

Solar Energy Measurement Systems

Solar Energy Measurements

The efficiency of solar energy projects is based on a proper prediction of the energy yield. Solar energy intensity for a specific site can be calculated by means of PC software. These simulations provide a rough idea about the solar energy potential. More accurate data are achieved by measurements at the individual site. The sensors must have a response corresponding to the spectral sensitivity of the solar collectors.

Photovoltaic Solar Energy Plants

Photovoltaic solar modules transform the solar energy directly into electric energy. They use the spectral range of 400..1100 nm.



Global Radiation Sensors with Silicon Photodiode

This type of sensors measure the sum of both, direct and diffuse irradiance based on a horizontal surface.



Solar Energy Sensor

A solar energy sensor simulates the behaviour of a solar module. It is installed with the same inclination as the solar module. It is also used for power curve measurements of photovoltaic solar modules.



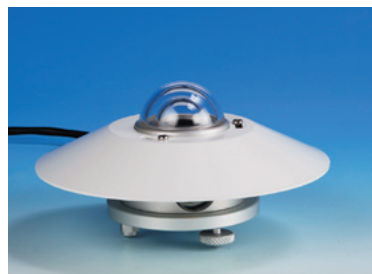
Solarthermal Plants

Solarthermal plants reflect the solar energy onto a pipe placed in the focus of a parabolic mirror. The fluid in the pipe evaporates and drives a turbine with a generator. Sensitivity of solarthermal collectors go from 300 to 2800 nm. Unlike photovoltaic modules, parabolic mirrors use the direct portion of the global irradiance.



Pyranometers and Sunshine Duration Sensors

Pyranometers measure global irradiance within a spectral range of 300..2800 nm.



Sunshine duration sensors record sunshine as direct irradiance $> 120 \text{ W/m}^2$.

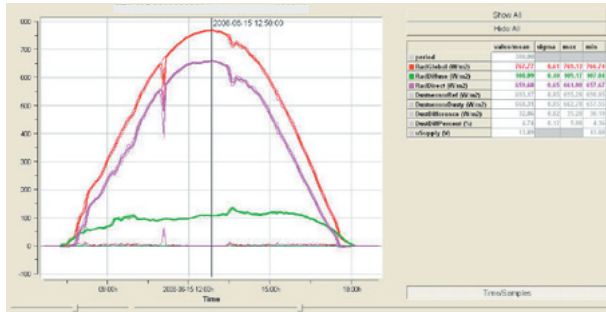
Measurements of global, diffuse and direct Irradiance

The most accurate sensor to measure direct irradiance is a pyrheliometer. Pyrheliometers must be oriented towards the sun by means of a solar tracking system.

Optionally, all three irradiance portions can be measured with 2 pyranometers. One pyranometer measures global



irradiance. The second sensor is covered from direct sun by means of a shadow ring or a tracked shadow ball. It measures the diffuse portion of global irradiance. The data logger **blueberry COMPACT** calculates in realtime direct irradiance as the difference between global and diffuse irradiance.



Meteorological Measurements

The solar energy measurement station records all parameters that influence the local solar energy potential:

- global, diffuse and direct irradiance
- sunshine duration
- temperature, relative humidity, barometric pressure
- wind speed and wind direction
- optionally, surface temperature and energy output of a solar collector

Sensors and data loggers comply to national standards (e.g., Turkish Met Office) and international standards (WMO, ISO, IEC, MEASNET). All sensors are available with calibration certificates from an independent laboratory.



Measured data are recorded by the **blueberry COMPACT** data logger. The data logger sends measured data automatically via eMail. It provides realtime access via Internet.



Wilmers Messtechnik

Since 1991, **Wilmers Messtechnik** develops and manufactures data loggers and measurement systems for wind and solar resource assessment, climate research and meteorological observations.

In addition to our data loggers **wilog306**, **blueberry NDL485** and **blueberry COMPACT** we integrate sensors and components from leading manufacturers. Many years of experience in production and installation of measurement hardware, in software and in processing of measurement data enables our team to provide qualified consultancy and support. A network of international partners ensures local service in many countries.



Wilmers Messtechnik GmbH
 Hammer Steindamm 35 • D-22089 Hamburg • Germany
 Tel.: +49(0)40-75 66 08 98 • Fax: +49(0)40-75 66 08 99
 info@wilmers.com • www.wilmers.com