

# The Italian Network for Sustainable Agrivoltaics

## An Initiative for the Knowledge Advancement and Implementation of Sustainable Agrivoltaic Solutions

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**Abstract.** In Italy, agrivoltaic systems (APVs) are seen as a driver for getting the national targets for photovoltaics (PV) and decarbonization, to enhance innovation in the agricultural sector, and reducing the energy costs on farms, overcoming land and landscape preservation issues, which cause bottlenecks in the permitting process of PV in agricultural areas. On April 2021, ENEA, in collaboration with ETA Florence Renewable Energies, launched the first Italian Network for Sustainable Agrivoltaics, with the objective of building knowledge and good practices around APV, enabling to support the implementation of sustainable agrivoltaic solutions and to build up a shared vision of Sustainable Agrivoltaics including three dimensions: Energy, Agriculture and Landscape. In the framework of the activities of the Italian Network for Sustainable Agrivoltaics, ENEA elaborated a communication strategy in cooperation with ETA Florence Renewable Energies, tailored to the identified major target groups (scientific community, broad public, specific stakeholder/user groups, farmer associations, media) and appropriate communication channels and conceived key communication elements. With the publication of *the Guidelines for The Design, Construction and Operation of Agrivoltaic Plants* on 27 June [1], new topics open up for the future which mainly concern the design and quality assessment around APVs in which the Network can be involved, thus maintaining a role of promoting knowledge advancement in this sector.

**Keywords:** Agrivoltaic Systems, Knowledge, Shared Vision, Landscape, Energy Transition, Ecological Transition

## 1. The Italian Network for Sustainable Agrivoltaics

In Italy, agrivoltaic systems (APVs) are seen as a driver for getting the national targets for photovoltaics (PV) and decarbonization, to enhance innovation in the agricultural sector, and reducing the energy costs on farms, overcoming land and landscape preservation issues, which cause bottlenecks in the permitting process of PV in agricultural areas. Moreover, APVs can contribute to building resilience of the agrifood sector, and preserve environmental resources (soil, water, biodiversity).

The National Plan for Recovery and Resilience (NRRP) [2, pp.132-133] supports the development of innovative APVs through an investment of 1.1 billion (1.04 GWp), confirming that

APV represents a great opportunity to combine the achievement of decarbonization targets with preservation of agriculture sector.

On April 2021, ENEA launched the first Italian Network for Sustainable Agrivoltaics with the support of ETA Florence Renewable Energies [3] (Fig.1). ENEA is the National Agency for New Technologies, Energy and Sustainable Economic Development and as public body it aimed at research, technological innovation and the provision of advanced services to enterprises, public administration and citizens in the sectors of energy, environment and sustainable economic development. The Italian Network aims to build knowledge and good practices around APV, to enable and support the implementation of sustainable agrivoltaic solutions and to build up a shared vision of Sustainable Agrivoltaics, including three different dimensions: Energy, Agriculture and Landscape. In Italy, the country having the highest density of UNESCO sites worldwide, landscape is a relevant dimension for social acceptance and permitting. In addition, landscape transformation may be perceived as negative. Therefore, to promote new visions for agrivoltaics as a part on new cultural landscapes of XXI century, it is essential to contribute to the debate with dissemination of knowledge and comparing different mindsets, while facilitating the dialogue among different stakeholders.



**Figure 1.** The logo of the Italian Network for Sustainable Agrivoltaics.

To date (November, 2022), the Italian Network for Sustainable Agrivoltaics counts almost 900 subscribers, including companies, institutions, universities and trade associations, spanning from the agricultural to the energy sector, and including landscape and local decision makers. To support the achievement of all mentioned objectives, the Italian Network for Sustainable Agrivoltaics implemented a communication strategy to ensure coherent dissemination of its activities, optimal visibility and a wide outreach to all relevant targets and stakeholders. The activities of the Network are supported by the ENEA's Task Force Sustainable Agrivoltaics @ENEA, involving two departments - "Energy Technologies and Renewable Sources" and "Sustainability of Productive and Territorial Systems" – equipped with laboratories, infrastructures and long-standing skills in the sectors of green technologies and agro-industry. The Network is managed by ETA Florence Renewable Energies, which is also responsible for the website [4].

## **1.1 Communication strategy**

The Task Force Sustainable Agrivoltaics @ENEA elaborated a communication strategy in cooperation with ETA Florence Renewable Energies, tailored to the identified major target groups

(scientific community, broad public, specific stakeholder/user groups, farmer associations, media) and appropriate communication channels and conceived key communication elements. The communication strategy adopts different tools:

- the website: [www.agrivoltaicosostenibile.com](http://www.agrivoltaicosostenibile.com),
- press releases: over 10 press releases in Italian and English languages spread and over 200 articles and interviews on national and international newspapers published,
- a monthly series of thematic webinars,
- one international design competition "Agrivoltaic for Noah's Ark" ([www.sustainablephotovoltaiclandscapes.com](http://www.sustainablephotovoltaiclandscapes.com)),
- social media,
- events,
- specific toolkit, as well as logo, templates for presentations, brochures.

