

Solar and wind power generation

This report calls for strategic government action, enhanced infrastructure, and regulatory reforms to ensure the successful large-scale integration of solar PV and wind in order to meet global energy transition targets. Robust data, stakeholder collaboration and government prioritisation of integration measures are essential for overcoming these challenges and achieving a sustainable energy future.

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To cover different climate zones and geographic locations, the selected solar stations and wind farm sites included areas in North, Central, and Northwest China, and the terrain included deserts, mountains and plains. It should be noted that all the original datasets were obtained and provided by a third-party, the Chinese State Grid, and the data collection process was out of the authors' control.

In this section, the data types and the structure of the dataset, which can be downloaded from Figshare¹⁹ or GitHub (<https://github.com/Bob05757/Renewable-energy-generation-input-feature-variables-analysis>), are described. In the following subsections, the solar and wind data files are presented to guide users. There are two folders in the data repository; one is the folder that contains the original data with no data preprocessing, and the other folder contains data that was preprocessed based on the methods in The processing of the missing data and outliers subsection.

Wind power generation data are in the wind_farms folder, which includes six Microsoft Excel files. The real-time power generation and weather conditions are recorded in these files. The basic information about each wind farm is listed in Table 1.

In each Excel file, two years (2019-2020) of data, which included on-site weather conditions and power generation, with a time granularity of 15 minutes were recorded. Table 2 describes the meaning of the column headings. The wind speed at different height levels was recorded, and the speed at the wheel hub of the wind turbine was the most important factor for predicting power generation.

In this section, the visualization of the data, which includes the processing of missing data, outliers, and correlation analysis of the influencing feature variables, is presented to clarify the data quality.

The missing data include variables that were zero, null, "NA", "0.001", "-99", and "-". The outliers included weather variables that remained unchanged over a long time, atmosphere values that were equal to zero, and the values that were unreasonably high or low. Table 6 shows the rate of outliers and missing data in the



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original dataset.

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Web: <https://www.sumthingtasty.co.za/contact-us/>

Email: energystorage2000@gmail.com

WhatsApp: 8613816583346

