

SOLAR-POWERED IRRIGATION SYSTEM FOR AGRICULTURE

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INTRODUCTION

For most of the countries in the world, agriculture offers a respectable occupation. Solar energy is not only a reliable energy source for commercial and residential purposes, but also for agricultural purposes. That is why, for different crop production, proper irrigation of the fields is important. In areas with no or inadequate water access, a solar-powered irrigation system (SPIS) is the solution. This irrigation system is ideal for most parts of the world with distinct dry seasons and plenty of sunlight. With least to no human intervention, solar-powered pumps will automatically pump water from the deep well because the system uses a moisture sensor that regulates the flow of water upon detection of the level of soil moisture content required for a certain crop. Flooding will be avoided and water will be saved. This method of irrigation is more beneficial to farmers because it will minimize their tiring jobs by manually measuring the humidity of the soil of their farms. To measure the moisture, copper wires are situated or inserted into the soil. It will send data to the microcontroller when the sensor detects either low or high soil moisture. Currently, several regions and countries are investing in solar-powered irrigation systems, including Europe, Asia, California, South Africa, and America, etc



OPERATING SYSTEM OF SPIS

The Solar Powered Irrigation System is simple to operate. Solar panels will supply electricity for a motor pump that delivers water either directly to the irrigation canal or to an elevated reservoir that can be used for the drip method.

The important SPIS components are:

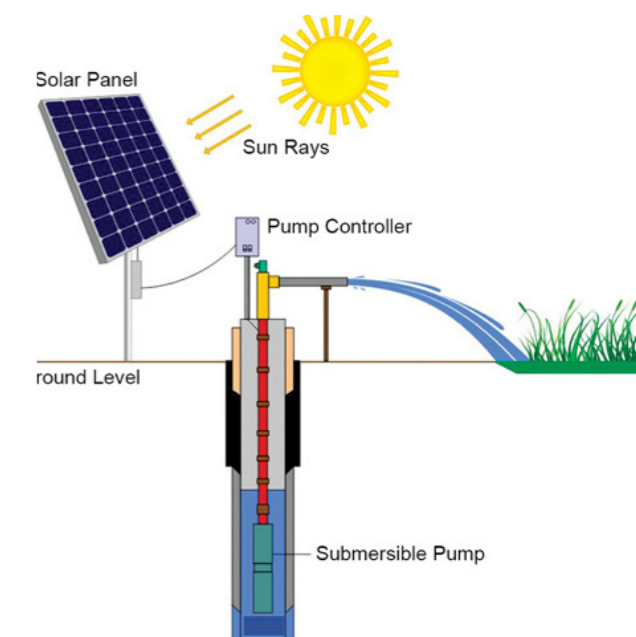
• The Solar Panels

Consist of solar or photovoltaic cells that convert sunlight into electricity. Electric current flows through the wire that is connected to the back of the solar cell which provides the energy needed to operate the motor pump unit.

• The Pump

1. The surface pump uses a pipe that is installed right next to the surface water source and suck water up that will pass through the other end of the pipe.
2. The submersible pump is installed or submerged

under boreholes and deep wells with a depth ranging from 10-120 meters. It can operate in automatic mode using control switches (eg. float switches).



• Reservoir

A reservoir is optional but can be necessary to store water that pumped over the day and can be used in a drip irrigation system.

• The Irrigation System

1. The drip method (simple and no wastage of water).
2. Sprinkler (traditional way of irrigation).

ADVANTAGES

• Low operating cost

Farmers can save on expensive non-renewable energy, such as gas, diesel, and commercial grids, because solar power is absolutely free.

• Secure and clean

SPIS is environmentally friendly because compared to conventional water pumps that use diesel and coal, it does not need fuels that emit toxic substances such as carbon dioxide, which can lead to more environmental damage and noise pollution.

• Accessible and sustainable

Solar energy is entirely sustainable and available as enough sunlight enters the planet.

• Reliability

Solar panels can have a life span of at least 25 years.

• Time-saving

Solar water pumps require very low maintenance compared to conventional water pumps, allowing farmers to save time because irrigation operations are no longer done manually.

- **Increasing the production of crops**

SPIS has the capability to produce higher yields than rain-fed agriculture, particularly in areas with less to no rainfall.

- **Increase the value of property**

Studies have shown that SPIS properties will enhance the resale value of the asset and make the property attractive to buyers.

CONCLUSION

In agriculture, there are three essential areas: soil, sun, and water. The soil can be replaced by hydroponics. The sun can be replaced with artificial light. But for water, there is no substitute. Farmers have no access to a reliable source of irrigation water, particularly in rural areas. The Solar-Powered Irrigation System is one promising solution to the issue. The Solar-Powered Irrigation System (SPIS) is an automatic irrigation system where the irrigation pump is powered by solar-powered electricity transformed by solar panels or photovoltaic cells. Installing an SPIS is a costly initial investment, but compared to traditional water pumps, it is actually a long-term money-saver. It has a certain significance, not only for the economy of a nation but especially for the environment.

