

**The National Renewable Energy Centre of Spain -CENER-** is a technology centre specialized in applied research and development as well as in the promotion of renewable energies. CENER is divided into six departments: Wind Energy, Photovoltaic Solar Energy, Solar Thermal Energy, Biomass Energy, Bioclimatic Architecture and Renewable Energy Grid Integration.

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## CHARACTERIZATION OF SOLAR RADIATION



### GENERATION OF REFERENCE METEOROLOGICAL YEAR (RMY)

A reference meteorological year (RMY) is an annual series of hourly radiation data representative of the long-term behavior of solar radiation. The resulting time series of the global and direct normal solar radiation is supplied along with by generic meteorological variables.

To estimate the long-term global radiation year, all available information is processed, for example:

- Public databases or with confirmed availability
- Measurement stations
- CENER databases based on numerical meteorological model output. This database includes additional meteorological information.
- Other databases supplied by the customer

As there are no measured databases with the necessary representativeness, this variable is estimated depending on site characteristics. Results of mathematical and/or physical **classic models** and **models specific** to the site are studied.



Total sky camera CENER Sarriguren

## MONITORING RADIOMETRIC STATIONS

The measurement station monitoring service includes application of the following quality control procedures:

1. Control of data recording time
2. Visual control of solar radiation variables
3. BSRN quality control

Graphic representation of the data recorded during the previous week is reported weekly, with observations and comments related to the application of quality controls.

Data are checked quarterly against own and historical data and a report is generated that includes an explanation of the methodology used and representative records (monthly, annual) at the site and their comparison with reference meteorological year data.

This comparison makes it possible to analyze the measured data in a long-term cycle and derive whether on the average it has been a particularly high or low year.

## GENERATION OF TYPICAL METEOROLOGICAL YEAR (TMY)

A typical meteorological year (TMY) includes generation of annual series of 5-10-minute data which are representative of the long-term behavior of the solar radiation at the site.

This meteorological year, unlike the reference year (RMY), is based on data measured at the specific site so the atmospheric and transient situations to which the plant will be subjected during real operation can be included.

Thus, the meteorological year must be considered "possible" for the concrete site, and in addition, for its production to be as similar as possible to the production of a plant at that site for a 20-year period.

The methodology for generation of the TMY is based on the construction of a complete year. This complete base year is made using available measured data at the concrete site after applicable quality controls (applied to the whole or during station monitoring.)

A file with the times corresponding to the global, direct and diffuse radiation as well as the other variables recorded at the site is delivered with the report.



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