

# Morocco and Italy for the transition to clean energy towards Africa

***“New RE technologies in Morocco and their adaptation for Africa”***  
***2016 March, 9th, Rabat***



## INDEX

- **Efficient Water Managemet**
- A Sustainable Solution: PV Water Pumping
- Available products (example)
- Case Histories
- Enabling tools

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## WORLD NEEDS FRESH WATER

It is predicted that by 2030 the world will need to produce:

- 50% more for food and energy
- 30% more available fresh water

In the **Mediterranean Region**  
**83% of water**  
is used in the agricultural sector

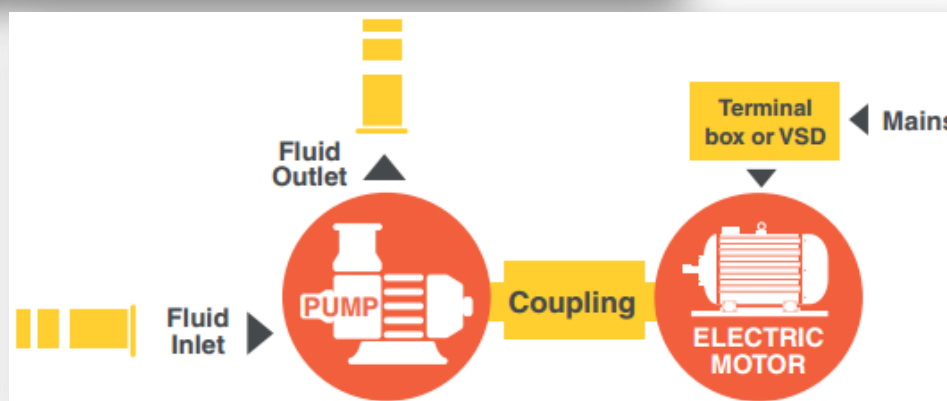


## WATER TREATMENT and DISTRIBUTION CYCLE

A big amount of energy is used in the entire water cycle.  
Water Pumps play a major role in all water and waste water processes.



During last 10 years the European Commission and European pumps manufacturers have worked to define standards, guidelines and norms to improve the **efficiency** of pumps and water management systems.





## SMART WATER TECHNOLOGY



**Remote Monitoring and Control** of water pipes and plants is of major interest in Italy now:

- reduce water distribution losses
- improve smart energy usage for water management
- reduce maintenance costs

Tools and Topics:

- GPRS / 3G connections
- Internet of Things
- Expert Systems



- [http://www.gruppohera.it/gruppo/attivita\\_servizi/innovazione\\_servizi/innovazione/telecontrollo/](http://www.gruppohera.it/gruppo/attivita_servizi/innovazione_servizi/innovazione/telecontrollo/)
- <http://www.acquaoggi.it/tag/smart-water-forum>
- <https://www.youtube.com/watch?v=bGS7-UN1Eq8>
- <http://www.swan-forum.com>
- <http://www.forumtelecontrollo.it/165/forum-telecontrollo-2015.html>

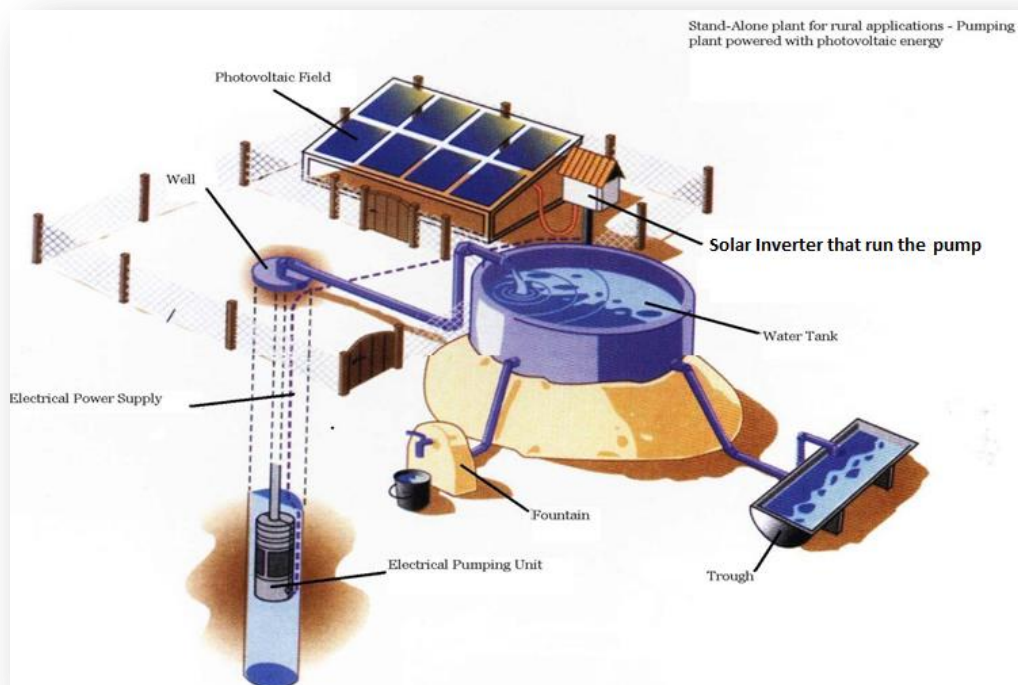
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## PHOTOVOLTAIC WATER PUMPING

