

# SOLAROPIA

INNOVATIONS IN SOLAR PUMPING TECHNOLOGY



## SOLAR RO INDUSTRIAL WATER RECYCLE PLANTS



**S-RO-R**

**WORLD'S FIRST RO PLANTS OPERATING WITH SOLAR POWER**

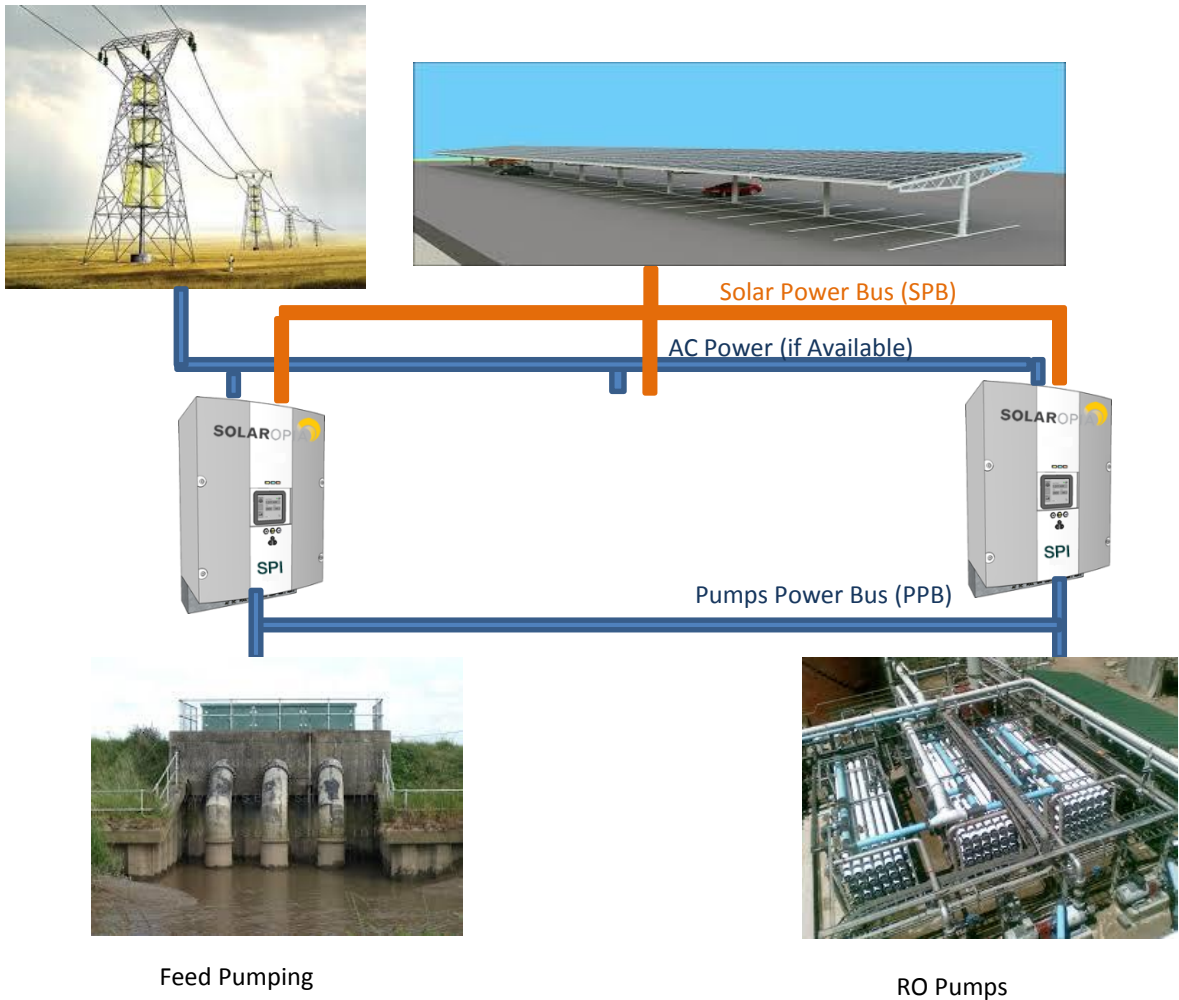
## ABOUT S-RO

SOLAROPIA S-RO are solar systems dedicated to operate RO plants directly from PV power. These systems use new solar pumping technologies (SPI Technology) with distinguished pumping solar technologies that:

