rem TEC


WE DEVELOP
INNOVATIVE
SOLUTIONS TO
CREATE
SUSTAINABLE
ENERGY
GREENPOWERTOTHEPEOPLE

ABOUT US

Rem Tec is an Italian company active in the renewable energy field, founded in 2015 by CPM FUTURE s.a.r.l. with other small companies interested to develop and improve the Agrovoltaico® project, created originally by REM Spa, a holding active in construction and renewable energy.

Rem Tec has developed several patents, filed worldwide, that allow the coexistence and optimization between energy production from renewable sources and agriculture: this is

Agrovoltaico®

OUR GOAL:

To make energy from renewable sources in an efficient and sustainable way, keeping the land fully exploitable for agricolture and other uses.

We want to enable our customers and partners to use our technology in order to develop and build renewable power plants compatible with agriculture.

WHAT IS AGROVOLTAICO?

Agrovoltaico® is an innovative technology developed to satisfy at the same time two increasing needs of humanity: **food and energy**.

It consists of a tracking solar system, single or double axis, that allows to maximise energy production from the sun.

Agricultural land use and PV production generally compete for the same resource: the land. Agrovoltaico® allows to build a PV plant with **full agricultural land exploitation** in an ethical and sustainable way, putting in synergy the two goals.

THE TECHNOLOGY

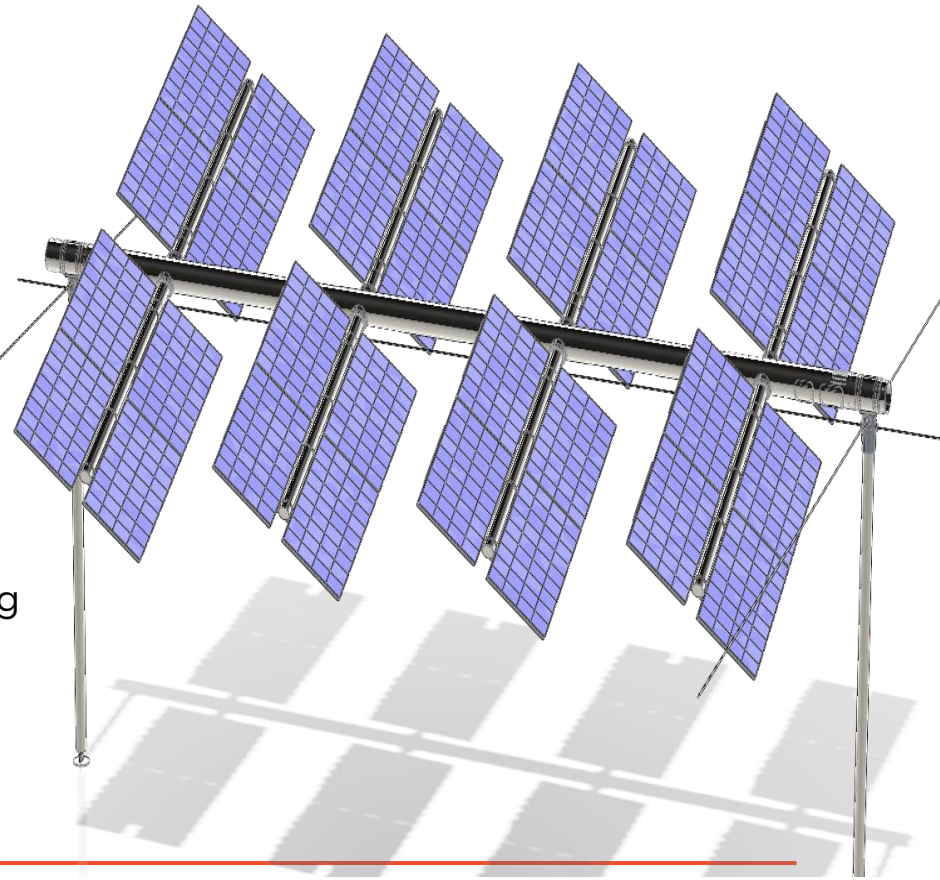
Agrovoltaico® is a modular technology: the base unit is the **solar tracker**.

THE TRACKER

Each tracker is composed of:

- A support structure comprising a first and a second post;
- a main horizontal tube able to rotate on its axis;
- a plurality of secondary tubes perpendicular to the main one, able to rotate on their axes. To each of these tubes is fixed the solar modules.

