

***Republic of Iraq
Ministry of Higher Education
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Department of Laser and
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***Performance Analysis of PV Solar System with Different
Configurations***

*A Thesis Submitted to
The Department of Laser and Optoelectronics Engineering / University of
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Of Master of Science in Optoelectronics Engineering*

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ABSTRACT

The photovoltaic section of a grid-connected photovoltaic system design has been completed in this thesis. The main purpose was to show two system alternatives that share the same power and area constructed at Baghdad - Ministry of Electricity/Training and Energy Research office. The design of the proposed configurations was to enhance the performance of selected parameters for the photovoltaic system.

A numerical investigation was performed by using HOMER software to study the result of changing the Orientations (East, West) and tilt angles (10° and 15°) compared with conventional orientation (South), the experimental part was done according to the results obtained from the software. While for the final aspect of the result, a load was added to estimate the interesting scenario that was required for the proposed configuration design.

The result for the power production curve is divided into three-time intervals along the day morning (6:00-11:00) am, noon (11:00 am-1:00 pm), and afternoon (2:00-6:00) pm which illustrates the energy consumed through the day, while for the irradiance was taken for a full day from sunrise to sunset.

On the other hand, each of the solar irradiance (W/m^2), energy production (Wh), and photovoltaic power (W) of the proposed design (East, West) in the simulation and experimental work are higher in (daily and monthly) measurements during the months (April, May, June, July, August, and September) are (13%, 10%, 22%, 18%, 12%, and 3%) respectively. In conversely the usual orientated (South) for daily or monthly performance that considered poor compared with (East, West). As well as concerning to the annual energy production was (1428 kWh/kW_p and 1459 kWh/kW_p) for East, West, and south respectively.

After analyzing the performance results, among the three alternative systems, the researched design can cover the exact area under the curve according to the peak load needed. There is no need for adhering to a specific direction. This means that not only the high noon PV production matters but distributing the panels according to what is needed is considered important, for instance, the morning demand or afternoon.