PV pumping is a real alternative, offering the following **advantages**:

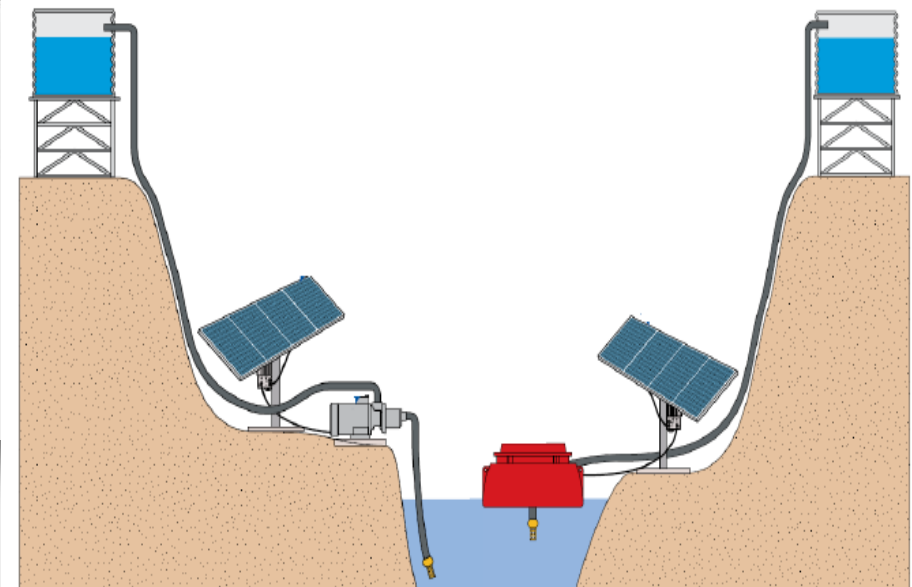
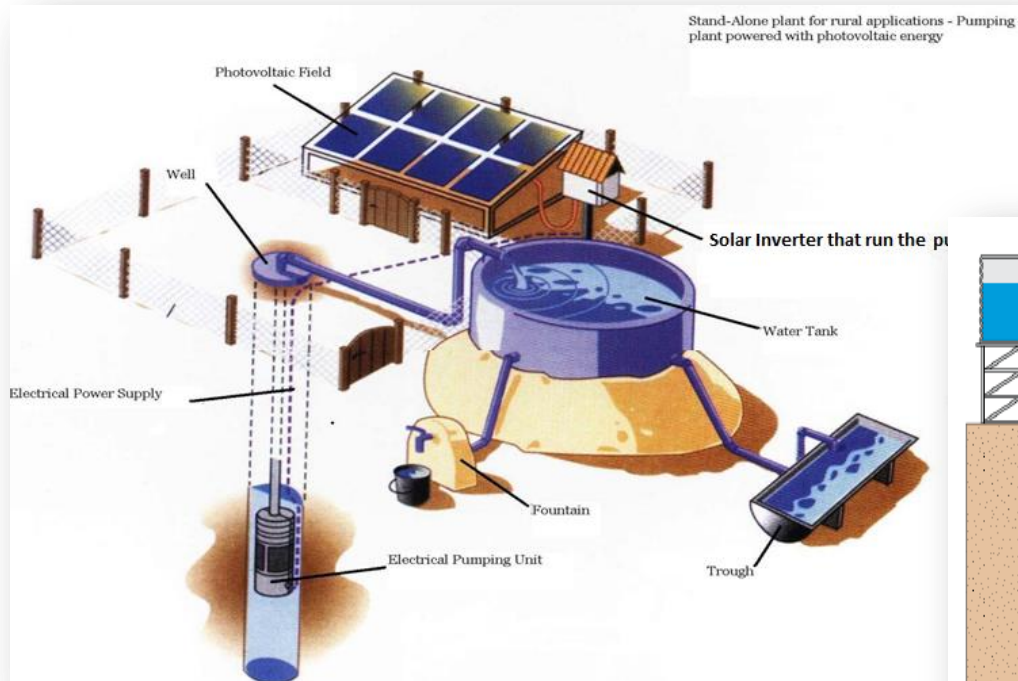


- ✓ Do not require fuel, thus their operation is independent from fuel availability and price development
- ✓ Can be located close to demand (no distribution losses)
- ✓ Little maintenance required
- ✓ No air pollution
- ✓ Do not require batteries as the energy is stored in a high level storage tank



## PHOTOVOLTAIC WATER PUMPING

Water can pump from a deep well, from a river or a lake.  
Water can be stored in tanks or injected in water pipes.