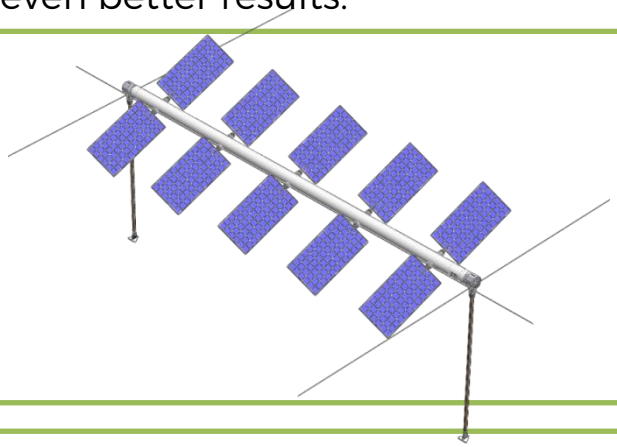
In this way the PV modules can be oriented, with a single or **double axis tracking system**, toward the sun, increasing electric energy production and PV field efficiency.

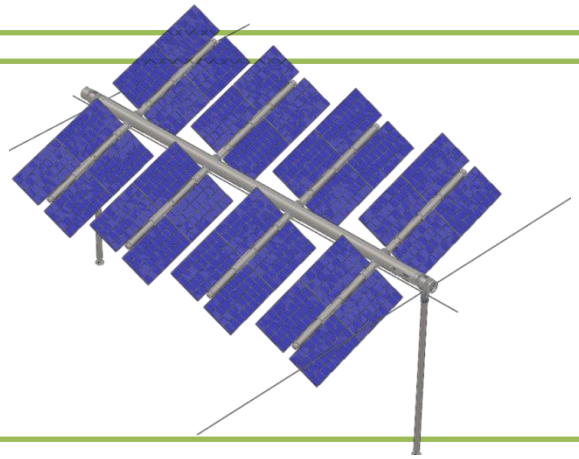


At the moment there are two releases of the system. Our engineers are always working on improving the technology to reach even better results.

RELEASE 1.0

- 10 panels per tracker
- Power of each tracker: 2,5 – 4,35 kWp
- Area panels/land = 13,5 %





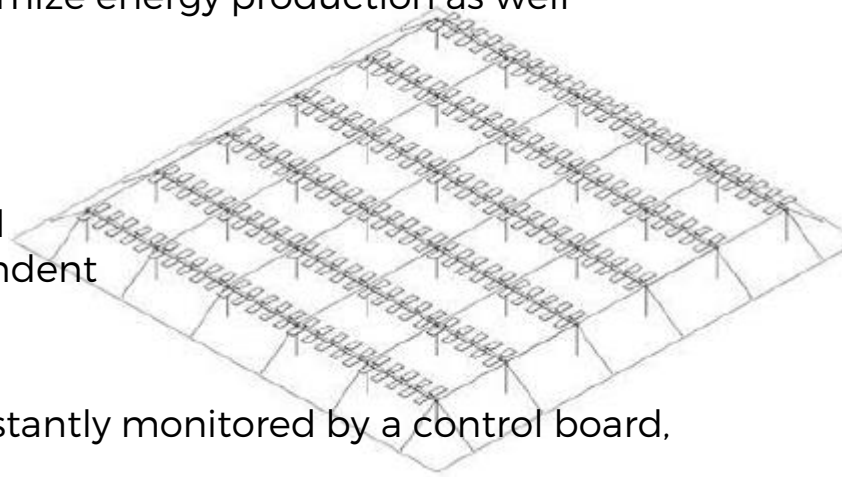
RELEASE 2.0

- 32 panels per tracker
- Power of each tracker: 8,6 – 11,5 kWp
- Area panels/land = 36,6 %

The release 2.0 can also be built using trackers 9 meters long, supporting 24 panels. This allows to reduce costs while maintaining the same concept and motorization.

Agrovoltaico® technology is **modular**, and the trackers can be arranged in several configurations, according to agricultural needs, field shape etc. For instance, the distance between rows can be set in order to maximize energy production as well as crops production:

- Tracker length: 12 / 9 meters
- Distance between lines: 12 / 18 meters



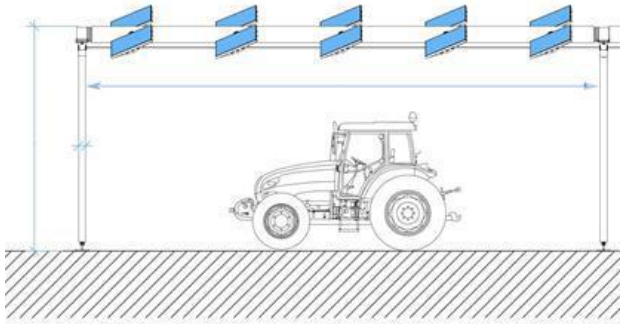
Each tracker is equipped with an electronic control board, so that is able to operate in a totally independent way on the basis of solar calendar, date, time and custom parameters previously mentioned.

