

EGU21-7386

<https://doi.org/10.5194/egusphere-egu21-7386>

EGU General Assembly 2021

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Comparison of PV potential models for africa and their potential cost implications.

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We currently have more than 7500 planned mini grids, most of them in Africa. These will soon connect more than 27 million people and cost about 12 billion dollars ^[1]. Africa is in a good position for Photo voltaic (PV) mini grid optimization, receiving more than 1800 KWh/m² Global Horizontal Irradiation (GHI) every year ^[2], for most parts of the continent. However, the lack of a coordinated renewable energy monitoring and distribution network works against optimization of PV potential models ^[3]. This study shows the accuracy of existing photo voltaic potential estimators like renewables ninja ^[3], the National Renewable Energy Laboratory (NREL), International Renewable Energy Agency (IRENA), and the global solar atlas ^[2], by comparing the modeled values with long term measurements from ground solar stations. This is done for more than 20 stations distributed over Africa. Our results show best correlations ^[4] of up to 65.3% from version 2 of the Surface Radiation Data Set from Heliosat (SARAH) derived from the Photovoltaic Geographical Information System (PVGIS). However, we also have correlations as low as 16.2% for models commonly used in off grid simulations. The sensitivities of the modeled cost of a mini grid to the variation in PV potential were tested ^{[5][6]} using the statistical range in sourced PV potential from the different estimators, giving us cost variation of more than 2.8% that may arise from the different sources.

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