## PHOTOVOLTAIC WATER PUMPING for RURAL WATER SUPPLY

While hand-pumps are an efficient way to supply small communities, motorized pumps are needed to supply larger communities and play a major role in agriculture.

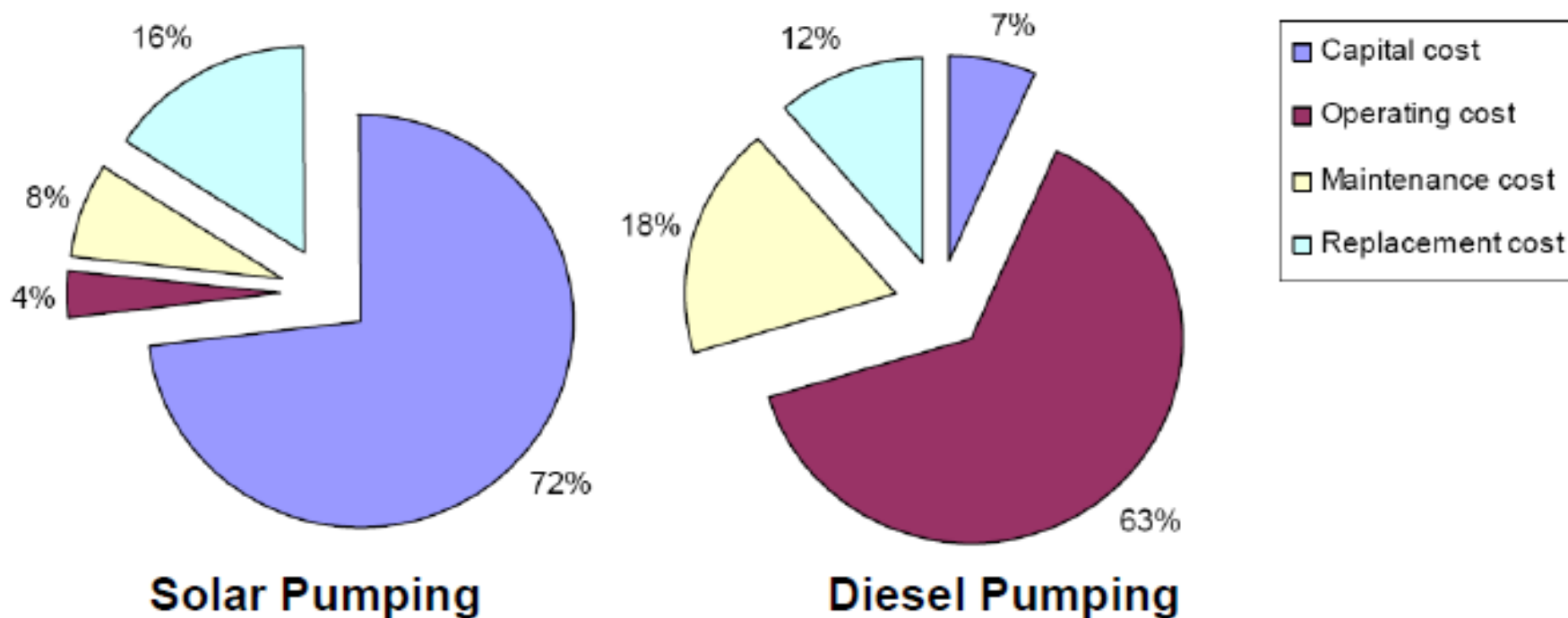
PV pumping is a mature and reliable technology which can compete with conventional pumping technologies such as diesel pumping.

Still, PV pumping is often overlooked by decision makers due to higher initial costs.



