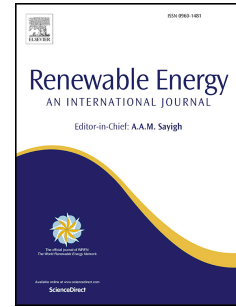


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Investor Focused Placement and Sizing of Photovoltaic Grid-Connected Systems in Pakistan

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Abstract

The world is moving toward renewable rich electricity generation systems. Pakistan being the sixth most populous country in the world and having median age of 21 years requires extensive resources for the next couple of decades to fulfill its energy requirements. Punjab is the largest province of Pakistan with 60% of total population and consumes about 80% of the electricity. The province does not have a lot of hydro and wind potential, but it has tremendous opportunity to utilize solar energy to fulfill its energy needs. In this paper, we explore the solar energy production possibilities in the province. Our objective in this paper is to find the best locations to install utility-scale solar power plants to fulfill 30% of energy needs by 2030. In addition to the technical feasibility of solar PV power plants, we also look at the economic aspects of such plants. To this end, we look at the complete life cycle of a solar PV power plant. Using data from an existing solar PV power plant we derive Profitability Index (PI) of various possible locations. According to our results, the transmission line losses range between 0.7% to 12.2% depending on the load and length of the transmission lines. Using data from transmission line losses the PI of potential utility-scale solar PV sites ranges between -9.11% to 69.65% based on various economic factors. These results provides detailed information on the best places to establish utility-scale power plants from technical as well as economic perspective.

Keywords: Investor-focused, Photovoltaics, Profitability Index, Distributed Power Generation, Transmission Line Losses.

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