



**ISI**

SOLUCIONES  
INDUSTRIALES  
INTERNACIONALES

# **SOLAR PUMPING AND IRRIGATION**



**SOLAR PHOTOVOLTAIC PUMPING**  
SEES (Solar Energy Efficiency System)

**OUR SOLUTION : PRESENTATION**



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## **SOLAR PUMPING AND IRRIGATION**



### Agriculture and Energy

Electrical energy plays a key role in irrigation facilities, the cost of electricity or diesel consumption is a major problem for the industry. In recent years, these costs have an increasing trend, and therefore, it is more and more difficult to maintain the profitability and competitiveness of exploitation.

Pumping water through renewable sources is a serious alternative to the current cost of electricity or diesel generators for irrigation. In particular, photovoltaic solar energy is already in the vast majority of isolated systems, it is the most efficient solution, providing benefits quite remarkable:

- Free energy.
- Reduced costs and improved competitiveness.
- Reduced maintenance costs.
- More hours of watering in the months when it is most needed.

# SOLAR PUMPING AND IRRIGATION

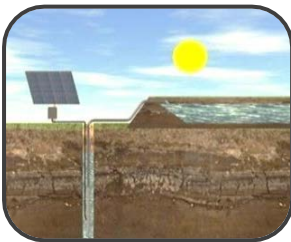
## Solar Photovoltaic Pumping



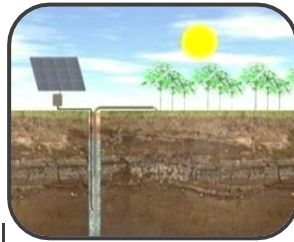
### WHAT IS SOLAR PHOTOVOLTAIC PUMPING?

Solar photovoltaic pumping is a technology that transforms solar energy and injects it into electro-pumps to extract water from boreholes and to boost the fields to be irrigated.

By the usage of photovoltaic solar panels, energy is captured from the sun and converted into electrical energy. This energy is made profits to power the motor of the pump and irrigation system.



*Pumping to tank*



*Direct Irrigation*

### A BIT OF HISTORY

Most part of solar photovoltaic pumping has been developed with direct current motors because it is the energy produced by the photovoltaic modules. This type of pump is limited to low power (approximately 5.5 HP), and the cost of materials and maintenance of these engines are high.

## SEES (Solar Energy Efficiency System)

Investments in Research & Development by S2i have allowed us to develop SEES solution (Solar Energy Efficiency System), which permits us to convert the direct current of the photovoltaic generator into alternating current by a frequency variation and inject it into the traditional electric motors located in boreholes. In addition, S2i has developed an algorithm that continuously monitors the operation of the facility, which allows making the most of solar energy and pumping up to 30% more of water.

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And so we offer our customers solutions for:

1. Solar pump for very deep wells and high flow rates.
2. Water treatment with solar generator.
3. Solar watering, drip irrigation, sprinkling and pivot.

## 1.- DIRECT SOLAR PUMPING

Our system is not limited by the required flow rate or depth of the borehole, which allows us to achieve the desired production regardless of the existing depth.

### MAIN ELEMENTS IN THE INSTALLATION:

#### 1. SOLAR PANELS



Photovoltaic solar field consisting of crystalline silicon cells with high efficiency. The cells are embedded in EVA and protected by anti-reflective tempered glass, low iron and a Tedlar film. Dimensions 1638x982x45 mm and weight about 21 kg, with aluminium frame, including bypass diodes, transport, assembly, small parts and accessories. Approximate measurements useful for photovoltaic surface of 76.5 m<sup>2</sup>, South facing gradient 0 °

#### 2. MOUNTING SYSTEM



Module support structure, which incorporates a metal fixing system integrated modules, able to resist its own weight and any type of external climatic type of stress. Includes assembly, small parts and accessories.

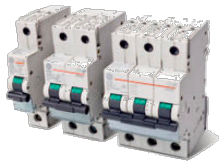
#### 3. SEES. CONTROL SYSTEM



Control system, frequency variation and optimization for solar energy developed S2i. Includes ferrites to protect the pump, controller, control and optimization algorithms, display, filling of the reservoir sensor, depth sensor, small equipment and accessories. It is possible to include an input for an emergency generator.

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## 4. PROTECTION AND ELECTRICAL EQUIPMENT.



Electrical components necessary for proper working of the system. Includes a protection box AC and DC, differences, automatic, variators, wiring, small materials and accessories.

## 5.- ELECTRO-PUMP



Submersible pumps. Formed by a three phase electric motor that works at 200-240 V AC and booster pump.

### Optional elements for the installation

As optional components, we propose:

#### 1.- STORAGE TANKS

Water storage metal tanks from 15 m<sup>3</sup> of capacity up to meet demand. In case that water is intended for human consumption these tanks incorporate a waterproof fabric special to contain water for human drinking. They are equipped with an air-tight cover to prevent external contamination



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## 2.- SOLAR WATER TREATMENT

S2i is a company specialized in water treatment, so we are able to offer our customers the most suitable and economical solution to treat their water and everything using the sun's energy.

Generally, we propose a combination of techniques for disinfecting and cleaning water according to the problems it has. In case that water would have to be treated for salinity problems or for industrial uses or if the customer wishes, we offer treatment systems and disinfection for membranes (ultrafiltration and RO).

We propose the use of the following technologies:

### 2.1.- DISINFECTION



Chlorination systems, with codifying pumps and / or ultraviolet lamps.

### 2.2.- CLEANING



Combination of cartridges and filters to remove problems with turbidity, color, and smell and components such as iron, manganese nitrate, lime, etc..

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## 2.3.- MEMBRANES



We propose reverse osmosis (RO) in the case of salinity in the water; and ultrafiltration like an alternative for combination of the two methods previously mentioned.

In every case, our systems operate by solar energy, and our developments are oversized to produce a greater amount of water than necessary in the operating solar hours, and then store in our tanks almost double the amount needed per day for an autonomy of nearly two days without sun.

## 3.- SOLAR IRRIGATION

Our solar irrigation system has the difference compared to our direct solar pumping, that the solar generator should make work an additional pump located in the surface to ensure a constant pressure.

The system is managed by a controller that is responsible for the operation of the pumps according to the solar energy available at any time.

Our system works with any pressure irrigation, borehole depth, area and culture.



Our system works for any type of irrigation method, from the drip irrigation; it is the simplest and does not require the additional surface pump to increase the pressure; until the sprinkler system, passing through the pivot system; where the PLC or frequency variator, in addition to move two pumps, must feed the engines in the pivot system.