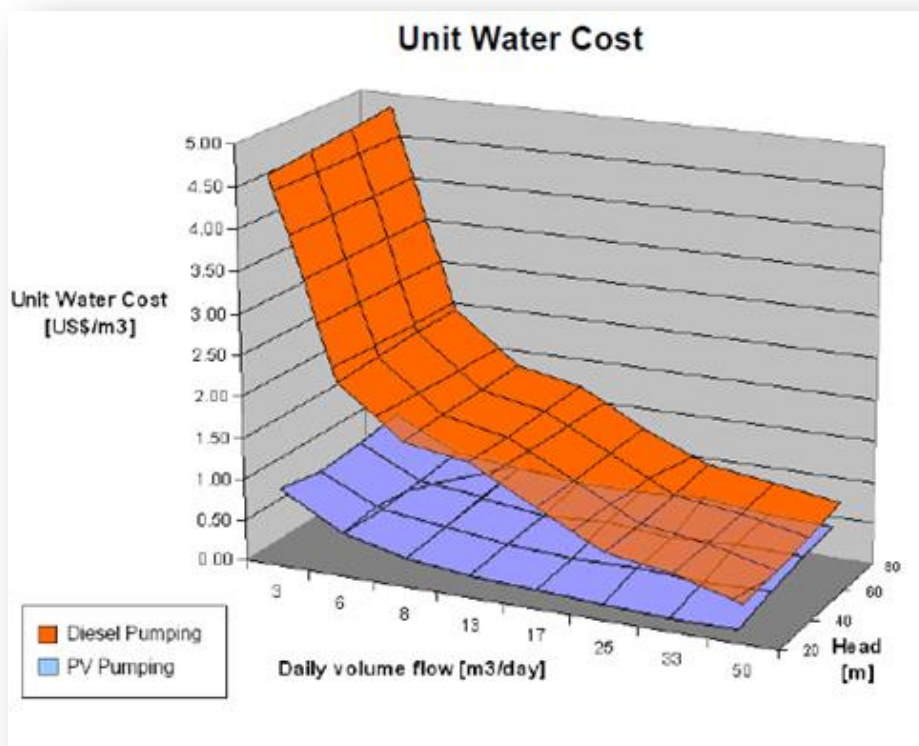
## PV pumps vs Diesel pumps

### Comparison of Life Cycle Cost of a PV vs Diesel System



Nov. 2012

## PV pumps vs Diesel pumps



- Diesel pumps are very uneconomical at low flow rates
- At 0.85 \$/liter of diesel fuel, PV pumping is more economical even at higher pumping heads and larger volumes ( > 8000 m<sup>3</sup> /day)
- In case of a 20% diesel price hike the application range increase to over 100kWp pumping power
- The costs of PV modules and plants decreased very fast during last 4 years, PV pumps are now extremely economical.

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## SOLARDRIVE

### SINCE 1985 SOLAR INVERTERS FOR PUMPING APPLICATIONS

The **Solardrive** inverters convert energy from PV to ensure/optimize the operation of the pumping systems. They came in two models:

**SOLARDRIVE 2000** for pumps up to 2kW  
**SOLARDRIVE 4000** for pumps up to 4kW



## SOLARDRIVE PLUS

### SOLAR INVERTER FOR PUMPING APPLICATIONS



**WALL MOUNTED** - Power up to 22 kW

**METAL CABINET** - Power up to 250 kW

Higher power on request up to 1000 kW and over

The **Solardrive Plus** inverters convert energy from PV to ensure/optimize the operation of the pumping systems. New features have been added to maximize energy and control water flow rate in all solar irradiation conditions.

The **Solardrive Plus** can be integrated into existing or new plant with full flexibility. It can be connected to an AC three-phase supply or to a backup diesel-genset, switching between supplies to pump water even during the night.



## SOLARDRIVE PLUS

### SOLAR INVERTER FOR PUMPING APPLICATIONS



<b>WALL MOUNTED</b>	<b>Pumps power kW</b>	
	<b>3 PH 230 Vac</b>	<b>3 PH 380-400 Vac</b>
<b>SOLARDRIVE PLUS 0018</b>	3.0	5.5
	4.0	
<b>SOLARDRIVE PLUS 0021</b>	5.5	7.5
	7.5	9.2
		11.0
<b>SOLARDRIVE PLUS 0024</b>	9.2	15.0
	11.0	18.5
<b>SOLARDRIVE PLUS 0032</b>		22.0

## SOLARDRIVE PLUS

### SOLAR INVERTER FOR PUMPING APPLICATIONS



<b>METAL CABINET</b>	<b>Pumps power kW</b>	
	<b>3 PH 230 Vac</b>	<b>3 PH 380-400 Vac</b>
<b>SOLARDRIVE PLUS 0051</b>	15.0	30.0
	18.5	37.0
	22.0	
<b>SOLARDRIVE PLUS 0069</b>		45.0
<b>SOLARDRIVE PLUS 0088</b>	30.0	55.0
	37.0	65.0
	45.0	75.0
<b>SOLARDRIVE PLUS 0164</b>	55.0	90.0
<b>SOLARDRIVE PLUS 0201</b>	65.0	110.0
	75.0	132.0
	90.0	
<b>SOLARDRIVE PLUS 0259</b>	110.0	160.0
<b>SOLARDRIVE PLUS0401</b>	132.0	200.0
		250.0

