

**A STUDY OF EFFECT TO THE WATER PUMPING SYSTEM POWERED BY PV SOLAR BY
REMOVING THE BATTERY STORAGE**



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5. Report

5.1 Proposed Executive Summary

A global awareness of the environmental challenges facing society has driven institutions to call for the use of renewable energy on a massive scale. Photovoltaics (PV) system is very popular in the renewable energy. Water pumping system powered by PV solar has been implemented around the globe as an alternative electric energy source for remote locations since solar PV was invented. According to Meah, Fletcher and Ula (2008), the solar PV systems are cost effective in many remote applications. However, there are inconveniences associated with these systems such as the maintenance and replacing for the battery storage system are quite high. The lifespans of the battery storage that usually been used for Off-grid system in between 5 to 15 years, which means the battery storage needs a replacement at least to match the lifespans of the PV module. This research is to study the performance and practicality of the Water Pumping System Powered by PV Solar by removing the battery storage part and to study the level of the solar irradiance that can powered up the system. The methods to achieve all the objectives is by removing the charge controller and battery storage from Water Pumping System powered by PV Solar. So, the design of the system just consists only the PV module and water pump only. The flow rate of pumped water is dependent on incident solar radiation and size of PV array. A properly designed PV system results in significant long-term cost savings as compared to conventional pumping systems. By removing of the battery storage from the system might reduce the cost to build water pumping system and can eliminate the maintenance's cost for battery storage.

5.2 Enhanced Executive Summary

The deficit in electricity and high diesel costs affects the pumping requirements of community water supplies and irrigation therefore using solar energy for water pumping is a promising alternative to conventional electricity and diesel based pumping systems. Water pumping system has a long history, so many methods have been developed to pump water. Manual pumping is the common method for many years, but it is impractical for many applications, such as unmanned or remote wells. Many pumping systems require an independent power source like an engine or electric power. Engines can provide the higher amount of the water, but they are requiring the fuel and regular maintenance. In order to minimize the cost, the alternative source is being used such as solar energy. This paper presents the performance review of water pumping system powered by photovoltaics (PV) solar. The purpose of this article is to review the performance of the water pumping system based on the model and experiment that were conducted. This paper also discuss about the optimum sizing of PV module, batteries, flowrate of water, and also the characteristic of charging and discharging pattern. The method of sizing were adapted from SANDIA National. The system based on the off-grid system configuration which contains PV module, charge controller, batteries, and load. Based on this research, the method of sizing from SANDIA National can be used to set up for off-grid water pumping system and it able to support the system for 2 days autonomy

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