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Study of Designing Solar Irrigation System

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Abstract - *In recent years, the use of pressurized pumping is improved the efficiency but it also increased the cost of the system. The cost of the system is not reasonable for farmers as well as other users. By using renewable energy source we can reduce the cost considerably. The project includes the simple design of irrigation system in which the energy from sun is converted into electrical energy and it is used to lift the water from source. This system avoids the use of conventional energy source. This method results in reduced cost of energy.*

Key Words: Solar Panels, Photoelectric Effect, DC Pump, Total Dynamic Head.

1.INTRODUCTION

Photovoltaic board are utilized in remote territories where the utilization of an elective vitality source is wanted for horticulture reason. The PV framework result in cost decrease if appropriately structure

The segments utilized in sun oriented water system framework are as per the following:

(1)PV Panels

(2)An electrical controller

(3)Dc pump

The data required to plan water system:

1. The sun power accessible in the site.

2. The volume of water required to pump.

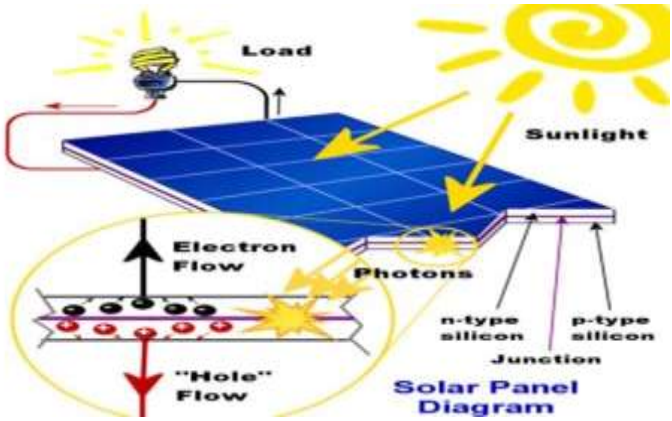
3. Total Dynamic Head required for the pump.

4. The Water source accessible.

5. System Layout.

1.1 Photoelectric Effect.

It is characterized as the transformation of sun's energy into electrical energy. At the point when the photons from sun's radiation falls on silicon or metal film, the electrons in the material energizes and hops starting with one layer then onto the next.



1.2 Solar Radiation, Solar Insolation, Solar Irradiation

Sun powered Radiation is the rays from the sun that reaches the earth. It is calculated in Kilowatt per square meter. The earth gets about 1.35 KW/m2 of sun radiation. Sun powered Irradiation is the measure of rays which are incident on sun powered board. Sunlight based Insolation is the measure of sun oriented irradiance estimated after some time period.

2. SOLAR PANELS

Solar powered board is comprised of arrangement of sunlight based cells. Each sun based cell is comprised of uniquely arranged layer of semiconductor material which produces DC power when presented to daylight. The semiconductor layer is crystalline film. Crystalline sunlight based cell are made out of silicon and has productivity upto half. Metal film sun powered cell has effectiveness upto 8-11%. PV boards must be organized in exhibit and associated by electrical wiring to convey capacity to a pump.

3. DESIGN PROCEDURE

3.1 PHOTOVOLTAIC PANELS

Photovoltaic (PV) boards are regularly utilized for rural tasks, particularly in remote zones or where the utilization of an electricity source is wanted. Specifically, they have been exhibited on numerous occasions to dependably create adequate power straightforwardly from sun powered radiation (daylight) to control animals and water system watering work. At the point when appropriately planned, these PV panels can likewise result in huge long haul cost investment funds and a littler ecological impression contrasted with regular power frameworks. The volume of water pumped by a solar controlled system in a given interim relies upon the aggregate sum of sunlight accessible in that timespan. In particular, the rate of the water pumped is dictated by both the force of the sun rays accessible and the measure of the PV panels used to change over that sun rays into DC energy.

3.2 DESIGN PROCESS

Stage 1:- Water Requirement

The initial phase in structuring a sunlight based controlled water pump system is to decide the general water necessity for the task. This should be possible to some degree by utilizing the normal water prerequisite. Neighborhood conditions ought to be mulled over. The task's water prerequisite will change consistently.

Stage 2:- Water Source

The water source accessible on the site is as of now accessible or we need to make new water source. In the site that the water source is as of now accessible, at that point different parameters like water level, quality of water is determined by visiting the site.

Stage 3:- System Layout.

The following stage for planning the system is system layout. In this progression the different part and their areas are resolved on the site. The segments like PV boards, water source, pump, tank and their heights are determined.

Stage 4:- Water Storage.

A water tank is regularly a fundamental component in a monetarily practical solar irrigation system. A tank can be utilized to store enough water. The tank ought to be measured to store at any rate a three-day water supply. Different tanks might be required if a substantial volume of water is to be put away. The region where the tank is to be put must be deprived of all natural material, sharp items, for example, rocks. The ground should then be leveled. Six crawls of very much compacted ¾ - inch leveling rock underlain by a geo material texture ought to be given as a base to the water tank. On the off chance that a raised stage or stand is required to give satisfactory gravity prompted weight to the water conveyance framework to work, the stage or stand should be assessed by a certified designer.

Stage 5:- Solar Panel Insolation and PV board area

Proper information ought to be utilized to decide the measure of sun based insolation (peak sun hours) accessible at the site. An on location examination is suggested for locales where sunlight based insolation information are missing or sketchy. The examination ought to be directed by a certified engineer and incorporate information confirming the real sun powered insolation at the site. The boards should be south facing with no shading in their region so as to accomplish full sun presentation. Be that as it may, incomplete shading (e.g., shadows from tall trees) out there amid the early morning or late evening might be unavoidable. The impacts of any shading present ought to be viewed as while deciding the measure of accessible sun rays. Likewise consider the potential impacts that the slant and part of future shading because of proceeded with tree development may have. The sun powered exhibit ought to be set as near the pump as conceivable to limit the electric wire length (and in this manner any vitality misfortune), just as establishment costs.

Stage 6:- Design Flow rate for the Pump.

The plan flow rate for the pump is determined by isolating the every day water needs of the activity by the quantity of peak sun hours out of each day (decided in Step 5).

Stage 7:- Total Dynamic Head(TDH) for the pump..

The TDH for a pump is the total of the vertical lift, pressure head, and friction head. Flow from the capacity tank to the point of utilization (for example the trough) is ordinarily gravity based. Accordingly, friction losses between the capacity tank and the purpose of utilization are neglected from the pump and shouldn't be represented when estimating the pump.

Stage 8:- Pump Selection and Associated Power Requirement.

The Pump ought to be chosen using pump characteristic curve, to know that the pump can convey the required flow rate (Step 6) against the known TDH (Step 7). The power required for the pump can be calculated from these curves for a given flow rate and TDH (pumping head) to help make the pump required, just as the proper PV board determination. The system designer may need to inquire about the distinctive DC pump available at the site of the system. The producer's particular sheet contains the important data to choose the right pump.

Stage 9:- PV Panel Selection and Array Layout

When the power required (Step 8) for the chosen pump is known, this can be utilized to choose the PV panels or numbers of panels required to supply that power. At the point when various boards are required, they should be wired in arrangement, parallel, series or a mix of arrangement parallel and series to meet both the voltage and ampere required of the pump. The power yield of the individual boards can be included to decide the complete power they produce.

4. CONCLUSION

Thus the objective of designing a solar irrigation system is to increase the operating time of pump and reducing the power of pump for better efficiency. The designed system results in cost reduction and better use of resources. The designed system is useful in remote locations for farming purpose.

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