

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON ENERGY
U.S. HOUSE OF REPRESENTATIVES
HEARING CHARTER

Advancing the Next Generation of Solar and Wind Energy Technologies

Wednesday, May 15, 2019

10:00AM EST

2318 Rayburn House Office Building, Washington, D.C. 20015

PURPOSE

The purpose of the hearing is to examine the range of research, development, and demonstration (RD&D) activities required to advance solar and wind energy technologies. Specifically, the hearing will serve to inform the development of legislation that will guide the Department of Energy's (DOE) activities in these areas. Many solar and wind energy technologies are now widespread and growing, but further innovation is needed to ultimately deploy these technologies at a greater scale that can be a major factor in reducing the impacts of climate change. The discussion will focus on the value of existing federal solar and wind energy research, development, and demonstration activities, and the next steps that these programs should be pursuing.

WITNESSES

- **Dr. Peter Green** is Science and Technology Officer and Deputy Laboratory Director for the National Renewable Energy Laboratory (NREL). He is responsible for developing NREL's research goals and strengthening its core capabilities, including the Laboratory's solar and wind energy technology activities. Before his current position, he was the Director of DOE's Energy Frontier Research Center for solar and thermal energy conversion and a scientist at Sandia National Laboratory researching polymers, glass, and electronic ceramics.
- **Ms. Abby Hopper, Esq.** is President and CEO of the Solar Energy Industries Association (SEIA). Before leading SEIA, she was Director for the Department of Interior's Bureau of Ocean Energy Management and, previous to that, Director of the Maryland Energy Administration.
- **Mr. Kenny Stein, Esq.** is Director of Policy at the Institute for Energy Research. He has previously held several positions for Senator Ted Cruz, including Legislative Counsel,

covering energy, environment, and agriculture issues, and served as Policy Advisor for the Cruz Presidential Campaign.

- **Mr. Tom Kiernan** is President and CEO of the American Wind Energy Association (AWEA). Prior to joining AWEA, he was President of the National Parks Conservation Association for 15 years and served various roles in the Environmental Protection Agency's Office of Air and Radiation.

Solar and Wind Energy Technology

Significant advances in solar and wind energy technologies have occurred over the past 40 years. According to a 2018 Report by Lazard, the unsubsidized, levelized cost of energy for solar photovoltaic systems and wind power dropped 88% and 69% since 2009, respectively, making each generation source competitive, if not cheaper than fossil fuel generation in some scenarios.¹ These cost decreases have been primarily driven by improvements in solar photovoltaics and wind turbines. In addition to increased affordability, the efficiency, scale, and distribution of solar and wind energy technologies has improved.² Federal RD&D led by DOE has contributed to these industries and continues to advance solar and wind energy technologies.

Solar Energy Research, Development, and Demonstration

In 1977, DOE launched the Solar Energy Research Institute to explore ways to harness power from the sun. This 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^{3,4}. Over time, many of these technologies were matured and commercialized by the private sector. But according to several assessments produced by the Department of Energy, 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.⁵

¹ "Levelized Cost of Energy Analysis—Version 12.0." Lazard. <https://www.lazard.com/perspective/levelized-cost-of-energy-and-levelized-cost-of-storage-2018/>

² "2017 Renewable Energy Data book." National Renewable Energy Laboratory. <https://www.nrel.gov/docs/fy19osti/72170.pdf>

³ "The History of Solar." U.S. Department of Energy. https://www1.eere.energy.gov/solar/pdfs/solar_timeline.pdf

⁴ "Photovoltaics Research and Development." U.S. Department of Energy. <https://www.energy.gov/eere/solar/photovoltaics-research-and-development>

⁵ "Sunshot Vision Study." U.S. Department of Energy. <https://www.energy.gov/eere/solar/sunshot-vision-study>

Wind Energy Research, Development, and Demonstration

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

Amidst these RD&D activities, the wind energy industry has grown tremendously. In 2018, there was enough wind energy in the U.S. to power 20 million homes.⁶ However, if wind energy is to meet the goal of supplying 35% of U.S. electricity by 2050, as outlined in the DOE Wind Vision report, continued research, development, and demonstration of these technologies and systems are needed.⁷ According to the report, this level of deployment would result in over 600,000 wind industry-supported jobs, billions of dollars in energy savings, and gigatons of air pollution avoided.⁸

Draft Solar and Wind Energy Research and Development Bills

The draft legislation that this hearing is meant to inform plans to guide DOE's work on wind and solar energy so that these technologies can achieve the ambitious goals laid out in DOE's Wind Vision and SunShot initiative, and more.

Draft Solar Energy Bill

The draft bill, currently titled the Solar Energy Research and Development Act of 2019, 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 and security;
- d) grid integration; and
- e) affordability.

⁶ "History of U.S. Wind Energy." U.S. Department of Energy. <https://www.energy.gov/eere/wind/history-us-wind-energy>

⁷ "Wind Vision Detailed Roadmap Actions." U.S. Department of Energy. https://www.energy.gov/sites/prod/files/2018/05/f51/WindVision-Update-052118-web_RMB.pdf

⁸ "Wind Vision." U.S. Department of Energy. <https://www.energy.gov/eere/wind/wind-vision>

The bill specifically directs the Secretary to conduct demonstration projects and pursue projects that improve U.S. domestic manufacturing, recycling, and environmental impact of solar energy technologies. It also authorizes 5% annual funding increases over 5 years for wind energy research, development, and demonstration activities, beginning with \$258.8 million in 2020, to carry out the Act.

Draft Wind Energy Bill

The draft bill, currently titled the Wind Energy Research and Development Act of 2019, is an update of bills previously introduced by Rep. Tonko in past Congresses, most recently H.R. 4423 in the 114th Congress. The current bill directs the Secretary of Energy to carry out a program for research, development, testing, and evaluation of wind energy technologies. The program prioritizes wind energy technologies, including both onshore and offshore turbines and airborne technologies, that improve:

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

The bill also directs the Secretary to award grants for demonstration projects, including the establishment of a Hybrid Energy System Facility, currently proposed by the Administration⁹, that can demonstrate wind energy technologies in an electric grid system that incorporates diverse generation sources, loads, and storage technologies.

In addition, the bill directs the Secretary to support research technologies that reduce regulatory and market barriers, and support innovative wind energy technologies that are not present in DOE's RD&D portfolio or roadmaps. The Act authorizes 5% annual funding increases over 5 years for wind energy research, development, and demonstration activities, beginning with \$120 million in 2020, to carry out the Act.

⁹ "Department of Energy FY 2020 Congressional Budget Request, Volume 3 Part 2." Department of Energy. <https://www.energy.gov/sites/prod/files/2019/04/f61/doe-fy2020-budget-volume-3-Part-2.pdf>