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Assessment of the energy yield of thin-film solar modules in various climate conditions

Energy yield of the PV modules depends significantly on the outdoor weather conditions. In the project PVKLIMA meteorological data and outdoor PV module characteristics for four different module technologies (thin-film and crystalline modules) were measured over at least one year period in the regions with different climates: temperate, mediterranean, hot, tropical and desert climates (five test sites).

In the presentation, different models which are used for modeling the power of the PV modules will be considered, in particular, Karmalkar-Haneefa model. It is a simple four parameters model for fitting IV curves of a PV module.

Since the measurements of meteorological data for a given location are not always available different sources of data can be used. We consider ERA-Interim reanalysis database as a source of ambient temperature and wind speed and study the accuracy of the PV power output predictions in that case. The solar irradiance is retrieved from Meteosat Satellite images. The main focus of the work is the modeling of the PV power output using these sources of input data. The validation of different PV performance models is done for the measured data from five PVKLIMA test site.