**Biggers sizes or multi-pumps systems available on request !**

## SOLARDRIVE PLUS



## SOLAR INVERTER FOR PUMPING APPLICATIONS

### Main features:

- ✓ Max operating ambient temperature 50°C
- ✓ BOX IP 52 / IP 54 for Cabinet version
- ✓ Single main switch for DC (PV) or AC supply (diesel genset backup supply)
- ✓ MPPT Smart function
- ✓ Tank water level control
- ✓ Water pressure control for pipe
- ✓ 3G / GPRS connection for remote monitoring (optional)

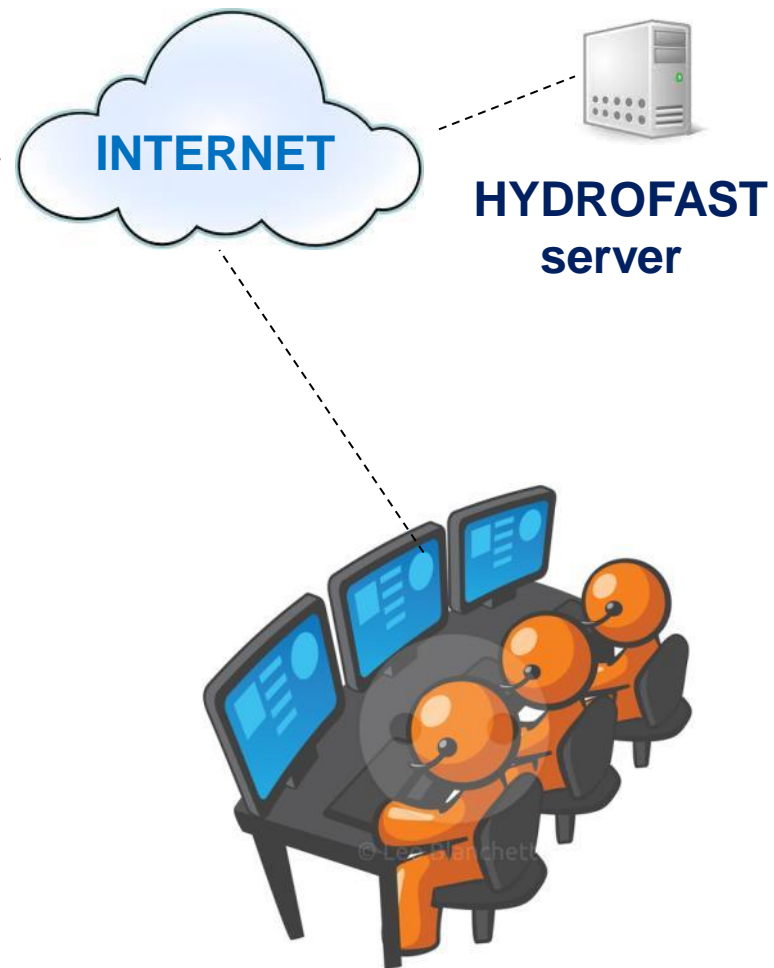
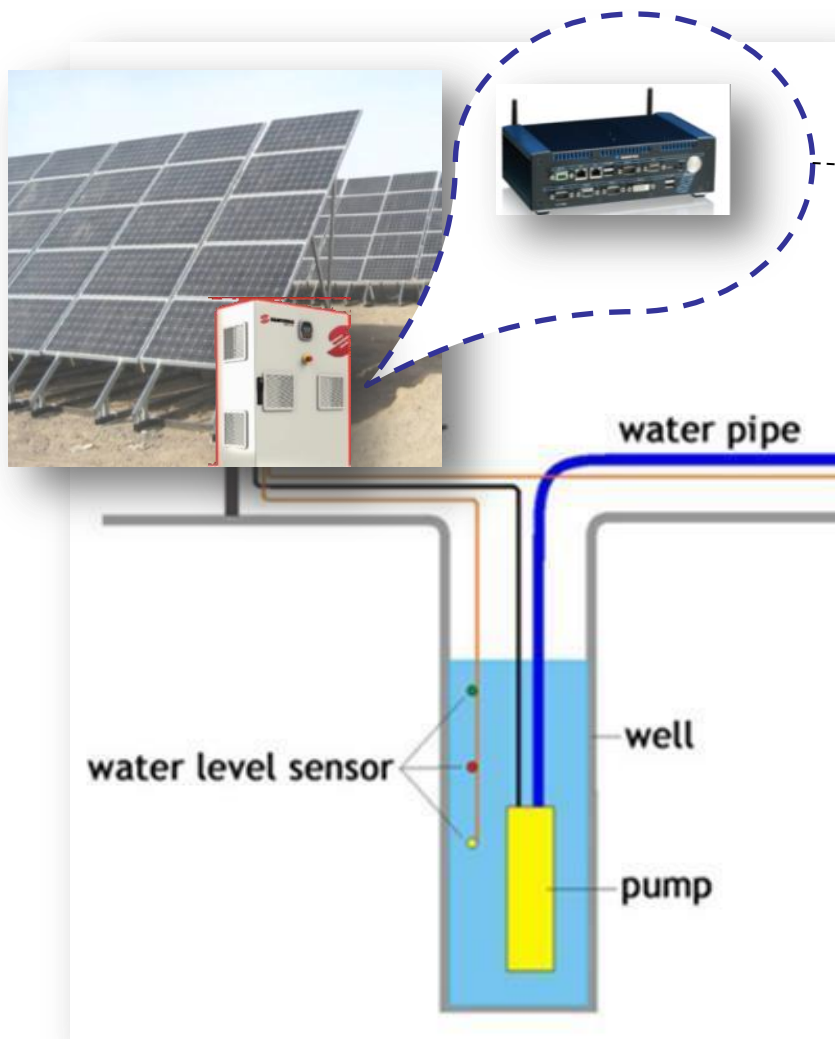
### Protection:

