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REM Tec is a worldwide leading agriPV technology company with more than 15 Agrovoltaico® patents and an operation experience over more than 45 ha since 2011.

In a global context, the world population has increased 4 times within 80 years; desertification has removed the third of arable land, moreover energy needs are growing exponentially. Therefore, it is necessary to find sustainable solutions, taking into consideration diverse factors such as: environment, energy, food and landscape. Producing solar energy requires large spaces, and agricultural farms are the most coveted. However land cannot be indiscriminately and fully occupied by photovoltaic panels. Consequently, REM Tec has developed over 15 globally recognized patents enabling the coexistence and optimization of agricultural and renewable energy production, known as the Agrivoltaics.

Moreover, Agrovoltaico® technologies developed by REM Tec fit into the international power sector by uniting the world's two main needs: food and energy, while respecting environment and landscape. Agrovoltaico® plants are operating in Italy, France, China, Japan and Portugal with further projects currently under development in other countries like Germany and Switzerland. REM Tec has a track record of being the first operational agrivoltaics plant since 2011 in the North of Italy, for a total of 6.7 MWp with 2384 biaxial trackers of the first generation over 45 ha. Studies carried out in cooperation with several well-known R&D institutions like the CNR, Catholic University of Piacenza, INRAE, CIRAD, IFV as well as many other wellknown research institutes and universities. In addition, the REM Tec large agrivoltaics experimental site covering several hectares in Italy completes this knowledge by allowing the comprehension of the crop's behavior under shadow impact generated by the PV modules. REM Tec's research work has shown that the impact of the structure on crops is beneficial, sustainable and improving crop production. As an exemple, REM Tec has produced the world's first Agrovoltaico® wine being with 2024 the fourth production year (figure 1)



Figure 1: REM Tec's vineyard and Agrovoltaico® wine

REM Tec provides tailor made agrivoltaic solutions assisting project developers and asset managers in all relevant project phases (preliminary studies, project development, construction and O&M services).

Several Agrovoltaico® fixed technologies has been developed: linear, chessboard or tunneled with semi-transparent modules systems.

The chessboard system (figure 2) was developed during 2021 using bi-facial photovoltaic modules mounted on suspended wire ropes at around 5 m height from the ground. The design tolerates a span up to 25 m between the poles allowing the circulation of wide agricultural machine. This design is compatible with large cultural fields, allowing a homogeneous shadow on the ground.

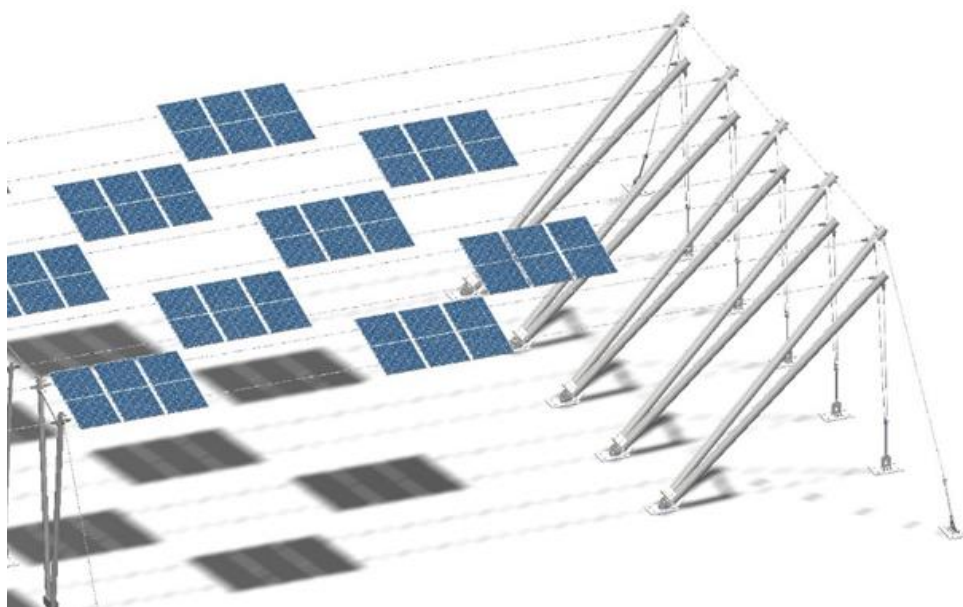


Figure 2: Agrovoltaico® fixed chessboard configuration

The design choice between fixed and dynamic agrivoltaics systems depends on several factors: land's topography, type of crop needs, shadow tolerance...

REM Tec's dynamic systems are the mono-axial and bi-axial trackers in his 3rd generation. Various monoaxial systems exist within REM Tec, the latest one developed during 2023 (figure 3) with 8 modules, and a rotation of the main axis up to 90°. This system allows an increased energy production up to 20% comparing to fixed systems, however, should be oriented E-W or N-S.



Figure 3: Mono-axial systems with 8 modules per tracker

The latest biaxial Agrovoltaico® tracker generation (

Figure), has a long horizontal tube “primary axis” of 10.5 m, supported by two truss pillars, crossed by 3 wings, each one supporting three bifacial photovoltaic modules. The distance between the trackers’ rows varies between 12 and 20 m, according to the agricultural needs of the crops beneath.



Figure 4: Agrovoltaico® Tracker 3D

The tracking algorithm is designed to improve crop growth and power production through an optimized shadow management. The combined rotation of the two axes in the 3D tracker systems allows the modules to be constantly perpendicular to direct radiation when the photosynthesis saturation has been achieved and therefore increasing the energy production up to 45% comparing to ground mounted systems. Added to that, the backtracking algorithm *VoltaicoPlus* avoids the mutual shading between the panels in the initial and final phases of the day, through a correction of the calculated theoretical position. Additionally, crop needs can be integrated in the *VoltaicoPlus* algorithm allowing an optimized agricultural development. Therefore, the tracking system guarantees a homogeneous and dynamic solar radiation for the underlying crops allowing shadow percentage management on the ground (Figure 5).



Figure 5: Management of the shadow below Agrovoltaico® tracker 3D

Several different crop types were tested like vineyards, kiwi and apple trees, tomatoes, potatoes, wheat, etc. Studies conducted in cooperation with many R&D centres show that the shadow generated by the modules has a positive impact in terms of water saving and yield; for example, a decrease of 26% in water consumption and an increase of 4,3% in agricultural yield was observed on corn crops under agriPV compared to an open field. Agricultural research conducted by REM Tec on its experimental site shows positive impact of the Agrovoltaico® system on soil humidity therefore reducing evapotranspiration and water consumption.,

To conclude with current global food and energy challenges, REM Tec offers innovative solutions for a sustainable future by integrating agricultural services with renewable energy through its Agrovoltaico® technologies, while prioritizing environmental sustainability. Through ongoing research and successful global projects, REM Tec demonstrates how agriculture and solar energy can coexist harmoniously, paving the way for a greener world.

Through his large Agrovoltaico® product portfolio and his 15 years' experience, REM Tec is the one stop shop for choosing optimized agrivoltaic technology in relationship with crop to be cultivated underneath.