***Selection Site of Solar Energy Power Plant***

Solar resource is the most important site condition to have reliable information on, according to Matt Perry, manager of Renewable Energy Group at Campbell Scientific. High quality solar irradiance data is critical for site selection and system design, he said, as well as for estimating, validating and forecasting power plant performance.

“Solar resource and power production are very tightly coupled,” said Gwendalyn Bender, product manager for Assessment Services at Vaisala. “Understanding how the solar resource has varied for the last 10 or 20 years is a substitute for normal performance variation over the lifetime of a project.”

Bender added that most sites will not have onsite or nearby observational equipment for over 10 years, however, satellite-based datasets from companies like Vaisala can provide high-quality long-term datasets. These datasets can be calibrated with local observations for higher accuracy.

Weather parameters also play a large role in solar site assessment. Perry cited weather as a defining PV-operating condition, as it provides a connection to historical and satellite data for accessing annual solar resource variability. He mentioned ambient temperature and wind speed as two weather variables to consider, each affecting the irradiance and operational PV-module temperature.

Elaborating on temperature, Bender explained that high irradiance usually goes hand-in-hand with high temperatures, which lead to reduced panel efficiency and energy output. However, some locations may have high irradiance with low temperatures during the winter or spring months.

“If you only have data on irradiance, then you’re missing a piece of the puzzle that explains energy output,” said Bender. “Knowing the temperature profile of a site can also help you choose the best equipment to handle weather extremes the system may experience—different manufacturers specialize in different temperature conditions.”

The precipitation profile, including snowfall, must also be considered for maintenance purposes. The amount and type of precipitation at a site affects soiling loss, which applies to pre-construction energy estimates and factors into cleaning schedules during operation of the solar system, as well.

“Knowing the amount of snow a region receives and when it will fall can help developers make pre-construction plans for handling snow loads, and aim to control its influence on production,”

**Working Principle**

The working principle is that we use the energy of photons to get the drift current flowing in the circuit using reversed bias p-n junction diode (p-type and n-type silicon combination).

**Main Components**

**1. Solar Panels**

It is the heart of the solar power plant. Solar panels consists a number of solar cells. We have got around 35 solar cells in one panel. The energy produced by each solar cell is very small, but combining the energy of 35 of them we have got enough energy to charge a 12 volt battery.

**2. Solar Cells**

It is the energy generating unit, made up of p-type and n-type silicon semiconductor. It’s the heart of solar power plant.

**3. Battery**

Batteries are used to produce the power back or store the excess energy produced during day, to be supplied during night.

**4. D.C. to A.C. Converter (Inverter)**

Solar panels produce direct current which is required to be converted into alternating current to be supplied to homes or power grid.

**Working of Solar Power Plant**

As sunlight falls over a solar cells, a large number of photons strike the p-type region of silicon. Electron and hole pair will get separated after absorbing the energy of photon. The electron travels from p-type region to n-type region due to the action of electric field at p-n junction. Further the diode is reversed biased to increase this electric field. So this current starts flowing in the circuit for individual solar cell. We combine the current of all the solar cells of a solar panel, to get a significant output.

Solar power plant have a large number of solar panels connected to each other to get a large voltage output. The electrical energy coming from the combined effort of solar panels is stored in the Lithium ion batteries to be supplied at night time, when there is no sunlight.

[**Advantages of Solar Energy**](https://www.mechanicalbooster.com/2019/01/advantages-and-disadvantages-of-solar-energy.html)

* Most clean and renewable source of energy.
* It is available in abundance and endless.
* It provides electricity at low cost, as fuel is free.
* With new research in this sector we now have a good power storage solution.
* Keeping in mind the pollution and cost of fossil fuel, it’s becoming the most reliable source of clean energy.

**Disadvantages of Solar Power Plant**

* It requires a lot of land to be captured forever.
* Initial cost of installation is too high.
* The energy storage options are not efficient and moreover costly if efficient.
* Power production is quite low as compared to nuclear or other resources to produce power.
* There is a problem if it is cloudy for few days.
* Their production causes pollution.

**Applications**

* Solar power plant is powering cities in most efficient manner.
* Solar panels could be used to generate electricity individually for each house especially in remote areas.