- ✓ Overcurrent and overload
- ✓ Pump dry-run detection
- ✓ Overtemperature
- ✓ PV isolation loss
- ✓ Surge Protection Device
- ✓ Output inductance for dV/dt pump protection



## SOLARDRIVE PLUS

### Remote Monitoring via WEB



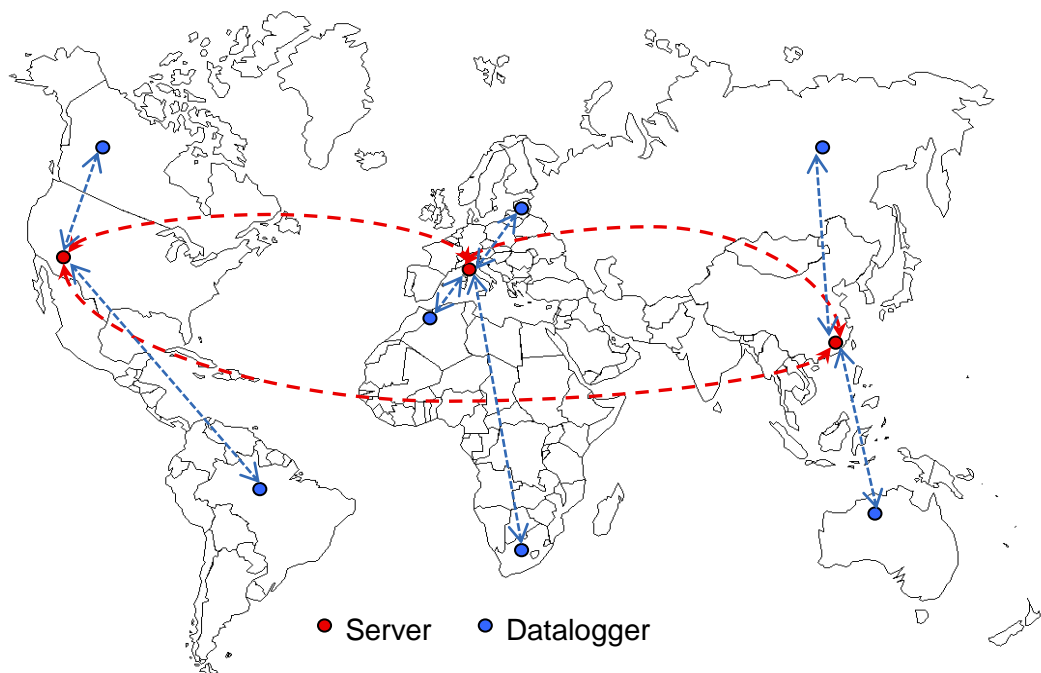
**Remote Technical Assistance**

## SOLARDRIVE PLUS

### Remote Monitoring via WEB

More than 2000 MW  
of PV inverters under real-time  
monitoring all over the world