In this paper, we focus our attention on communication. Tools we consider more innovative and more corresponding to stakeholders' needs are: the website, a monthly series of thematic webinars, international design competition, social media and events.

### **1.1.1 The website**

The website has been online since September 2021 and to date (November, 2022) 10373 users have currently visited it.

The website, which can be reached at [www.agrivoltaicosostenibile.com](http://www.agrivoltaicosostenibile.com), provides news and up-dates regarding the development of APV in Italy, an activity which is boosted by the network's LinkedIn page. On the website, users can register for the monthly newsletter, and know about the events and online webinars organized by the Network. To date, the "webinar" webpage has been viewed by 5000 users. This data confirms the interest in webinars seen as a place to exchange knowledge and experiences on the various national initiatives on APVs development.

### **1.1.2 A monthly series of thematic webinars**

From October 2021 to June 2022, a monthly series of thematic webinars was organized by a collaboration of ENEA and ETA Florence Renewable Energies. In total 8 webinars, with about 300 registred participants each, had been implemented primarily to ensure a wide visibility of the Network, to identify and define exploitation opportunities and strategies to support a "cultural" promotion and the social acceptance of the APV.

The webinars are conceived as a place for discussion and sharing of issues where all those interested in developing sustainable APVs can find useful answers and indications and also suggest topics of interest. Furthermore, webinars are a place where it is possible to build networks of interest, make contacts with stakeholders and therefore strengthen the role of the Network at a national level. The structure of the webinar includes two external speakers on the specific topic chosen and an introductory report on the topic by an ENEA researcher chosen among the members of the Task Force Sustainable Agrivoltaics @ENEA or within the Agency. For the organization of webinars, ENEA selected the topics and speakers, provided support for the promotion of webinars on ENEA's social channels and on ENEA's websites; while ETA Florence Renewable Energies provided IT support, managed live broadcasting and promotion on the Network's LinkedIn page and group. In the webinars, an important role was dedicated to the participants who actively interacted with the speakers, always asking numerous questions, sharing their considerations and fostering a stable discussion forum. Topics of webinars covered a wide spectrum from landscape and legislative aspects to the inclusion of geospatial technologies and are shown in more detail in Table 1.

**Table 1.** Topics of webinars.

<b>Date</b>	<b>Topic of webinar</b>
October 19, 2021	Agrivoltaic systems in Italy: from project to system
November 19, 2021	Agrivoltaic systems and crowdfunding: the involvement of local communities in the landscape transformations
January 21, 2022	Agrivoltaic systems in the actual climatic and energetic emergency
February 24, 2022	Agrivoltaic systems in Italy: farms experience and projects
March 24, 2022	Agrivoltaic systems and energetic communities: a possible alliance?
April 29, 2022	Geospatial technologies in agrivoltaic systems: what possible applications?
May 27, 2022	Agrivoltaic systems: what perspectives among authorizations, landscape transformations and energy transition?
June 23, 2022	Agrivoltaic systems: permitting, authorization procedures and disputes,

The speakers involved in the webinars represent important stakeholders in the field of agrivoltaic plant development, innovative farmers, landscape architects, agronomists, legal consultants. They are those currently engaged in the development and promotion of APVs and in the analysis of landscape and agricultural transformations. In total, over 2000 participants have taken part in the webinar series, including farmers, agronomists, architects, engineers, consultants, photovoltaic entrepreneurs. Video recordings are available on the webinar page of the website, as well as on the Youtube channel, where the webinars have been viewed by over 11000 people so far.

### **1.1.3 The international design competition "Agrivoltaics for Noah's Ark"**

In the framework of the activities of the Italian Network for Sustainable Agrivoltaics, an international Landscape Design Competition named "Agrivoltaic for Noah's Ark" (Fig.2) had been promoted to award the best agrivoltaic "garden" to be built at the NeoRuraleHub company (Fig.3). This competition promoted advance research supporting a sustainable vision that includes energy, food and beauty production, and also biodiversity preservation and public spaces for the socializing. Particularly, a vision in which APVs seen as a resource for local communities, going beyond the productive value of energy and agriculture, to also add social, recreational and educational value. Thereby, APVs can provide an opportunity to transform the energy transition into an ecological transition by developing new complex visions and designs that go beyond pure technological aspects. The initiative is conceived by ENEA, the NeoRuraleHub company, the National Institute of Architecture (IN/Arch), ETA Florence Renewable Energies and the Italian Association of Landscape Architecture (AIAPP), and supported by the Ministry of Ecological Transition, Lombardy Region, Municipality of Giussago, National

Council of architects, landscape architects and conservationists, Legambiente and SITdA Italian Society of Architectural Technology along with the media partnership of Archilovers and Archiportale.

This competition had a two fold objective:

- to design an APV with an approximate size of minimum 1MWp and max 3 MWp on a total area of 8 hectares, which must enable rice cultivation within the same area. In essence, this project will suggest spatial and technological choices that allow for a synergy between photovoltaic energy generation and rice cultivation, the largest crop grown in the NeoRuraleHub company;
- to conceive the proposed APV as a part of the landscape integrating the panorama of the APV with the structural and semantic texture of the landscape itself.

