

Abstract

During the last period, solar energy gained a lot of attraction and is expected to be the replacement for non-renewable energy due to its great potential and advantages, one of these advantages is that solar energy is scalable, this means it can be used on an industrial scale or lesser, another advantage is that solar energy is a clean source, this means it causes no pollution to the environment, in addition solar energy is the future, as its cost is going down and non-renewable energy is becoming more and more expensive. This project aims to conduct a comparative analysis of the performance of bifacial and monofacial solar panels under diverse conditions. The investigation involves examining the influence of varying albedo levels and the type of surface beneath the PV panels, including sand, white paint, black asphalt, or artificial grass. The renowned software tool PVsyst will be employed to simulate and analyze PV systems.

The location selected for this study is An-Najah National University in Nablus, Palestine. The PV panels will be oriented towards true south, and a tilt angle of 28° will be employed. Through meticulous simulations and thorough analysis, this research seeks to provide comprehensive insights into the contrasting performance characteristics of bifacial and monofacial solar panels across different environmental contexts. The ultimate objective is to contribute valuable knowledge regarding the suitability and optimal utilization of these PV technologies. The study aims to evaluate and compare the electrical output, energy yield, and overall performance of bifacial and monofacial solar panels under different scenarios. The project will analyze factors such as the energy gain achieved by the bifacial panels due to rear-side irradiance reflection, the impact of albedo on the performance of bifacial panels, and the influence of shading on both panel types.