- Redundant
- Secure
- Bidirectional
- Monitorable
- Scalable

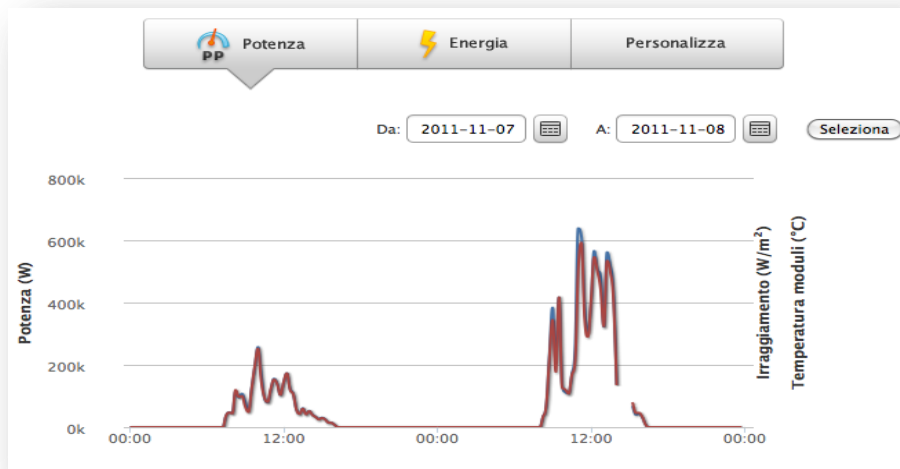
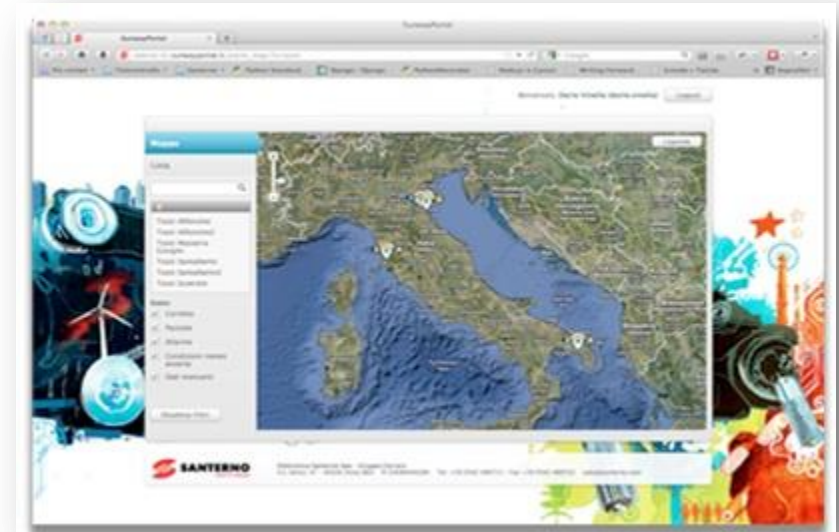


## SOLARDRIVE PLUS

## HYDROFAST WEB PORTAL



- Visual representation of the collected data with a geotagged marker on a map
- Accurate display of water production info
- Customizable charts by range and/or measure
- Simple and user-friendly interface



- Log trends download (csv format)
- Alarm sent via email
- Based on the latest security standards and web technologies

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## SOLARDRIVE PLUS: CASE HISTORY



**Location:** EGYPT  
**Connection date:** 2015  
**PV:** 144 kWp  
n.576 solar panels 250 Wp  
**Inverter:** SOLARDRIVE PLUS 0164

**Remote monitoring with Hydrofast.it**





## SOLARDRIVE PLUS: CASE HISTORY



**Pump power:** 92 kW  
**Flow rate:** 100 m<sup>3</sup>/s  
**Head:** 260 m

**Location:** EGYPT  
**Connection date:** 2015  
**PV:** 144 kWp  
n.576 solar panels 250 Wp  
**Inverter:** SOLARDRIVE PLUS 0164

