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Global solar radiation on tilted surfaces in Tunisia: Measurement, estimation and gained energy assessments

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A very important factor in the assessment of solar potential for the installation of photovoltaic plants is the availability of global irradiation data measurements. Such data must be collected over a period of time longer than 11 years and must be accurate. In some countries, it is difficult to have databases of these measures. To overcome this problem, we propose, the use of numerical models to estimate the monthly, seasonally and annually solar energy irradiation (global diffuse and direct solar radiation), especially on tilted surface.

The results obtained from the numerical models are compared to the data collected from three regions on Tunisia: Bizerte (in the north), Nabeul (near to the north east) and Djerba (in the south). The actual measurements taken from the meteorological stations and the measurements generated by the numerical models are very close.

After the validation of the numerical models, we tried to calculate the best tilt angle for each period of the year to position a photovoltaic panel, in a given region, to reach maximum energy recovery. The practical validation, of the optimal tilt angle search and the adequate period, was conducted at the Research and Technology Center of Energy of Borj_Cedria. The obtained results are satisfactory and prove the reliability of the constructed numerical models.

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