Moreover, the effective modules orientation is constantly monitored by a control board, using the **inclinometers** mounted on each tracker.
An important feature of Agrovoltaico® tracker is the remote control system implemented with the technology. The operator can remotely control the tracker movements, stop it, or put the modules in flat position. 5

In case of strong wind, the anemometer present on site communicates with the local control system, which moves all the trackers to the safe position, reducing the wind load into the design limit. Agrovoltaico® can operate, according to the base engineering, with wind speeds up to 14 m/s, and can withstand wind speeds up to 42 m/s. The strength of the system can be easily increased for specific site with special strong wind conditions, adjusting the size of the wire ropes, as well as the thickness of some key components.

PHOTOVOLTAICS AND AGRICULTURE

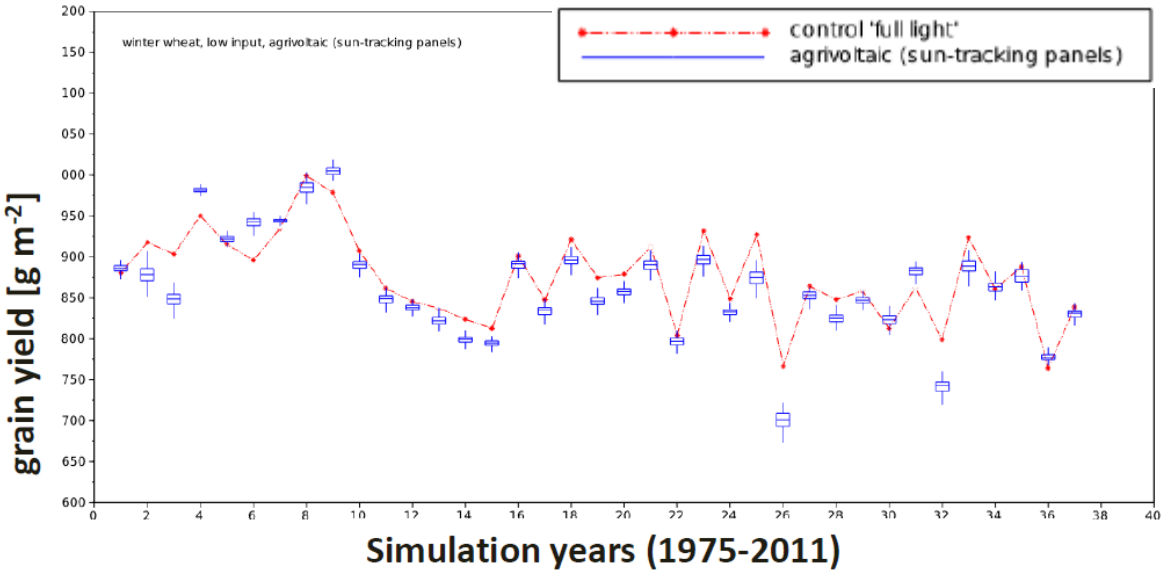
In order to maintain the land usable for its primary purpose of crop cultivation, a **specific solution** has been engineered: the support structure is made of thin posts of about 5m height, maintained in position by wire ropes. Thanks to that, the fixing foundations for posts and ropes are reduced and a large passage between rows is ensured letting agricultural vehicles operate.



Furthermore the electric cables are connected to the wire ropes, thus there is no cables underground and there is no restriction for the plowing of the soil. The result is a total agricultural workability of the land underneath.

A possible concern about Agrovoltaico® technology could be the quality and quantity of the **agricultural product**. Accurate studies held together with the University of Piacenza (Department of Sustainable Crop Production) showed that, after field installation, the production for wheat and corn doesn't show relevant changes, and for other specific crops that require shadow, such as tea, increased significantly. Also rice and grapes have been proved to grow correctly under these plants.

Moreover, the studies show that under drought conditions Agrovoltaico® technology can improve crops production, because it reduces the evaporation of water from the soil.



OUR EXPERIENCE

At the moment there are 4 Agrovoltaico plant in the world, built using the release 1.0.