**Remote monitoring with [Hydrofast.it](http://Hydrofast.it)**



## SOLARDRIVE PLUS: CASE HISTORY



**Location:** Turkey  
**Connection date:** 2014  
**Inverter:** SOLARDRIVE PLUS 0032

**Motor power:** 9.2kW

**Pump:**  $Q=32\text{m}^3/\text{h}$   $h=60\text{m}$

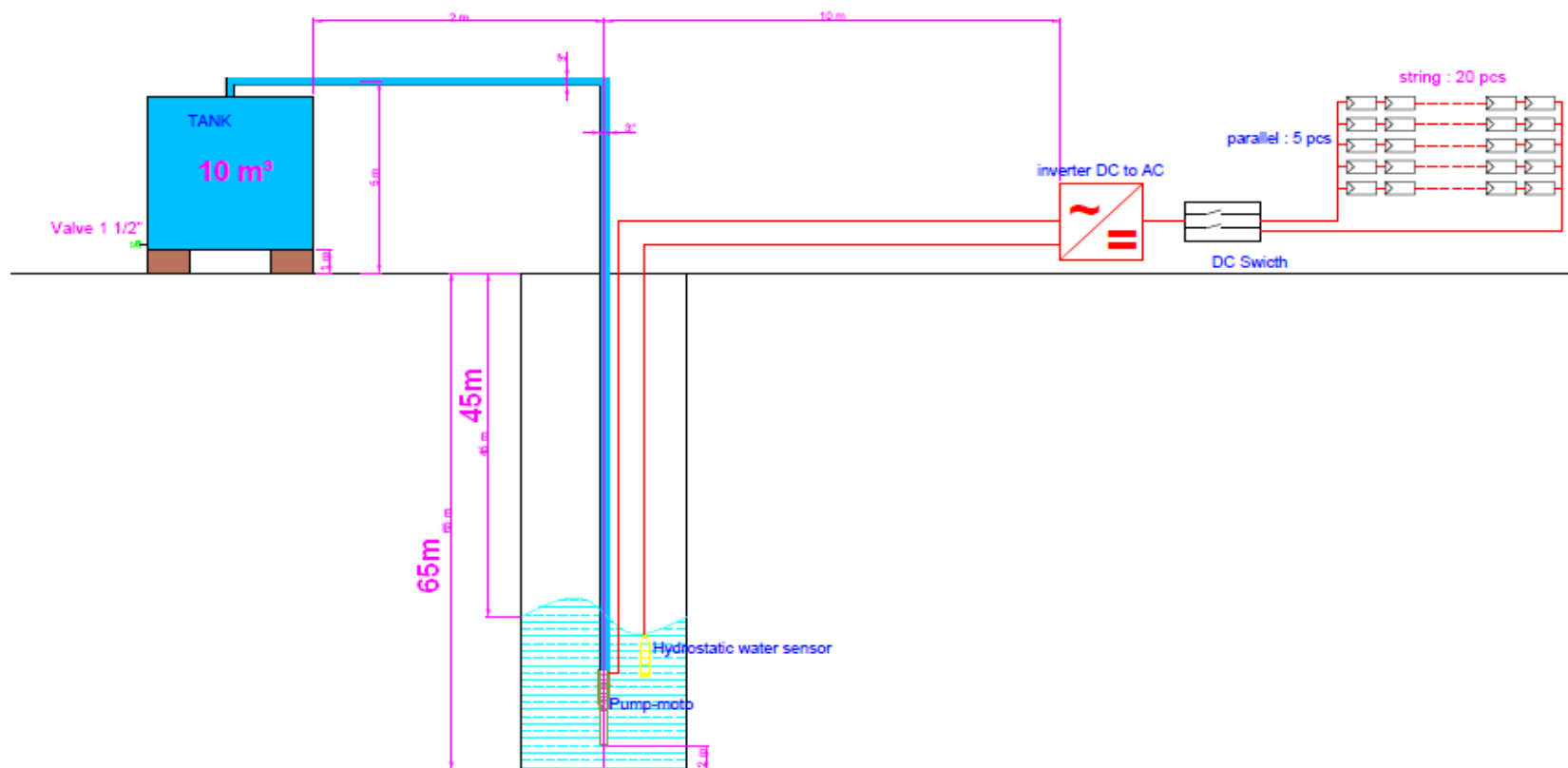


## SOLARDRIVE PLUS: CASE HISTORY

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## CAPRARI: CASE HISTORY - TUNISIE



**Location:** TUNISIE  
**Pump:** Electric stainless submersible pump  
**PV:** n.18 solar panels 50 Wp  
**Inverter:** CAPRARI E4XP Solar





## CAPRARI: CASE HISTORY - SPAIN



**Location:** SPAIN – PEDRO TORRES

**Pump:** n.2 Submersible pump 3,0 and 7,5 HP

**Inverter:** CAPRARI Solar VARIPOWER





## CAPRARI: CASE HISTORY - CUBA



**Location:** CUBA, FABREZ

**Pump:** n.4 Submersible pump

**PV** **n. 72 photovoltaic solar panels**

**Inverter:** CAPRARI Solar E4XP and electric panels



## EUROMACCHINE: a DIESEL-PV Hybrid Pumping Solution



**LAMPO SOLAR:** DIESEL + PV + Pumps



The PV Modules contribute to save diesel fuel during sunny days



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## WHAT CAN HELP the MARKET DEVELOPMENT of SOLAR PUMPS



- ✓ Specific incentives and financial products
- ✓ Local System Integrators and Manufacturers
- ✓ After-Sales support centers and spare parts stock in the country
- ✓ Software tools for proper dimensioning and simulations
- ✓ Availability of complete kits: PV modules + Inverters + Pumps

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In two words: **support** and **partnership**



## SANTERNO EXPERIENCE: Complete KITs



A complete KIT offered and dimensioned by a single supplier, ex:

- Summersible Pumps:



[www.caprari.com](http://www.caprari.com)

- Inverter and Control Panel:



[www.santerno.com](http://www.santerno.com)

- PV Modules:



[www.brandonisolare.com](http://www.brandonisolare.com)



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**RES4MED and SIE conference**  
*2016 March, 09th, Rabat*

**Simone Bernardi**  
PV Business Development Manager

Elettronica Santerno Spa  
Via della Concia 7  
40023 Castel Guelfo (BO) Italy  
[simone.bernardi@santerno.com](mailto:simone.bernardi@santerno.com)  
[www.santerno.com](http://www.santerno.com)

