Performance Data for Solar Photovoltaic Systems: Acquisition, Access, and Sharing

DATE: October 14, 2022
SUBJECT: Request for Information (RFI)

Description

The U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) is requesting information on the cost and value of acquiring, accessing, and sharing solar photovoltaic (PV) system performance data. SETO seeks responses from all interested stakeholders in industry, academia, government, research laboratories, and more, including data owners, data users, and system owners, operators, and developers. These responses will help inform SETO activities relevant to PV system performance and related data to accelerate research, development, and deployment of solar energy.

Background

Easy access to high-quality information about the real-world performance of solar PV systems and their components would be highly beneficial for the PV research and development (R&D) community. It would also help in shaping DOE and SETO priorities for PV system-related research. However, this type of data has typically been limited or difficult to obtain. While owners and operators of PV systems may have access to such data, the capacity of such data for R&D is either limited or the outputs are proprietary. Data-owning entities have also been slow in providing broad access to even limited sections of their datasets for a variety of reasons, such as confidentiality concerns and the labor cost of curating this data.

SETO supports PV R&D projects that drive down the costs of solar-generated electricity by improving efficiency and reliability. Access to PV system performance data sets often plays a critical role in SETO-funded PV R&D projects. However, this data may not be available, or may not be accessible, to parties beyond the team doing that research.

To overcome this challenge and increase access to high-quality, comprehensive PV system performance data, SETO is soliciting information and comments from stakeholders to understand their needs regarding use, collection, and sharing of this data.

This is a Request for Information (RFI) only. EERE will not pay for information provided under this RFI and no project will be supported as a result of this RFI. This RFI is not accepting applications for financial assistance or financial incentives. EERE may or may not issue a Funding Opportunity Announcement (FOA) based on consideration of the input received from this RFI.

Purpose

The purpose of this RFI is to solicit feedback from industry, academia, research laboratories, government agencies, and other stakeholders regarding solar photovoltaic (PV) system performance data. In particular, this RFI solicits information and comments about the costs of acquiring, accessing, and sharing performance (and related) data, as well as about the value of data to the various stakeholders. This is solely a request for information and not a Funding Opportunity Announcement (FOA). EERE is not accepting applications.

Disclaimer and Important Notes

This RFI is not a Funding Opportunity Announcement (FOA); therefore, EERE is not accepting applications at this time. EERE may issue a FOA in the future based on or related to the content and responses to this RFI; however, EERE may also elect not to issue a FOA. There is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if EERE chooses to issue a FOA regarding the subject matter. Final details, including the anticipated award size, quantity, and timing of EERE funded awards, will be subject to Congressional appropriations and direction.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. EERE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. EERE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that EERE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind EERE to any further actions related to this topic.

Confidential Business Information

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.

Evaluation and Administration by Federal and Non-Federal Personnel

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Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to EERE providing their response to non-Federal parties. Non-Federal parties given access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

Request for Information Categories and Questions

Category 1: Cost and Value of Data *(from a data owner perspective)*

1. What would be the estimated cost of curating[1] a multi-year, high-quality[2] dataset for a PV system, where that data set is captured at sampling rates of at least one reading every 15 minutes and contains readings from components such as the AC meter, the AC output of the inverter(s), the DC input(s) of the inverter(s), and the weather station?
2. What, if any, would be the added cost per MW_{DC} associated with collecting, storing, and curating data for:
    a. tracker position
    b. string- or combiner-level DC information
    c. energy flows to and from energy storage (if applicable)
3. Opportunity cost of data sharing:
    a. What is the perceived opportunity cost or burden for publicly sharing a data set containing historical values (with a lag of at least one year)?
    b. What is the source of the opportunity cost?
    c. How does recency affect the opportunity cost? (i.e., is there a time lag of a certain number of years after which the opportunity cost drops to zero?)
    d. Would collecting less precise information help reduce that cost? (e.g., location recorded as gross coordinates with just two decimal places instead of an address or 4 decimal place precision, normalization of power and irradiance values instead of raw values)
4. Operations and maintenance information:
    a. Aside from cost concerns, what would stand in the way of sharing operations and maintenance information that is concurrent with the time series datasets?
    b. What would be the estimated cost of curating[3] that dataset?

Category 2: Access, Availability, and Value of Data *(from a data user perspective)*

[1] For the purposes of this question, "curating" means collecting the data and flagging periods with missing data.
[2] "High-quality" means that the sensors provide trusted data and there is less than 5% of missing or questionable values during daytime.
[3] For the purposes of these question, "curating" means collecting the data and removing cost and personally identifiable or proprietary information.

1. If you are performing or plan to perform R&D related to the performance of PV systems, do you have sufficient data for analysis and validation? If not, what is the most critical missing information? (e.g., length of collection time, variety of system types, sizes, and locations, number of observed variables, completeness and/or fidelity of data)
2. What are the minimum and optimum sets of PV system performance variables collected from a standard non-residential PV system (anything bigger than 50 kW_{DC}) that are necessary to perform and validate your R&D project (e.g., modeling of output of DC field, inverters, or entire systems, modeling of impact of soil and snow, identification, classification, and prediction of performance anomalies)?
3. What is the value of collecting high-quality time series data from residential systems at higher sampling rates (at least one reading every 15 minutes), given the lack of ground sensor-based irradiance measurements from such systems?
4. What are unique parameters regarding the performance of residential systems that cannot be estimated from models or lab-scale prototypes?
5. Accessibility of large datasets:
    a. How much value would be added by an interactive interface for accessing large datasets if that data is already otherwise accessible and accompanied by high-quality metadata (e.g., through an Application Programming Interface—API—or directly from a data repository)?
    b. Do you know of any examples of interactive interfaces for accessing time series data that you consider exemplary?
6. DOE and other federal, state, and local government organizations collect and publicly share some environmental data (e.g., high-quality irradiance data available from the Surface Radiation Budget (SURFRAD) and SOLar RADiation (SOLRAD) networks). Is there a need for additional environmental data that could be collected by government agencies that is not currently captured at a sufficient granularity, rate, and quality, or at all?

Category 3: Value-add Ancillary Datasets *(from a system developer/owner perspective)*

1. Unavailable data
    a. What data is *not* currently collected by the operators of your assets that could provide additional value?
    b. What advantage could this data provide for the operation and long-term value of the assets?
    c. What are the barriers to collecting or accessing those data sets?
2. How does an aerial inspection of the asset impact its optimal operation?
    a. In your experience, what (if any) is the desired frequency of such an inspection?
3. Extreme weather impact
    a. Do you collect data about damage inflicted by extreme weather events, such as hurricanes, derechos, large hail, or floods?
        i. If so, what would be the optimal way to leverage the data to support more resilient PV systems?

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Request for Information Response Guidelines

Responses to this RFI must be submitted electronically to SETO.RFI.PV@ee.doe.gov no later than 5:00 p.m. (ET) on November 18, 2022. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25 MB be compressed (i.e., zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (.docx), or Microsoft Word compatible, attachment to the email, and no more than 4 pages in length, 12-point font, 1-inch margins. Only electronic responses will be accepted.

Please identify your answers by responding to a specific question or topic if applicable. Respondents may answer as many or as few questions as they wish.

EERE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

Respondents are requested to provide the following information at the start of their response to this RFI:

- Company / institution name;
- Company / institution contact;
- Contact's address, phone number, and e-mail address.

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