

New Era method of Water pumping for Agri-Applications

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Abstract: -- Shortage of power combined with the expanding lack of quality of rainstorm rainstorms and predominant expensive diesel pumping frameworks represents a monetary hazard to little and peripheral agriculturists. A mind-boggling set of elements including a dangerous atmospheric deviation, aggressive land utilize and absence of fundamental framework is making new difficulties for India's huge agrarian populace. The consistently expanding crisscross amongst request and supply of energy, and power specifically, is posturing challenges particularly to farmers in remote territory. Agrarian innovation is evolving quickly. Homestead apparatus, cultivate building and creation offices are always being made strides. Rural applications reasonable for photovoltaic (PV) arrangements are various. These applications are a blend of individual establishments and frameworks introduced by service organizations when they have discovered that a PV arrangement is the best answer for remote farming need, for example, water pumping for products or animals. A sunlight based controlled water pumping framework is comprised of two essential parts. These are PV boards and pumps. The littlest component of a PV board is the sun oriented cell. Sun-powered pumping can help balance the cost of customary water system fills. The all the more frequently a pump is run, the more noteworthy the open door for investment funds from sun-based. Sunlight based pumps are dependent only on the sun to give control and consequently work just amid light hours unless combined with a battery/stockpiling framework. Sun-powered pumps might be a decent choice for bringing down water volume and daytime water system frameworks. So far, reasonable sun based innovation can't supply adequate energy to draw enough water for the substantial scale surge water system.

Index Terms — Solar Energy, PV Cells, Water Pump set, Water.

I. INTRODUCTION

Generally, diesel-controlled pumps are utilized as a part of regions where interfacing with the power medium is upsetting. Sun oriented photovoltaic (PV) frameworks can be an attractive reciprocal energy source sent close by diesel draws in ranges with a lot of daylight and where the cost to run electrical cables is high. Photovoltaic frameworks have the advantage of being multipurpose, with limit extending from a couple of watts for applications, for example, mechanized ranch entryways or clocks, to many kilowatts for the property and homestead sheds. As opposed to having one extensive concentrated framework, various circulated PV frameworks can be sent at pump destinations. Sun oriented pumping frameworks are most appropriate for exchange operations (to direct water out of bore, for example, or exchange it from dam to capacity tank) in which pumps run consistently for the majority of the day Applications that expect water to be pumped during the evening are not too suited to sun oriented controlled pumps, as capacity arrangements, for example, batteries and capacity tanks can add fundamentally to the cost of the framework. In spite of the fact that these vitality stockpiling arrangements can be costly, they take into account more noteworthy use of the PV framework. Contingent upon the application, supplied water can be bolstered by gravity

when there is inadequate daylight to control the sun oriented pumps, along these lines diminishing diesel utilization further.

II. WORKING OPERATION

An average sun powered fueled pumping framework comprises of sun based boards associated with an electric engine that runs a drag or surface electric pump. A sunlight based pumping arrangement accessible from your water system provider will ordinarily supply a DC pump that is associated straightforwardly to the sun oriented board and does not require a DC/AC inverter. DC brushless engines additionally offer high productivity levels. In situations where an AC pump is now set up, an inverter is required between the PV board and the engine to change over from the immediate current produced by the sun based board to the substitute current required by the electric pump engine. On account of a sun based diesel half breed framework, sunlight based pumping framework is introduced to supplement the current diesel pump operation. The sun based pump can either pump specifically into the framework to balance diesel direct operation amid daytime, or draw water to a capacity tank or store (which is a piece of the sunlight based pumping arrangement) so water is additionally accessible on shady days and during the evening[1].

The proposed New Era method of Water pumping for Agri-Applications is shown in the below figure 1

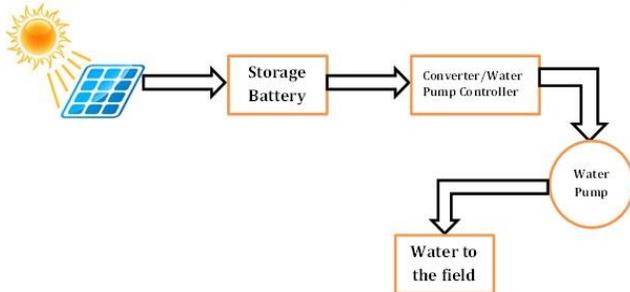


Figure 1. Proposed New Era Water Pump-set arrangement. There are two fundamental sorts of sun oriented controlled water pumping frameworks, battery-coupled and coordinate coupled. An assortment of elements must be considered in deciding the ideal framework for a specific application. Battery-coupled water pumping frameworks comprise of photovoltaic (PV) boards, charge control controller, batteries, pump controller, weight switch and tank and DC water pump. The electric ebb and flow created by PV boards amid light hours charges the batteries, and the batteries thus supply energy to the pump whenever water is required. The utilization of batteries spreads the pumping over a more drawn out timeframe by giving an unfaltering working voltage to the DC engine of the pump. In this manner, amid the night and low light periods, the framework can in any case convey a consistent wellspring of water for domesticated animals. Here we are going with battery operated water pumping system; with this we can access the water facility for the filed whenever we wanted.

