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# Benchmarking of Typical Meteorological Year datasets dedicated to Concentrated-PV systems

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Accurate analysis of meteorological and pyranometric data for long-term analysis is the basis of decision-making for banks and investors, regarding solar energy conversion systems. This has led to the development of methodologies for the generation of Typical Meteorological Years (TMY) datasets. The most used method for solar energy conversion systems was proposed in 1978 by the Sandia Laboratory (Hall et al., 1978) considering a specific weighted combination of different meteorological variables with notably global, diffuse horizontal and direct normal irradiances, air temperature, wind speed, relative humidity. In 2012, a new approach was proposed in the framework of the European project FP7 ENDORSE. It introduced the concept of "driver" that is defined by the user as an explicit function of the pyranometric and meteorological relevant variables to improve the representativeness of the TMY datasets with respect the specific solar energy conversion system of interest.

The present study aims at comparing and benchmarking different TMY datasets considering a specific Concentrated-PV (CPV) system as the solar energy conversion system of interest. Using long-term (15+ years) time-series of high quality meteorological and pyranometric ground measurements, three types of TMY datasets generated by the following methods: the Sandia method, a simplified driver with DNI as the only representative variable and a more sophisticated driver. The latter takes into account the sensitivities of the CPV system with respect to the spectral distribution of the solar irradiance and wind speed. Different TMY datasets from the three methods have been generated considering different numbers of years in the historical dataset, ranging from 5 to 15 years.

The comparisons and benchmarking of these TMY datasets are conducted considering the long-term time series of simulated CPV electric production as a reference.

The results of this benchmarking clearly show that the Sandia method is not suitable for CPV systems. For these systems, the TMY datasets obtained using dedicated drivers (DNI only or more precise one) are more representative to derive TMY datasets from limited long-term meteorological dataset.