

Developing Southeast Asia Solar Resource Data to Support the Clean Energy Transition in the Region

Countries within Southeast Asia are part of a global effort to deploy renewable energy technologies and transition to clean, sustainable electricity generation. Because high quality, robust, and reliable resource data are at the core of critical decision making, the lack of access to openly available data can hinder project planning and investment decisions needed to drive energy transitions.

To address this need, with funding from USAID under the Advanced Energy Partnership for Asia, the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) developed and released high spatial (2-kilometer) and temporal (10-minute) resolution solar resource data for the entire Southeast Asia region (available at: www.re-explorer.org/re-data-explorer). This high-resolution data set was developed in collaboration with the University of Wisconsin and the National Oceanic and Atmospheric Administration. NREL developed the Physical Solar Model (PSM Version 3), which employs a physics-based approach to model the radiative transfer of solar irradiance through the atmosphere. The PSM relies on high-resolution cloud properties derived from imagery provided by the Japanese Meteorological Agency's Himawari weather satellite. The final data set was validated using ground measurements across Southeast Asia and Oceania and meets high levels of accuracy

Through the Advanced Energy Partnership for Asia, USAID and NREL have produced a data set covering 2015 through 2019 with 2-km spatial and 10-minute temporal resolution.

similar to other data sets produced with the PSM. This data set enables a wide range of research in photovoltaic (PV) energy and concentrating solar power (CSP) to assess system performance, estimate plant costs, and inform planning decisions. Furthermore, this novel solar irradiance data set can be used to support solar energy market expansion and inform prospecting, target setting, renewable energy auctions, and other high impact decisions ranging from the micro to the macro scale to accelerate renewable energy deployment throughout Southeast Asia, as shown in **Figure 1**.

Accessing and Visualizing Data with RE Data Explorer

This data can be accessed on the expanded and upgraded RE Data Explorer, which provides access to wind and solar data, and other critical data layers such as land use and environmental data for not only the Southeast Asia region, but all countries in the world. Funded by USAID, the RE Data Explorer is a publicly available, intuitive, best-in-class geospatial analysis platform with the ability to integrate with many other leading web applications and models through API and data download, and is managed by NREL, a well-known and trusted energy research institution. Data can be accessed directly from the RE Data Explorer, either by utilizing the application map viewer or

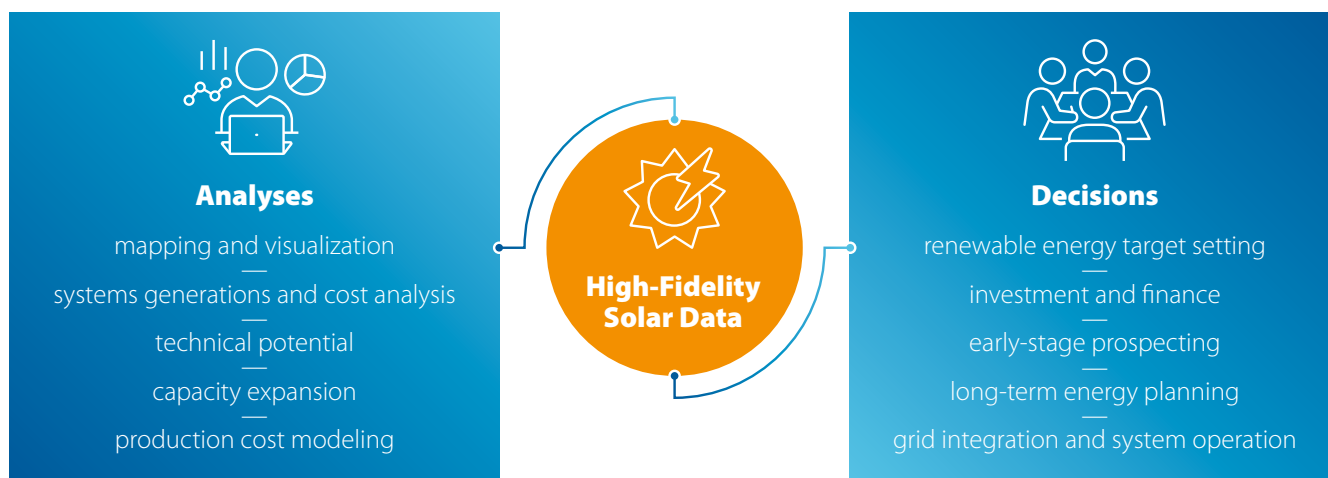


Figure 1. High quality, reliable data are at the core of critical decisions to enable energy transitions. Image by Christopher Schwing, NREL