III. NEW ERA METHOD OF WATER PUMPING COMPONENTS

The major components of the new era method of water pumping are as follows;

PV Modules

Solar PV Modules electric frameworks are used here to collect the solar energy from the sun. A solar array can be fixed or can have a tracking system that follows the sun and increases energy yield. The key measure of effectiveness of a solar PV system is the capacity factor, i.e. the ratio between the average power actually provided by the solar panels and the power output specified on the nameplate.

Mounting Structures

There are two approaches to mount sun powered modules either on a settled structure or on a following structure. Settled mounts are more affordable and endure higher breeze stacking yet must be precisely arranged so they confront genuine south.

An exhibit can without much of a stretch be mounted on a trailer to make it convenient. A following exhibit takes after the sun over the sky.

Pumps

DC water draws when all is said in done utilize 33% to one-a large portion of the vitality of traditional AC (rotating current) pumps. DC pumps are classed as either removal or centrifugal, and can be either submersible or surface sorts. Removal pumps utilize diaphragms, vanes or cylinders to seal water in a chamber and power it through a release outlet. Radial pumps utilize a turning impeller that adds vitality to the water and pushes into the framework, like a water wheel.

Submersible pumps, put down a well or sump, are exceedingly solid since they are not presented to solidifying temperatures, needn't bother with unique insurance from the components, and don't require preparing. Surface pumps, situated at or close to the water surface, are utilized principally to move water through a pipeline. Some surface pumps can grow high heads and are appropriate for moving water long separations or to high heights.

Converter/ Water pump Controller

The pump controller shields the pump from high-or low-voltage conditions and boosts the measure of water drew in not as much as perfect light conditions. An AC pump requires an inverter, an electronic part that proselytes DC power from the sun based boards into AC power to work the pump.

Other Accessories

A float switch kills a pump on and when filling the stock tank. It's like the buoy in a latrine tank however is wired to the pump controller. Low water cut-off cathodes shield the pump from low water conditions in the well.

IV. FACTORS TO BE CONSIDER DURING THE INSTALLATION AND OPERATING TIME

Each pumping and stock-watering circumstance is exceptional. The normal consumer is probably going to be scared by the possibility of measuring and outlining a sun based pumping framework, and most individuals require the help of a qualified sun oriented merchant. By and large merchants are anxious to offer assistance[2].

Keeping in mind the end goal to size and plan a framework;

- ✓ How much water you require.
- ✓ When you require the water.
- ✓ Whether your water source is a stream, lake, spring, or well.
- ✓ Water accessible in gallons every moment (gpm).
- ✓ Well profundity.
- ✓ How far the water should be pumped, furthermore, with what height pick up.

- ✓ Water quality issues (e.g., residue or high mineral substance) that may harm the pump.
- ✓ How much volume is accessible away tanks and how the tanks are masterminded

V. STEPS IN SIZING A SOLAR PUMPING SYSTEM

Determine the total dynamic head (TDH) of the system using flow-rate requirements (L/min), pipe length and diameter, and height between suction and discharge points. $TDH = \text{static head} + \text{dynamic head (line friction)}$. Determine the daily flow (m³/day) requirement and the expected number of weeks per year of pumping [3]. Depending on the water source, choose a surface or submersible (bore) pump. Using manufacturer pump curves, select a pump of adequate size to meet head and flow requirements. Knowing the power requirement and running time for the selected pump, determine the electrical load profile of the pumping operation to then size the solar PV system. Refer to supplementary paper, solar photovoltaics. The capacity of the storage dam or tank is determined by the flow rate the process requires and the storage time, which can be equal to amount of time outside daylight hours for which the pump normally runs. Consider using battery storage or combinations.

VI. CONCLUSION

Since the expansion in cost per increment in unit control yield of a photovoltaic outline is more prominent than that for a diesel, gas, or electric framework, photovoltaic power is more cost aggressive when the water system framework with which it works has a low aggregate dynamic head. Consequently, photovoltaic power is more cost-focused when used to control a miniaturized scale water system framework when contrasted with an overhead sprinkler framework. Photovoltaic control for water system is taken a toll aggressive with conventional vitality hotspots for little, remote applications, if the aggregate framework plan and use timing is deliberately considered and composed to utilize the sun based vitality as proficiently as would be prudent. Later on, when the costs of fossil fuels rise and the monetary preferences of large scale manufacturing lessen the pinnacle watt cost of the photovoltaic cell, photovoltaic power will turn out to be more cost-aggressive. We are expressing our proposed work in this paper and we are working on practical difficulties and also we planning to commission this unit in our college campus. After installing and testing results will be discussed in the next article.

REFERENCES

- [1] PDF Article Potential for Solar PV Water Pumping for Irrigation in Bihar.
- [2] www.google.com
- [3] www.grundfos.com/content/dam/Global%20Site/Industries%20%26%20solutions/waterutility/pdf/Grundfos_Water-Utility_Solar-SP-Pumps_Brochure.pdf