[6450-01-P]

DEPARTMENT OF ENERGY

Notice of Request for Information (RFI) on Prediction of Solar Variability for Better Grid Integration

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy (DOE).

ACTION: Request for information (RFI).

SUMMARY: The U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) is issuing this request for information (RFI) to solicit feedback from industry, academia, research laboratories, government agencies, and other stakeholders. This RFI will inform SETO's strategic planning on research related to the integration of solar energy resources. Specifically, this RFI will inform SETO's strategies relating to prediction of solar irradiance reaching the surface of the earth, and power output from solar generation plants, using either photovoltaic (PV) or concentrating solar power (CSP) technologies. Improving solar generation prediction will better inform grid operators as they consider the impacts of solar power variability on grid planning and operations technologies, as well as the owners and operators of utility-scale plants and aggregators of distributed PV systems.

DATES: SETO will accept response to the RFI for at least 30 days after **[INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER],** the date this notice is published.

ADDRESSES: Interested parties are to submit comments electronically to: *SETO.RFI.SI@ee.doe.gov*. Include Prediction of Solar Variability for Better Grid Integration, in the subject of the title. Only electronic responses will be accepted. The complete RFI document DE-FOA-0002284 is located at *https://eere-exchange.energy.gov*.

FOR FURTHER INFORMATION CONTACT: Questions may be addressed to Mr. Tassos Golnas at telephone (202) 287-1793 or by email *SETO.RFI.SI@ee.doe.gov*. Further instructions can be found in the RFI document posted on EERE Exchange.

SUPPLEMENTARY INFORMATION: SETO's systems integration research focuses on enabling effective grid operations with increasing amounts of solar energy and improving system resilience. Topics include dynamic PV inverter models and adaptive distribution protection; grid services from integrating solar with energy storage and other technologies; advanced inverter controls and sensors; and standardized interconnection, interoperability, and cybersecurity for PV. The goal is to advance the understanding and technologies needed to integrate increasing amounts of solar generation into electric transmission and distribution systems in a cost-effective, secure, resilient, and reliable manner. SETO's recent R&D funding includes, but is not limited to, the SETO FY2019 Funding Opportunity[1], and the Advanced Systems Integration for Solar Technologies (ASSIST),[2] Solar Forecasting 2,[3] and Enabling Extreme Real-Time Grid Integration of Solar Energy (ENERGISE)[4] funding opportunities.

[1] *https://www.energy.gov/eere/solar/funding-opportunity-announcement-solar-energy-technologies-office-fiscal-year-2019*
[2] *https://www.energy.gov/eere/solar/funding-opportunity-announcement-advanced-systems-integration-solar-technologies-assist*
[3] *https://www.energy.gov/eere/solar/funding-opportunity-announcement-solar-forecasting-2*
[4] *https://www.energy.gov/eere/solar/funding-opportunity-announcement-enabling-extreme-real-time-grid-integration-solar-energy*

SETO has supported solar prediction technologies in its Solar Forecasting funding program, launched in 2013, which delivered WRF-Solar[5] - a version of the Weather Research and Forecasting (WRF) model[6] that is optimized for solar irradiance, and more recently in the Solar Forecasting 2 funding program, launched in 2018. This latter program prioritizes improvements in the prediction of solar irradiance for horizons between 3 and 48 hours ahead, the successful integration of probabilistic solar power forecasts with generation unit scheduling, and the creation of an open-source framework for the efficient and transparent evaluation of irradiance and power forecast models.

SETO hosted a workshop on October 7-8, 2019, in Washington, D.C. to review the progress of projects awarded under the Solar Forecasting 2 funding program and to better understand the remaining challenges associated with the variability and prediction uncertainty of solar generation. At the event, subject matter experts and SETO-funded researchers presented on the state-of-the-art of solar irradiance forecasting, opportunities for the integration of hybrid systems with solar plants in the bulk power system, and efforts associated with the DOE-funded projects. These efforts work to improve the WRF-Solar model, use machine learning and other artificial intelligence methods to better predict irradiance under variable cloud cover and during ramps, and calculate the optimal amount of generation reserves using probabilistic solar power forecasts. An extended session was dedicated to the demonstration of the current state of Solar Forecast Arbiter,[7] which is an open-source platform designed to facilitate objective, transparent, and auditable evaluation of irradiance and power forecasts. The participants openly discussed emerging challenges regarding the prediction of solar irradiance and power in a world with

[5] *https://ral.ucar.edu/projects/wrf-solar*
[6] *https://www.mmm.ucar.edu/weather-research-and-forecasting-model*
[7] *https://SolarForecastArbiter.org*

increasing solar and renewable penetration, and an increasing population of behind-the-meter variable loads. The detailed workshop agenda and presentations are available on the SETO website.[8]

In this RFI, SETO is seeking additional feedback on these topics from industry, electric utilities, balancing authorities, academia, research laboratories, government agencies, and other stakeholders. The main goal is to lower the integration cost of high penetrations of solar power to the bulk power and distribution systems by making the prediction of solar generation more accurate and effective. Such a development could be realized by leveraging advances in ground and remote sensing, numerical modeling of atmospheric processes, artificial intelligence techniques, and stochastic optimization. The questions are given as follows and responders are welcome to answer all or any subset of the questions.

Confidential Business Information

[8] *https://www.energy.gov/eere/solar/downloads/solar-forecasting-2-workshop*

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well marked copies: One copy of the document marked "confidential" including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Signed in Washington, DC on January 27, 2020.

Rebecca Jones-Albertus,
Director,
Solar Energy Technologies Office.

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