- Operate Plant pumps Off-Grid (in Rural Areas Plants)
- Operate 24 hours pumping in hybrid Solar-AC mode (in Urban Areas)
- Pump type independent (no need to change existing plant infrastructure to operate with solar)
- Extremely efficient (about 40% higher efficiency than conventional solar power systems)

## S-RO R PLANTS

S-RO GW provides complete solar system to operate brackish water RO plants for deep-wells up to 2000' (700 m) head, and RO production capacity up to 2 million GPD (about 5000m<sup>3</sup>/day). S-RO GW offers economic solution for new plants, and for existing plants – it does not require changes to existing RO plants infrastructure. S-RO operates all plant pumps from one control: Deep-well pump, RO pumps, and distribution pumps (or pumping to elevation tanks). Our S-RO GW can operate all RO plant size (small or large) offering clean economic power solution to use ground brackish water to supply towns, cities, industrial and irrigation plants with sweet water to support basic living in rural or urban areas.

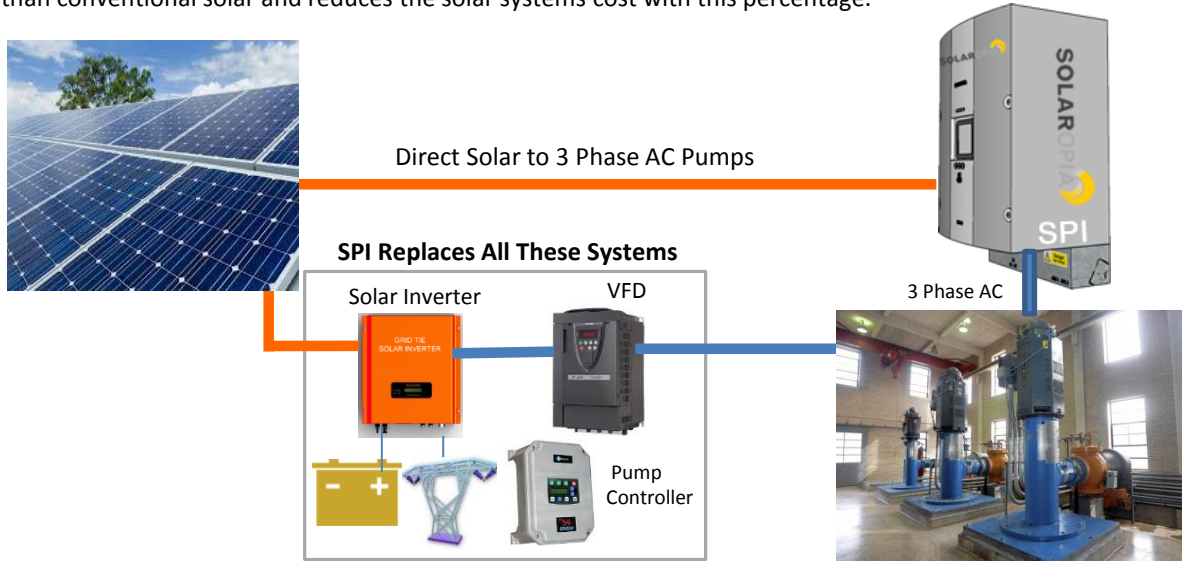


Feed Pumping

RO Pumps

## EFFICIENT SOLAR PUMPING TECHNOLOGY

S-RO plants use new SPI solar pumping technology developed by SOLAROPIA for industrial pumping with solar power. Conventional solar inverters (Off and On Grid) are not suited to operate pumps – they would need four systems (Solar Inverter, Transformer, VFD, and Pump Controller) which translates into 20%-30% of solar power losses. SPI solar pumping technology operates pumps directly from PV plants - it eliminates all the losses and the extra systems cost (see the diagram below). SPI technology is by 40% average more efficient than conventional solar and reduces the solar systems cost with this percentage.



