

# Assessment of the Energy Production by Means of the Clearness Index in Hybrid Systems

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## Abstract

The Clearness Index is defined as the ratio between the terrestrial global radiation on the horizontal surface to the extraterrestrial irradiation on the horizontal surface. This index presents different values in different geographical locations and could be taken into account for the hybrid system's energy balance and energy price calculations.

A PV-Gasoline hybrid system and its components and the energy flow between them will be simulated. During this work the simulation models were verified with measured data in a real hybrid system located in the city of Kassel, Germany.

Two simulation groups were determined:

- The first simulation group corresponds to a hybrid system with a fixed photovoltaic generator in an hourly radiation basis for a year.
- The second simulation group corresponds to a hybrid system with a two-axis track system in an hourly radiation basis for a year.

The following geographical locations were assessed: Albuquerque and Madison in the U.S.A., Kassel and Freiburg in Germany and Caracas in Venezuela.

The results and conclusions of the energy balance and the energy price for determined capital, maintenance and operation costs will be addressed.