

# Solar Pumping



- ✓ Simple installation
- ✓ Could be integrated to existing solar pump
- ✓ Can extract water from several hundred meters depth
- ✓ Very Low Water Extraction Cost
- ✓ Eligible for Kafalat and NEEREA financing mechanism
- ✓ Low pay back period
- ✓ No running cost and no maintenance
- ✓ Ecological (Zero CO<sub>2</sub> and toxic gases emission)
- ✓ Noise free
- ✓ Create shading areas (Storage rooms, cattle rest areas...)

## **Application:**

- Water pumps ( Well water extraction, drinking water ...)
- Agriculture (Irrigation)
- Residential compounds





## Introduction:

In agriculture the most essential element is Water. This precious element is usually extracted from the earth depth where it is pumped through pipes to irrigate the cultivation.

It is common to use diesel to power generators in agricultural operations. The cost of the diesel based water extraction is relatively high (0.12\$/m<sup>3</sup>).

While these systems can provide power where needed there are some significant drawbacks, including:

- Fuel has to be transported to the generator's location, which may be quite a distance over some challenging roads and landscape.
- Their noise and fumes can disturb livestock.
- Fuel costs add up, and spills can contaminate the land.
- Generators require a significant amount of maintenance and, like all mechanical systems; they break down and need replacement parts that are not always available.

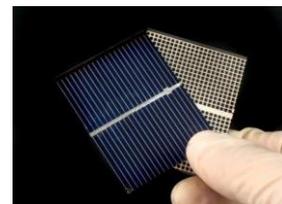
For many agricultural needs, the alternative is solar energy. Modern, well-designed, simple-to-maintain solar systems can provide the energy that is needed where it is needed, and when it is needed. These are systems that have been tested and proven around the world to be cost-effective and reliable, and they are already raising levels of agricultural productivity worldwide

In this paper we introduce an attractive solution to integrate a PV system to the existing Water Pumping system in order to lower the Energy bill by up to 80%.

## What is Photovoltaic Technology?

The solar cells in a PV module are made from semiconductor materials. When light energy strikes the cell, electrons are knocked loose from the material's atoms.

Electrical conductors attached to the positive and negative sides of the material allow the electrons to be captured in the form of a D.C. current. This electricity can then be used to power a load, such as a water pump.



## System components:

The PV pump topology is very simple:

- The **PV Modules** produce DC current.
- The **Mounting Structure** to hold the PV modules
- The Solar **Variable Frequency Drive (VFD)** converts the DC current into AC
- The **Pump** that extracts water from the source (already existing pump)

## How does it Work:

The PV panels produce DC current that is proportional to the amount of sunlight. The VFD converts the power into suitable AC electricity to supply the pump. The extracted amount of water will then be proportional to the amount of sunlight. This means that in the morning, the water flow will increase gradually to reach its maximum at noon than will decrease until zero at dusk.

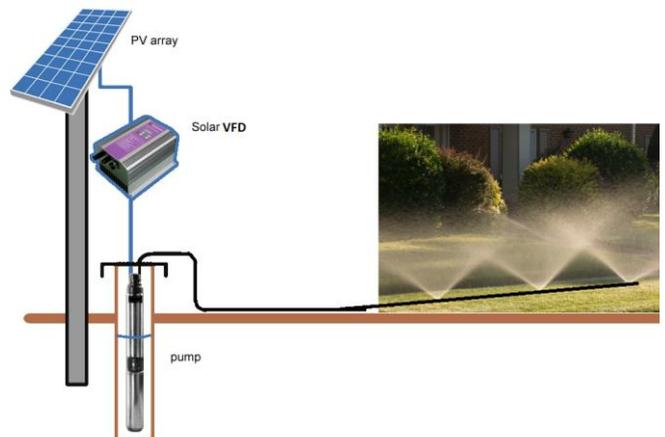
The design will be made to provide the needed amount of water every day.

All systems are equipped with a change over switch that allows the system to work on the existing diesel generator in case of night operation.

Two system configurations are possible:

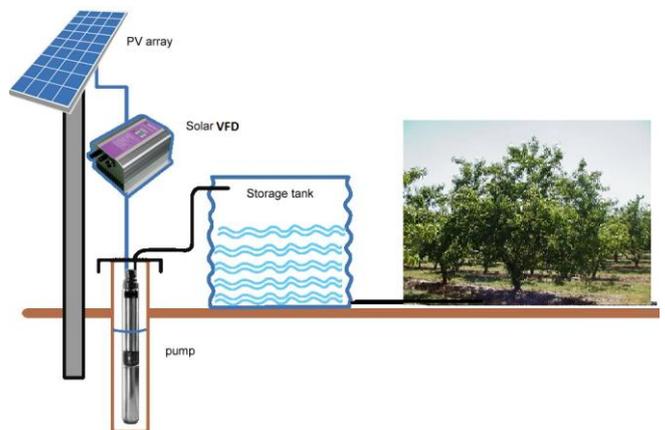
- **System without storage tank:**

The water comes out directly from the pump to the irrigation point. The system is cheaper than the storage tank system and requires a diesel generator for night operation



- **System with storage tank:**

The water is stored into a big storage tank in order to be used when needed. This will allow an all-time operation. The water stored in the backup tank will circulate by gravity to the desired irrigation point.



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