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Estimation of Solar Power Generation of Aquavoltaic System through Field test and Simulations

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ABSTRACT

Solar radiation and wind-rich salt farms have high potential for solar power generation. In this study, 1.5kW test beds were installed to develop an aquavoltaic system at the salt farm evaporation site as a field test in Muan-gun, jeollanam-do, republic of Korea. SolarPro PV (Lapplace System, USA) was employed to predict the power generation of an aquatvoltaic system. The test was conducted between January and December 2018. The test group had underwater type 0° (water depth 2cm) while a control group had land-based 30° and 0°.. For more accurate prediction, a temperature of the installed module was monitored ., the forecast and comparison of power generation through transcription simulation shows that the annual generation capacity of 30° land type and 0° water type was similar (aquavoltaic compared to land type is about 97%), 1962 and 1910kWh, respectively. However, the power generation efficiency of the aquavoltaic is predicted to be higher by up to 118% than that of the land type, and the cooling effect is believed to contribute to improve the power generation significantly compared to the solar absorption loss caused by the seawater, which was about 2cm high. In addition, it is predicted that the power generation of the aquavoltaic will decrease significantly over the land type since September, mainly due to the effect of the angle of incidence as the seasons move from summer to autumn.

Keywords: Aquavoltaic, Field test, Module, Salt farm, Simulation