In this competition, design should include three different type of area: 1) an area for biodiversity conservation; 2) an area for community and recreational activities 3) a productive area for photovoltaic technology and agricultural crops. The projects will be awarded on 27 September 2022 in Milan, during the event Photovoltaics | Forms Landscapes 2022 ([www.pv-landscapes.com](http://www.pv-landscapes.com)), on the occasion of the World Conference on Photovoltaic Energy Conversion (WCPEC8), chaired by ENEA and scheduled in the capital of Lombard on 26 - 30 September 2022.



**Figure 2.** The logo of international design competition "Agrivoltaic for Noah's Ark".



**Figure 3.** Top view of the restored fields in the NeoRuraleHub company.

#### 1.1.4 Social media

The Network manages, with the support of ETA Florence Renewable Energies, a LinkedIn group and a LinkedIn page. The Sustainable Agrivoltaics LinkedIn group was created in October 2021, and aims to connect stakeholders in the field of APV, as well as promote and facilitate the exchange of information among them. At the time of publication, the group had about 200 members. To date, the Sustainable Agrivoltaics LinkedIn page has 2900 followers and promotes information and content relating to the Network activities, also supported by ENEA on its social media accounts (Facebook, LinkedIn, Twitter, Instagram, Telegram, YouTube).

#### 1.1.5 Events

As part of the activities of the Network, ENEA and ETA Florence Renewable Energies organized 4 main events, held in national and international contexts, in which they presented the establishment of the Network, the activities and initiatives undertaken to promote the vision of sustainable agrivoltaics and to network with other important players in the photovoltaic and agricultural sector. On 11 May 2021, during the SolarPower Summit 2021 with over 2000 participants including representatives of institutions, associations, companies and policy makers of the European energy sector, the Network made its debut in Europe. On 26 October 2021, on the occasion of Key Energy, the international exhibition and conference presenting technologies, services and integrated solutions that promote and accelerate the transition towards a carbon neutral economy, an important event was held on the development of the APV. The speakers involved were expressing different points of view on the transformation of the landscape, the development of the agricultural sector. The aim of the event was to stimulate dialogue and discussion on divisive issues such as the integration between energy and landscape. On 8 April 2022, during the Solar Exhibition and Conference, organized by Key Energy, the launch of the international design competition "Agrivoltaic for Noah's Ark" was the occasion to open a space for discussion on the coexistence between landscape and renewable energy production (Fig.4). On 2 March 2022 the Italian Network for Sustainable Agrivoltaics was involved in Fieragricola, the most important international exhibition of agricultural technologies held in Italy. In this framework, the presence of the Network aimed to underline how the APV can be a new approach that offers tailored solutions capable of guaranteeing agricultural production, protection of the environment, soil, water resources and management of landscape transformations.



Figure 4. Event held at The Solar Exhibition and Conference.

## 2. Conclusions

At a time of great interest for the development of APVs, also due to the worsening of the energy and climate crisis, but also at a time of uncertainty and lack of regulatory framework and common language for APVs, the Italian Network for Sustainable Agrivoltaics was launched. In this context, the activities carried out by the Italian Network for Sustainable Agrivoltaics have been considerable to build knowledge and good practices around the APVs, with the awareness that tailored solutions are needed for an agricultural sector in which there are farms of different sizes and economic dimension. Furthermore, the activities aimed also at building a shared vision boosted by ENEA of Sustainable Agrivoltaics comprising three dimensions: Energy, Agriculture and Landscape. Thanks to the activities carried out in recent months, the Network has established a permanent dialogue with the various stakeholders. As a part of these activities, ENEA, acting as spokesperson for requests collected from the interaction with the various stakeholders met, participated in a collaborative working group for the drafting of *the Guidelines for The Design, Construction and Operation of Agrivoltaic Plants* which were published in Italy by the Ministry of Ecological Transition, on June 27. They clarify the minimum characteristics and requirements a photovoltaic system must have to be considered “agrivoltaic”. The working group was coordinated by the Ministry of Ecological Transition, in collaboration with the Council for Agricultural Research and Analysis of Agricultural Economics (CREA), Gestore dei Servizi Energetici S.p.A. (GSE), and Research on the Energy System S.p.A. (RSE). With the publication of the Guidelines, new topics open up for the future which mainly concern the design and quality assessment around APVs in which the Network can be involved, thus maintaining a role of promoting knowledge advancement in this sector.

## Data availability statement

Data available from the corresponding author upon reasonable request.

## Author contributions

Conceptualization, Alessandra Scognamiglio, Federica Colucci, Angela Grassi; writing—original draft preparation, Alessandra Scognamiglio, Federica Colucci, Laura Moretti; writing—review and editing, Alessandra Scognamiglio, Federica Colucci, Angela Grassi, Laura Moretti, Giulio Poggiaroni.

## Competing interests

The authors declare that they have no competing interests.

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