

# SOLAROPIA

## S-RO Solar Plants for RO and Water Plants

### FREQUENTLY ASKED QUESTIONS (FAQ)



### COMPLETE SOLAR SYSTEMS TO OPERATE PUMPS IN WATER PLANTS

- What is S-RO System?
- How S-RO is different from conventional solar plants?
- What is the maximum HP pumps can be operated by SPI?
- What is the difference between SPI and Conventional VFD?
- What changes required to be made in existing water plants to operate them with S-RO system?
- What about the land required to deploy Solar PVs plants? How big it is per MW?
- What about cloudy weather, early and late daytime when solar power is not sufficient?
- How easy to operate SPI in water plants? Do they require specially skilled Operators?
- Can pumps in S-RO be operated remotely? Can SPI devices be controlled from control room?
- What is the solar power cost in S-RO systems and how it compares to Grid, Local plant or Diesel Genset Power cost?
- How Solaropia can help our Company to use S-RO systems? Is there local support?

## ■ What is S-RO System?

S-RO is a complete solar system supplied by SOLAROPIA to operate pumps in water and RO plants with solar power. S-RO- use the new SPI solar pumping inverter-VFD technology to power and control each pump in the plant. SPI is solar dedicated pumping technology and it is 30% more efficient than conventional solar power generation plants that use solar inverters– SPI systems combines powering and controlling pumps in one solar system. It reduces with this percentage the solar power cost and the required PV area too.

In S-RO system all SPI devices are connected directly to the solar PV plant via DC Bus, and supplies variable frequency 3-phase AC power to each pump in the plant. Each pump is controlled individually via its SPI device.

The standard solar system supplied by S-RO consists of three components:

1. The PVs (Photovolotile Modules) as per the plant power requirement.
2. The PV mounting structures (Ground mounting, Canopy –parking lots Mounting, Roof Mounting)
3. SPI - Solar pumping Inverter-VFD devices that operate and control pumps



Note that S-RO plant just adds DC bus to the water plant. SPI are equivalent to conventional VFD ( Pump controllers) and they also generate 3phase –AC power from DC power bus. Each pump can be controlled individually by its SPI devices and its data can be monitored locally on TFT touch screen or transmitted to control room server. S-RO can operate pumps in 3 power modes: Solar, Hybrid ( solar and AC), and AC mode at night time. SPI offers auto switching mode in which no action is required to switch between these modes – it automatically uses AC power when it is needed if solar power is insufficient to operate pumps.

## ▪ **How S-RO is different from Conventional solar plants?**

Conventional solar power plants use solar inverters to generate fixed frequency power for all purposes. Additional Conventional VFD must be added to operate and control plant pumps. S-RO offer pump power and control in one using SPI device. This saves about 20% of solar power that is lost in multiple power conversion between inverters and VFD (Commonly S-RO requires 30% less PV power and reduces with this percentage the solar plant area and its cost).

S-RO also offer more sustainability in operating water plants- when grid power turns off for any reason, S-RO is not affected and continues plant operation. Conventional solar power plants depend totally on the grid (it uses grid-tie inverters) – if the grid turns off the solar plant will stop its generation which cause halting or shutting-down water plants. Off-Grid solar systems are very expensive and they are limited in power – so they are not commonly used in water plants.

## ▪ **What is the maximum HP pumps can be operated by SPI ?**

SPI systems are available to operate up to 750 hp pumps by single SPI device. It is pump independent and can operate all pump brands used in the plant.

## ▪ **What is the difference between SPI and Conventional VFD?**

SPI offers the same pumping control function as conventional VFD does, however, it has three additional functions :

1. SPI operate with solar power
2. SPI embeds Power management system that allows hybrid DC and AC power to switch automatically between power modes (it eliminates the need for switching power boards).
3. SPI embeds PLC to control pumping applications and integration with plant control systems.

## ▪ **What changes are required in existing water plants to operate with Solar?**

The only change is to replace existing VFD with SPI devices so that pumps can be operated with solar power. No changes to the pumps or to AC power infrastructure are required.

## ▪ **What about the land required to deploy Solar PVs plants? How big it is per MW?**

Each 1 MW PV power will require approximately 0.2 Acre land –so 10MW plant would require just 2 Acres.

## ▪ **What about cloudy weather, early and late daytime when solar power is not sufficient ?**

S-RO operate plants under any weather conditions. For example, if solar can provide 80% of the required power, then SPI will consume only 20% from grid or diesel Genset. When solar can provide 100% it will not use any AC power.

## ▪ **How easy to operate SPI devices in water plants? Do they require specially skilled Operators ?**

SPI is a programmable device when it is programmed with the pumping data it does not need further services. Operators can locally change RPM, Mode, or to start-stop the pump using with the user friendly TFT touch screen on SPI. There is no need for extra skilled operators as it is very much like operating pump using VFD – and even simpler using the SPI user friendly TFT screen. SOLAROPIA offers training for the engineering-operation staff when its solar plants are deployed.

▪ **Can pumps in S-RO be operated remotely? Can SPI devices be controlled from control room ?**

Yes.S-RO offers two options to remotely control pumps via SPI devices. Each SPI has built-in GPRS modem (CDMA/GSM) with given password to access to control or monitor pumping data ( optionally ordered and added to SPI) . Also it has built-in modbus TCP protocol (optionally added per request) .

S-RO easily integrates in existing control rooms or SCADA systems – it offers standard industrial protocols (modbus, profibus) to communicate with SPI devices of each pump and retrieve data for monitoring .

▪ **What is the solar power cost in S-RO systems and how it compares to Grid, Local plant or Diesel Genset Power cost?**

The average cost of operating RO plant with S-RO solar system is about 10¢-12¢ cents per 1KWh calculated over 15 years ( the service life of S-RO systems). Utility grid in the range 20¢, diesel Genset is about 30 cent per KWh . The table below provides percentage pumping operating cost reduction for these three sources applied to 1MW water plant.

Pumping System	\$ cost/ 1 KWh	\$ cost /1KW year (8 hours day operation)*	% cost Reduction from highest cost
Diesel Genset	30¢	\$867	0%
Local plant Grid Utility Power	20¢	\$584	33%
Solar S-RO System	10¢	\$292	66%

\* The cost is calculated for 8 hours per day the time S-RO uses pure solar energy to operate pumps

▪ **How Solaropia can help our Company to make use of S-RO systems ?Is there local support ?**

SOLAROPIA works with certified partners ranging from OEMs, consultants , contractors and service companies to design, deploy and maintain S-RO plants. We work with them and with your company in all stages and we provide full engineering and technical support , and training to your staff and to our partners