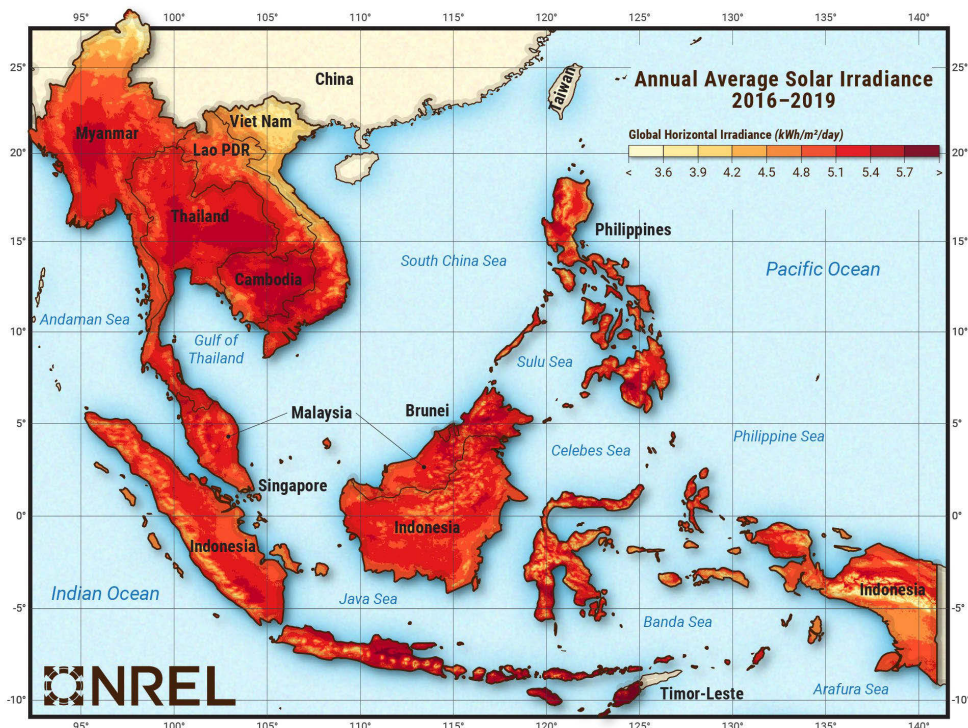


Figure 2. The above figure depicts annual average Global Horizontal Irradiance (GHI) spanning 2016–2019 and is based on data collected by the Himawari-8 satellite and processed using the Physical Solar Model Version 3 (PSM-v3). Image by Billy J. Roberts, NREL

by downloading the data. The data is available for download in multiple options, including GeoJSON, Shapefile, CSV, and GeoPackage, as well as in time series format. The solar resource data is available for the three solar irradiance components: GHI, DNI, and diffuse horizontal irradiance. Meteorological parameters, such as temperature, wind speed, and relative humidity, are also available as time series downloadable options. Additional features include analysis tools comprising Technical Potential, Cost of Energy Mapping, and PV Watts.

The RE Data Explorer offers all types of energy sector users—from project developers and investors to technical planners and policymakers—quick and convenient access to high-quality geospatial data and analysis capabilities for informed renewable energy decision-making. For a full description of RE Data Explorer, see **Box 1**.

Box 1. RE Data Explorer Informs High-Impact Decisions

RE Data Explorer is a user-friendly geospatial web-based application and high-quality data repository to support renewable energy analysis and inform high-impact decisions around the globe. Developed by NREL and supported by the U.S. Agency for International Development (USAID), RE Data Explorer performs customizable visualization and analysis of renewable energy potential for different scenarios and allows users to download global data to feed into other key analyses. Here are some of the many unique qualities that set RE Data Explorer apart as an unparalleled tool to support renewable energy development throughout the Southeast Asia region and around the world:

- Provides **best-in-class data from around the world**, including time series data for certain countries, extensive administrative layers, and data sets from key partners such as Danish Technical University, Energy Sector Management Assistance Program, World Bank, and the World Resources Institute.
- Offers **intuitive and user-driven analysis capabilities** to inform renewable energy high impact development and deployment decisions, including prospecting, integrated planning, policymaking.
- Contains a **breadth of renewable energy resources and technologies** available for analysis, including solar and wind and, for certain countries, geothermal, biomass, and ocean wave.
- Creates **links between data, analysis, and decisions** through curated knowledge products, training resources, and an “Ask an Expert” service to provide **customized support**.
- Offers the flexibility of adding **functionalities and analysis capabilities** to respond to the changing needs of countries.
- Provides the opportunity to work with the RE Explorer team to **add localized data**.

www.re-explorer.org | www.nrel.gov/usa-id-partnership

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Renewable Energy (RE) Explorer provides renewable energy data, geospatial analysis tools, and technical assistance to support data-driven renewable energy decision making. The RE Explorer was developed by the National Renewable Energy Laboratory and are supported by the U.S. Agency for International Development.

The USAID-NREL Partnership addresses critical challenges to scaling up advanced energy systems through global tools and technical assistance, including the Renewable Energy Data Explorer, Greening the Grid, the International Jobs and Economic Development Impacts tool, and the Resilient Energy Platform. More information can be found at: www.nrel.gov/usa-id-partnership.