## SOLAR HANDLES ALL DAY PLANT SUPPLY

S-RO systems have a great economic advantage – it can operate plants without grid power providing 100% plant production capacity during solar hours with dual pumping to direct distribution and to gravity tanks for night time supply.

## THE S-RO PLANT ECONOMY

RO water sewage and industrial recycle plants are energy intensive -the treatment of 1AF (about 1000 m3) per day would require about 150 KWh. This power represents about 80% of the plant total operating cost. S-RO will reduce this cost dramatically by 50% or more, making brackish RO plants affordable, economic water solution, and environmentally clean powered plants.

The cost and saving to produce 1 AFPD (1000 m3/day) is provided below for comparison between the operating cost of S-RO power (average ₺8 per KWh), diesel co-plant power (average ₺22 per KWh), and Utility grid power cost (average ₺18 per KWh). The operating cost is provided for 15 years (S-RO solar plants operate for 15 years minimum and 25 years average). S-RO saves about 66% of the diesel operating cost (saving about \$400,000), and 55% of grid power operating cost (saving about \$280,000).

Plant Power Source	Operating Cost (\$USD) (15 years)*	Saving in Operating Cost (\$USD) (15 years)
Diesel Co-Plant Power	\$180,000	\$0
Utility Grid Power	\$150,000	\$30,000
S-RO Solar Plant	\$65,000	\$115,000

\* The cost is calculated based on 1AF water production at power consumption 150 KWh, 8 hours/day for 15 years

## S-RO Ground Water Plants Models

S-RO -IR models can be sized for various Ground RO plants. S-RO GW models are listed below for up to 1million GPD (3000 m3/day). The required Plant power is provided for standard 1000' deep- well – source TDS at 10000 ppm requiring 300 psi RO pump ( for other pumping heads and required RO pressure please refer to our SPI pumping systems for their power sizing) . Larger than 1 million GPD also can be provided using this modular plant.

RO Plant Capacity		Required Solar Power (KW PV)				S-RO Plant
GPD	m3/day	Surface Pumps* (H: 75' -25m)	RO Pumps (P: 150 psi-10bar)	Distribution Pumps (P: 115 psi-7 bar)	S-RO Plant Power (KWh/ KW PV)	S-RO REF
25000	100	3	9	6	18 KW	S-RO-WR 18
50 000	200	6	18	12	36 KW	S-RO-WR 36
125 000	500	15	30	24	75 KW	S-RO-WR60
300 000	1000	30	60	48	150 KW	S-RO-WR150
600000	2000	60	150	120	250 KW	S-RO-WR 300
1 000 000	3000	90	210	180	500 KW	S-RO-WR 500

\*Surface pumps supply to RO plant twice the water volume it process ( 50% RO recovery rate)

## S- RO PLANT IMPLEMENTATION

SOLAROPIA Offers services to install a-operate and commission S-RO plants:

PAC1: Package for New RO plants (designated for RO Plant manufacturers-designers- contractors)

PAC2: Full service package for Existing RO plants ( designated for Plant Operators- City water Utilities)

PAC1	PAC2
Complete solar System for new designed plants SOOLAROPIA works with RO Plant designers to provide complete solution , install and commission the solar S-RO plant	Complete solar System for existing RO plants SOLAROPIA and its certified partner in the country of installation will provide complete solution , install and commission the solar S-RO plant



## S-RO Plant Referencing

S-RO	IR	W	P
Plant Type		Plant Power	Package Type: 1, 2

