## **Project Description**

### **Description**

This dataset explores the relationship between weather conditions and renewable energy generation through detailed hourly data. It includes energy consumption, weather parameters such as solar radiation, temperature, pressure, humidity, wind speed, and precipitation. The goal is to understand how varying weather conditions affect the generation of renewable energy, particularly solar energy. The dataset's columns provide insights into factors such as sunlight availability, daylight length, and overall weather conditions, making it highly valuable for analyzing renewable energy generation in response to changing weather patterns.

### **Column Descriptions**

* **Time** – Timestamp of the data point (in hourly intervals).
* **Energy delta[Wh]** – Change in energy consumption over the given time period, measured in watt-hours (Wh).
* **GHI (Global Horizontal Irradiance)** – The amount of solar radiation received by a horizontal surface, measured in watts per square meter (W/m²).
* **Temp (Temperature)** – Temperature in degrees Celsius (°C) at the given time.
* **Pressure** – Atmospheric pressure in hPa (hectopascals) at the given time.
* **Humidity** – The percentage of relative humidity at the given time.
* **Wind Speed** – Wind speed in meters per second (m/s) at the given time.
* **Rain\_1h** – Amount of rain (in millimeters) that has fallen in the last 1 hour.
* **Snow\_1h** – Amount of snow (in millimeters) that has fallen in the last 1 hour.
* **Clouds\_all** – Cloud coverage percentage (0-100%) at the given time.
* **IsSun** – Binary indicator (1 or 0) indicating whether the sun is currently visible (1) or not (0).
* **SunlightTime** – Duration of sunlight (in hours) during the given time period.
* **DayLength** – Length of the day (from sunrise to sunset) in hours.
* **SunlightTime/DayLength** – Ratio of the available sunlight time to the total day length.
* **Weather\_type** – Categorical description of the overall weather condition (e.g., clear, cloudy, rainy, etc.).
* **Hour** – The hour of the day for the given data point (from 0 to 23).
* **Month** – The month number (1 to 12) for the given data point.

### **Limitations**

* **Geographical Scope**: The dataset may be limited to specific geographic regions or facilities, so its findings may not be universally applicable.
* **Weather Data Granularity**: While the dataset includes hourly weather parameters, more frequent measurements (e.g., every 15 minutes) may provide additional insights, especially for short-term energy fluctuations.
* **Weather Classification**: The weather types are categorized, but finer classifications (e.g., storm intensity or cloud type) may provide more granular insights into energy production.
* **Incomplete Data**: Some entries, such as wind speed or sunlight time, may be missing or have zero values in cases where the data is not available or the weather condition is not meaningful.
* **Focus on Solar Energy**: While the dataset provides a variety of weather conditions, it may be more heavily weighted toward solar energy generation, with less emphasis on wind, geothermal, or hydro power.