PV Fleet Performance Data Initiative:
Long-Term Photovoltaic (PV) System Performance Benchmark

The U.S. Department of Energy (DOE) Solar Energy Technologies Office is launching the Photovoltaics (PV) Fleet Performance Data Initiative to support the U.S. PV community by pooling plant operation data in a central database and providing a performance assessment of individual solar assets using standardized state-of-the-art methods. The analysis results will provide PV plant owners and operators with a confidential, detailed assessment of the performance of their fleet and give the broader community an aggregate benchmark for the performance of the solar fleet in the United States. These outcomes will enable more efficient operation of PV installations and improve financial assessment accuracy for current and future PV power plants.

How to Participate

PV plant owners, operators, analysts, and researchers are invited to participate in the PV Fleet Performance Data Initiative by sharing PV plant power output and operation data they own with DOE and the

National Renewable Energy Laboratory (NREL), to be incorporated into a secure database (DuraMAT DataHub) maintained by NREL. In exchange for a confidential, customized individual performance analysis performed by NREL for the data partner, the initiative will periodically publish an anonymized, fleet-wide performance report on performance degradation rates extracted from all available data. Data will be protected by confidentiality agreements arranged with the participants in a standardized process, and individual participant data will not be visible to other participants or research team members unless authorized by the data owner. Data contributors will be fully engaged in defining the process of anonymizing data and reviewing the publications before they are released.

The initiative will use alternating-current power output data from medium and large (>250 kilowatts) PV installations over at least three years with a minimum resolution of 15 minutes, together with on-site plane-of-array irradiance, meteorological data, and system specifications. The performance assessment will be carried out using RdTools, a set of open-source tools written in Python. Research and collaboration with industry has shown RdTools to be a promising method for calculating plant-level module degradation rates, as well as performance impacts by soiling, inverter clipping, and plant availability. It is envisioned that the analysis will provide system-level evaluation of individual PV plants, including degradation rates and events affecting the plant performance, and compare the performance of a specific power plant to an aggregate benchmark.

The initiative also seeks to publish anonymized PV power generation data,
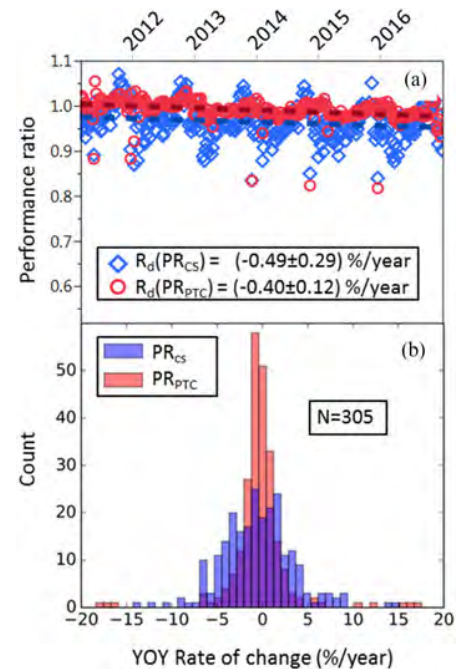

Figure 1. (a) Performance ratio of a single system at NREL. (b) Year-on-year aggregated histograms for the respective performance ratios (PR) calculated by RdTools. Ref: Jordan et al. *IEEE Journal of Photovoltaics* 8(2): 525, 2018.

such as anonymized individual PV power output data and/or voluntary contributions from data owners with more details. Allowing full or partial data sets to be made public is encouraged but not required for the participation in the initiative.

The initiative will be ready to set up confidentiality agreements and receive data starting in May 2019. The aggregate benchmark data will be available when DataHub receives data from at least three independent, similarly sized sources in order to maintain data anonymity.

For more information, please contact Tassos Golnas (Tassos.Golnas@ee.doe.gov) and Inna Kozinsky (Inna.Kozinsky@ee.doe.gov). ∎

About the Solar Energy Technologies Office

The U.S. Department of Energy Solar Energy Technologies Office supports early-stage research and development to improve the affordability, reliability, and performance of solar technologies on the grid. The office invests in innovative research efforts that securely integrate more solar energy into the grid, enhance the use and storage of solar energy, and lower solar electricity costs.