of photovoltaic and electronic device manufacturing, design, refurbishing, and recycling. The activities supported under this section shall 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) MERIT REVIEW.—Grants shall be awarded under this section on a merit-reviewed, competitive basis.

(d) APPLICATIONS.—Each application shall include 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.

(e) DISSEMINATION OF RESULTS.—The results of activities supported under this section shall be made publicly available through—

(1) development of best practices or training materials for use in the photovoltaics manufacturing, design, 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 research organizations on the problems and solutions related to reuse and recycling of photovoltaic devices.

(f) PHOTOVOLTAIC MATERIALS PHYSICAL PROPERTY DATABASE.—

(1) IN GENERAL.—The Secretary shall establish a comprehensive physical property database of materials for use in photovoltaic devices. This database shall include—

(A) identification of materials used in photovoltaic devices;

(B) a list of commercially available amounts of these materials;

(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.—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 and the Administrator of the Environmental Protection Agency to facilitate the incorporation of the database under this subsection with any existing database for electronic manufacturing and recycling.

Passed the House of Representatives October 22, 2009.

Attest:

Clerk.

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