Solar Data and Tools: Resources for Researchers, Industry, and Developers

In partnership with the U.S. Department of Energy SunShot Initiative, the National Renewable Energy Laboratory (NREL) has developed a suite of analytical tools and data that can inform solar R&D and deployment decisions. They are increasingly becoming the basis of private-sector services offered to solar energy consumers. The following data sets and analytical tools are available at no cost to the public. These and other resources are linked from *www.nrel.gov/analysis/solar_tools.html*. For help accessing the tools, or to provide feedback, contact: *solar.tools@nrel.gov*.

Name	Type	Description
PVWatts	Online Calculator & API	With more than 2 million page views and 38 million API calls in fiscal year (FY) 2015, PVWatts is widely used by industry and the public alike to estimate the energy production and cost of energy of grid-connected photovoltaic (PV) systems throughout the world. It allows homeowners, small-building owners, installers, and manufacturers to easily develop estimates of the performance of potential PV installations, providing an estimate of hourly, monthly, and annual PV system production using a rooftop drawing tool and simple analysis options. Tool: *https://pvwatts.nrel.gov* | API: *https://developer.nrel.gov/docs/solar/pvwatts-v5/*
System Advisor Model (SAM)	Desktop model & SDK	SAM makes performance predictions and cost-of-energy estimates for grid-connected power projects. SAM covers multiple technologies, including PV, concentrating solar, and solar thermal systems, as well as wind, geothermal, and others. NREL provides downloadable versions of SAM for Windows, OSX, and Linux as well as a software development kit (SDK) for using the SAM Simulation Core in other models and tools. It combines detailed performance and financial analysis and is used by project engineers, policy analysts, technology developers, and researchers. Model: *https://sam.nrel.gov/* | SDK: *https://sam.nrel.gov/sdk*
OpenPV Project	Database & API	The OpenPV Project is a collaborative effort of government, industry, and the public to maintain a database of PV installations for the United States, providing PV system price and installed capacity data at the Zip code level. It represents nearly 500,000 installs and provides valuable insight into the market. The core dataset is updated annually by NREL, with data from LBNL, in addition to data contributed by the public. Tool: *https://openpv.nrel.gov/* | API: *https://developer.nrel.gov/docs/solar/openpv/*
Utility Rate Database (URDB)	Database & API	The Utility Rate Database is a free storehouse of detailed rate structures for U.S. utilities. Rates are updated regularly by NREL and Illinois State University. Accurate utility rates help inform decision makers on the applicability of various system designs and configurations. URDB data are accessed by SAM and hundreds of unique API calls. Database: *http://en.openei.org/wiki/Utility_Rate_Database* API: *http://en.openei.org/services/doc/rest/util_rates/?version=4*
Developer Network	APIs	The National Renewable Energy Laboratory's developer network helps developers access and use energy data via Web services. It has several solar data APIs, including OpenPV and PVWatts, as well as information about climate data and solar resource data available to be used for solar analysis. *https://developer.nrel.gov*
National Solar Radiation Database (NSRDB)	Database, GIS Viewer, & API	The National Solar Radiation Database is a collection of hourly and half-hour values of the three most common measurements of solar radiation and other meteorological data with a spatial resolution of 4 km x 4 km across the U.S. and an increasing number of international locations. In addition, the NSRDB viewer is an interactive Web-based application for visualizing and downloading complete solar resource datasets for regions or specific locations. *https://nsrdb.nrel.gov*
PVDAQ	Database, GIS Viewer, & API	The PV Data Acquisition application provides the access to raw (unfiltered) PV performance data at sites across the United States. Data for installations in 13 states are available to the public. Website: *http://maps.nrel.gov/pvdaq* | API: *https://developer.nrel.gov/docs/solar/pvdaq-v3/*