SOLAR ENERGY RESOURCE ASSESSMENT

QUALITY THROUGH INNOVATION AND DESIGN

March 2017

Energy, Water, Environment.
Global Sustainable Solutions.

05 Solar Energy Resource Assessment - (SEMS)

SunTracker-2000

Solar energy is certainly one of the most important renewable energies available, and we use it under two forms: thermal and photovoltaic.

The Solar Energy Measurement System (SEMS) is the most advanced technical solution for the measurement of all the components of Solar Radiation:

- Direct Normal Irradiance (DNI)
- Global Horizontal Irradiance (GHI)
- Diffuse Horizontal Irradiance (DHI)
- Global Normal Irradiance (GNI)
- Solar Spectral Irradiance (SSI), plus AOD, Ozone and Water vapour columns

For solar energy resource assessment purposes and solar power plant monitoring, generally it is required to measure all the three components of the Solar Irradiance: DNI, GHI, DHI plus optionally GNI. This is made by the Remote Solar-Meteo Stations of the SEMS System, consisting of one METEODATA Data Logger, a Sun Tracker with Shadow Arm/Disc, plus one or two Pyrheliometers and one or two Pyranometers.

For the measurement of the Solar Spectral Irradiance (SSI) it is required to use a Solar Spectral Sensor as the Solar Spectral Meter Model GEO-SSIM, which is the most advanced, unique, efficient and affordable technical solution to measure solar spectral irradiance and DNI in near real-time, when mounted on our SunTracker-2000 or 3000 Series, as part of SEMS System.

The GEO-SSIM uses first quality silicon photodiodes, integrated with hard coated band-pass filters to measure the solar spectral irradiance in several narrow wavelength bands.

GEO-SSIM's proprietary software then uses these measurements to resolve the direct solar spectrum, in addition to major atmospheric processes, such as air mass, Rayleigh scattering, aerosol extinction, ozone and water vapour absorptions. This new approach has allowed us to dramatically reduce the cost of obtaining, precise, reliable solar spectral irradiance measurements in near real-time.

The GEO-SSIM is designed to provide the CSP, CPV and PV industries with a low-cost tool for accurately determining the solar spectra and DNI as part of on-site solar resource assessments and module performance characterization studies.

So the GEO-SSIM delivers the following information in real-time:

- Measuring range: 280 – 4000 nm [W/m2/nm]
- Total column ozone content: cm (spectral ozone absorption optional)
- Total column water vapour content: cm (spectral water vapour absorption optional)
- Aerosol Optical Depth (AOD): at 500 nm (spectral aerosol extinction optional)

Additional meteorological sensors for the measurement of ambient temperature, relative humidity, wind speed and direction, atmospheric pressure, precipitation, etc., can be also connected to the same data logger of the SEMS System. The values of all these meteorological parameters are stored at the data logger and transmitted to a Central Receiving Station or SCADA via GPRS/3G, Radio-Link, Fiber Optic or through Satellite networks.

Our Software Package manages all the communications, data transmission, and remote programming, creating a database with all the information for subsequent data analysis. The information can be also WEB Posted by our WEBTRANS Ubiquitas Internet Platform.

SunTracker-3000

In base of solar historical data Government agencies in many countries publish maps commonly collected together as a National SOLAR ATLAS, which serves to inform policy-making and encourage solar power development.

A good example of this is the Indian National Solar Network supplied by our Manufacturer to the C-WET Institution, consisting on more than 130 Remote Solar Meteo Stations configured by our METEODATA data logger, SunTracker-3000, Solar Irradiance and other meteorological sensors, covering the whole Indian country, transmitting data in near real-time via GPRS/3G to the Central Receiving Station. Numerical data and graphical information is WEB Posted by our Application WEBTRANS Ubiquitas Internet Platform (www.cwetsolar.com).

SOLAR RESOURCE ASSESSMENT NETWORK IN INDIA (> 130 STATIONS)

The thermal technology (CSP) concentrates sunlight, converts it into heat, and applies it to a steam generator or engine to be converted into electricity. Solar thermal works by using mirrors to concentrate sunlight. The concentrated sunlight is then used either directly as a source of heat, as in solar water heating, or to drive a heat cycle such as a sterling engine.

Concentrated Solar Power (CSP), also called Concentrating Solar Power or Concentrated Solar Thermal is using different types of concentrators such as: Parabolic trough, Enclosed trough, Fresnel reflectors, Dish Stirling and Solar power tower. For all these technologies ENEA Grupo® offers advanced remote Automatic Meteorological Stations for the measurement of the solar irradiance as well as the rest of meteorological parameters of interest.

The Photovoltaic (PV) form of solar power produces electricity directly by means of generally static and sometimes moving solar panels.

Solar Irradiance monitoring at PV solar power plants is also carried out by means of solar radiation sensors plus additional meteorological sensors connected to our data logger Model METEODATA-2000/3000 Series. Data is stored and transmitted to a local SCADA or to a distant Data Receiving Center, in which our software package is installed for system management, remote programming and database generation.

Concentrating Photovoltaic (CPV) form of solar power produces electricity directly also by means solar panels. Concentrating photovoltaic systems use lenses or mirrors to concentrate sunlight onto high-efficiency solar cells. Concentrating photovoltaic technology offers a number of advantages as for example: efficiencies greater than 40%, near ambient temperature operation, fast response, etc.

As in the case of CSP solar power plants, at CPV plants it is essential to measure the Direct Normal Irradiance (DNI). This parameter has to be measured by means of a first class Pyrheliometer mounted on our SunTracker-2000 or 3000 Series and connected to our METEODATA-3000C data logger for data recording and data transmission to a local SCADA or remote computer. Concentrating thermal solar power (CSP) and Concentrating Photovoltaic (CPV) technologies are poised to take its place as one of the major contributors to the future clean energy mix.