New approach to determine mathematical equation for optimum tilt angle of solar panel in Indonesia and its techno economy impact

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Abstrak

The findings in this study refute mathematical equation in determining the optimum angle of the solar panel installation provided by Duffie and Beckmann, Heywood, Lunde, Chinnery, Lof & Tybout, and Garg. Existing research has been determining the optimum tilt angle of the solar panel with a subtropical location perspective. Influence degrees latitude (Y) and longitude (X) to the optimum angle of solar panel installation in the territory of Indonesia represented by the equation -0,0093 X + 1,3042 Y. RMSE value is 1,88 and R2 value is 0,928. In this study, a mathematical equation based on the coordinates of the location to determine the optimum tilt angle of the installation of solar panels in Indonesia and analyze its impact on the technical and economical aspects. The maximum potential economic benefits gained from the installation of solar panels at the optimum angle in Indonesia, assumed Feed in Tariff in Indonesia is US$ 0,25, with a capacity of 1 MW solar and assumed to have a production life of 20 years, are US$ 740.839,66.