NREL
NATIONAL RENEWABLE ENERGY LABORATORY

India Solar Resource Data

Enhanced Data for Accelerated Deployment

Identifying potential locations for solar photovoltaic (PV) and concentrating solar power (CSP) projects requires detailed understanding of the solar resource available at various locations. Under a bilateral partnership between the United States and India—the U.S.-India Energy Dialogue—the National Renewable Energy Laboratory (NREL) has developed solar maps and data for India to provide 15 years of hourly information by extending the dataset to include the period from 2000 to 2014.[1] These maps and data help identify high-quality solar energy project locations, which can help accelerate the deployment of solar energy in India.

There are various ways to estimate solar resource, including (a) measurements using ground-mounted instruments, (b) modeling using information from weather satellites, and (c) modeling using numerical weather prediction models. The 10km x 10km gridded hourly solar resource data were developed using weather satellite (METEOSAT) observations incorporated into a site-time specific solar modeling approach developed at the State University of New York at Albany.[2] The new satellite-based data incorporates improved aerosol optical depth, which provides a more accurate estimation of surface radiation than the previous satellite product. Aerosols such as dust, smoke, haze, and particulates partially block solar irradiation, and the new analysis incorporates a better method to account for this in the satellite-based estimates, thus increasing confidence in the resource.

Accessing the Data

The solar resource data are available for both global horizontal irradiance (GHI) and direct normal irradiance (DNI) and can be accessed in three different formats: maps, geographic information system (GIS) summary layers, and hourly data. To access the data, visit the National Solar Radiation Database at *nsrdb.nrel.gov/nsrdb-viewer*. This data set is useful for a number of applications, including performance and financial projections in software such as NREL's System Advisor Model: *sam.nrel.gov*.

DNI, also referred to as beam irradiance, is the direct sunlight that falls on a mirror or collector surface. This direct beam can then be concentrated onto a receiver, which collects the energy. The diffuse part is not useful for this concentrating technology and that is why DNI is the component of interest for CSP.

PV technology uses photons coming from sunlight irrespective of direction. GHI is a sum of the direct and the diffuse, and these three components can be used to understand the generation from a PV panel.

For More Information

Please visit *nrel.gov/international/ra_india.html* for additional information on the solar resource data for India. There, you can download annual and monthly average resource maps and GIS data.

[1] In 2013, the period of analysis for the dataset was expanded to 2002-2011. The time period of analysis for the previous dataset was 2002-2008.

[2] Perez R., P. Ineichen, K. Moore, M. Kmiecik, C. Chain, R. George and F. Vignola. 2002: "A New Operational Satellite-to-Irradiance Model." *Solar Energy* 73(5): 207-317.

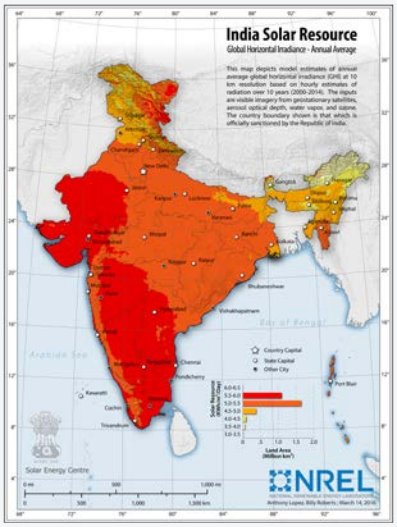

Figure 1. Annual Global Horizontal Irradiance

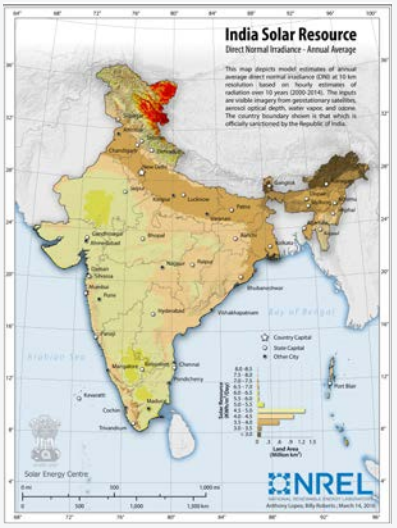

Figure 2. Annual Direct Normal Irradiance

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