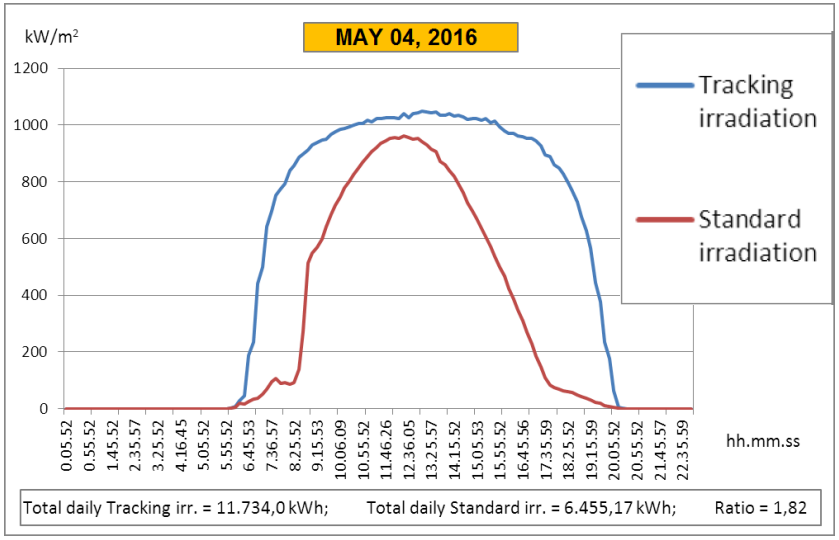
There are 3 plants in Italy (Piacenza and Mantua) for a total nominal power of 6,67 MW, of which Rem Tec takes care of the O&M activities. This allowed in the years to grow an extensive knowledge of the system and to carry on tests for the improvement of performances.

A prototype of the realease 2,0 has been installed in November 2016 and it is running smoothly and with good performance.

In 2016 has been built a 544,4 kWp in the province of Jinzhai (Anhui) in China by the licensee Share Power Co.

In Japan, multiple plants are in the works thanks to the collaboration with different companies active in the energy industry. The main target is green tea cultivations, a crop that needs shadow for growing, together with rice fields.

PERFORMANCE AND PRODUCTION



Another important aspect of the technology is the outstanding energy performance: the two-axes tracking system specifically engineered increases the annual energy production up to 30% with respect to a fixed system.
Such result is achieved thanks the double axis tracking system that increases the solar irradiation received by the PV panels.

Moreover, an innovative algorithm have been implemented, called Voltaico Plus. allowing an efficient production also with low solar altitudes. The backtracking algorithm avoids mutual shadowing between modules at the beginning and at the end of the day.
The increased energy production largely covers the extra costs related to initial investment and O&M, making the system economically convenient.

GREENHOUSES

Agrovoltaico® system results interesting if installed on greenhouses. The trackers can be integrated into the greenhouse structure,, both in case of new projects or existing ones.

The goal is to produce the energy needed by the greenhouse for the functioning of the different devices installed in it, such as irrigation pumps, conditioning system, ventilation. In this way the environmental conditions inside the greenhouse can be optimised and the production increased.

The software developed by Rem Tec controls both the movement of the PV modules and the devices for climate control of the greenhouse, in order to reach the best energy balance possible.

The shadowing created by the structure is managed so that the crop is not negatively influenced, but on the contrary it is improved.

The aim is to reach the optimal balance between electrical and agricultural production.

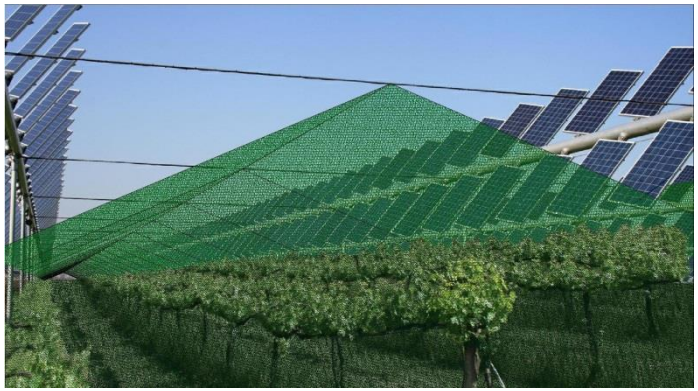
IMPLEMENTATIONS

WIND AGROVOLTAICO

It involves the combination of wind and solar energy in the Agrovoltaico® system, increasing the nominal power of the plant without using more land.

SHADING NETS

The basic Agrovoltaico® system can be integrated with a series of automated systems in order to increase the agricultural yield, such as shading nets, special hail nets, transparent sheets and white films.
The nets can be moved manually or automatically during the day, depending on season, weather and crop, leading to a significant improvement of the agricultural practice.



OUR TEAM

Our team is made of engineers, administrative staff and technician. We cooperate to improve our service and realise our dream of seeing Agrovoltaico® realised.
We collaborate with IT and agriculture experts to have a thorough understanding of everything related to the system.

Giancarlo Ghidesi
co-founder & CEO

Ronald Knoche
co-founder &
executive director

Alessandro Reboldi
technical director

Alberto Manzone
business developer
Asia Pacifica

Laura Svanera
development engineer

Silvana Pezzali
administrative and
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Giovanni Mattei
O&M engineer

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