ADVANCED AGRIVOLTAIC SYSTEMS FOR ORCHARDS, VINEYARDS AND OLIVE GROVES

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ABSTRACT: iGreen System was created through the synergistic collaboration between Romagna Impianti, a leader in agricultural plant engineering, and Eco Energia, one of the leading EPC Contractors in the renewable energy market since 2007. We operate in the agrivoltaic sector, using state-of-the-art technologies to ensure that each intervention is perfectly tailored to the specific needs of each company and each crop. iGreen System Advanced Agrivoltaic Systems are provided on a turnkey basis, complete with a DSS (Decision Support System) and an agronomic, photovoltaic, and data-collection monitoring platform, enabling integrated and optimized management of the systems. The agrivoltaic solutions we offer range from orchards to elevated trellis and single-row adjustable systems, as well as extensive field crops. As part of our innovation journey, we inaugurated the first agrivoltaic system on citrus crops in Italy, a project developed in Sicily that represents a major recognition and a significant milestone in the application of innovative agrivoltaic models in the agricultural sector.
Keywords: Agrivoltaics, Design, Feasibility Study

1 AGRIVOLTAIC SOLUTIONS

Agrivoltaic technology makes it possible to generate income through diversification of revenue streams, as both agricultural production and electricity generation are carried out on the same land area.

1.1 Orchards – Elevated

Single-axis tracking structures suitable for and adaptable to all the main training systems used in fruit growing: a perfect synergy capable of optimizing and improving production (Fig.1).

Particularly suitable for kiwifruit, citrus, pome fruits, stone fruits and berries.

Figure 1

1.2 Trellis Systems - Elevated

Single-axis tracking structures designed for all trellis training systems: thanks to their configuration, these systems do not hinder the mechanization of the main operations, both for management and harvesting (Fig. 2). Particularly suitable for vineyards and almond orchards.

Figure 2

1.3 Trellis Systems – Adjustable Single-Row

Inter-row, highly versatile single-axis tracking structures that can be perfectly adapted to the main trellis training systems. An excellent compromise between sustainability and production (Fig. 3).

Particularly suitable for olive groves, almond orchards, and vineyards.

Figure 3

1.4 Extensive Crops – Adjustable Single-Row

Inter-row, highly versatile single-axis tracking structures that can be perfectly adapted to all types of field crops (Fig. 4).

Figure 4

2 DDS – DECISION SUPPORT SYSTEM

The iGreen System DSS, proprietary and customizable according to the project, integrates the three secondary-level platforms, making the overall system management both effective and efficient. The DSS autonomously controls the position of the panels throughout the day,

constantly ensuring the optimal conditions necessary for plant growth.

Management ranges from maximum shading to maximum sunlight exposure, while ensuring compliance with construction regulations and guidelines for monitoring the continuity of agricultural activity in the following years.

2.2 Monitoring and data collection platform

The data collected by the DSS are stored in a proprietary platform. Analysis and preservation of this information, combined with other system parameters, form the basis for comparing the in-field results of the underlying crops' response. This enables increasingly in-depth investigations and continuous operational improvements in agronomic management.

2.3 Agronomic monitoring platform

Each system is provided complete with the field agronomic sensors required for the specific crop, agreed upon in the preliminary phase between the parties. The platform, connected to the sensors and provided to the client, collects data in real time, processes it, and makes it immediately available. This allows for detailed analyses and the ability to make proactive decisions.

2.4 Photovoltaic monitoring platform

The System is equipped with a photovoltaic monitoring device, which allows real-time tracking of electricity production and consumption. Thanks to the event history and status and error codes, the software promptly alerts any anomalies or issues. This enables optimization of the plant's performance, improving its overall lifespan.

3 INAUGURATION OF THE FIRST ADVANCED AGRIVOLTAIC SYSTEM ON CITRUS IN ITALY

On November 7, 2025, iGreen System completed and inaugurated the first Advanced Agrivoltaic System on citrus crops in Italy. Located in Terrasini (PA), this system represents a one-of-a-kind achievement and marks the beginning of a new era for the integration of renewable energy with agriculture (Fig. 5).

Figure 5

Designed, authorized, and built by iGreen System, the Advanced Agrivoltaic System, combined with citrus cultivation, was commissioned by Land Impresa Agricola Sociale; a historic organization that immediately embraced the vision of a future in which agriculture and solar energy production can coexist harmoniously and sustainably.

The design and construction of an Advanced Agrivoltaic System require multidisciplinary expertise and a cohesive team: it is, in fact, a complex ecosystem that integrates building, electrical, electronic, agricultural, and agronomic components. iGreen System approached the project with a clear strategy: to design the system starting from the preliminary feasibility study with a 360-degree vision, thus ensuring efficiency and effectiveness during the authorization phase, punctuality and precision during construction, and also providing a simple, efficient, and integrated management of the system in the years to come.

A unique and innovative feature of the system is the DSS (Decision Support System), developed and patented by iGreen System and accessible via web or iOS/Android app. The platform monitors the synergy between photovoltaics and agriculture to ensure that the system operates optimally both agriculturally and energetically.

The inauguration of the first Advanced Agrivoltaic System in Italy represents a concrete example of how agriculture and energy can truly coexist, creating added economic, social, cultural, and territorial value. A serious, professional, and virtuous approach to Advanced Agrivoltaics is now essential to successfully address the challenges of the agro-energy sector.

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