# D8.2 Strategy for the European Agrivoltaics community

Symbiosyst

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# Executive Summary

Agrivoltaics systems can be interpreted as social-ecological systems contributing to the energy transition, therefore they require systemic knowledge and design approaches and fully multi-disciplinarity and trans-disciplinarity. Agri-PV research and implementation is in an early stage, and there is a need to empower the few available knowledge exploitation among the main actors and stakeholders, first of all farmers, at the different levels.

Web platforms and networks mobilitate human resources, knowledge and expertise at the different levels: those are similar to arenas where market actors, scientific community, policy actors and local stakeholders can meet and exchange different types of knowledge. Currently platforms and networks appear promising in empowering knowledge exploitation. For this purpose, in September 2023 (M9), Symbiosyst launched a European network for the development of agrivoltaic systems, called the "*Cross European Cooperation for Agrivoltaics* Development". This deliverable, due in December 2024 (M24), reports on the first outcomes of the "*Cross European Cooperation for Agrivoltaics Development"* after 15 months of activity.

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# 1. INTRODUCTION

Agrivoltaic systems (Agri-PV) can be interpreted as social-ecological systems contributing to the energy transition [1, 2, 3, 4]. Agri-PV systems require therefore systemic design approaches and fully multi-disciplinarity and trans-disciplinarity [5, 6]. Agri-PV research and implementation is in an early stage, thus there is a need to empower the few available knowledge exploitation among the main actors and stakeholders, first of all farmers, at the different levels (from local to regional and national [7, 8, 9, 6].

Web platforms and networks mobilitate human resources, knowledge and expertise at the different levels: those are similar to arenas where market actors, scientific community, policy actors and local stakeholders can meet and exchange different types of knowledge [10]. Among the other tools networks and platforms use webinars and in presence events as seminars and workshops [11].

EU member states are currently promoting and funding Agri-PV systems, among the others Italy, Germany, France, where national associations for the development of Agri-PV, as the Italian *AIAS* (Italian Association Sustainable Agrivoltaics) or the French *France Agrïvoltaisme* have been established.

With regards to Italy, the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), launched in 2021 the Task Force SustainableAgrivoltaics (AgrivoltaicoSostenibile@ENEA), promoting the concept of sustainable Agri-PV systems: those aiming at synergies not only between energy and food but also within the landscape, ensuring public acceptance [7, 12].

In 2021 ENEA and ETA-Florence, both partners of the Symbiosyst project, started the *Italian Network Sustainable Agrivoltaics*, whose aim was to give an answer to knowledge demand and sharing on good practices and data within the development of sustainable Agri-PV systems. The concept of Sustainable Agrivoltaics had relevant impact on policy making and in June 2022 ENEA and other research institutions and key stakeholders were directly involved in the writing of the Environmental Ministry guidelines on the development of Agri-PV systems. The Italian Network Sustainable Agrivoltaics gained popularity and impact through the organization of a series of training webinars on topics and issues related to the Agri-PV systems development in Italy and the organization of a design competition for Agri-PV systems in Lombardy region for a farm doing rice fields and nature development [12]. In November 2022 the Italian Network for Sustainable Agrivoltaics reached almost 900 subscribers, “including companies, institutions, universities and trade associations, spanning from the agricultural to the energy sector, and including landscape sciences and local decision makers” [12, p. 2].

Symbiosyst project aims to promote innovative Agri-PV systems with the ambition to create a symbiosis where PV and agriculture can have a mutually beneficial relationship, with positive ecological and cultural impacts on the landscape. Symbiosyst develops integrated solutions, from design to implementation, that aims at: 1, demonstrating the feasibility of Agri-PV; 2, adopting monitoring and controlling systems for PV modules and crop yield; 3, limiting the impact of PV on crop yield; 4, Digitalizing farming tools; 5, Improving systems for water supply and mitigation of climate change impact; 6, conducting sustainable agriculture; 7, enlarging and strengthening social acceptance through participatory approach; 8, protecting and enhancing biodiversity; 9, realizing guidelines for Agri-PV systems landscape integration. This broad spectrum of objectives requires fully multi-disciplinarity and trans-disciplinarity and knowledge exchange beyond the project consortium partners at different levels. Among the Symbiosyst project objectives it is relevant to mention here the number 7 and 8.

Those are strongly interlinked to this deliverable and will be defined at regional level (NUTS 2), for the regions hosting the project demos.

Concluding, National networks and associations for Agri-PV development are strongly focused on topics and issues which are limited to each member state social-ecological systems and related regulations. International conferences such as EUPVSEC and Agrivoltaics Europe, or working groups as ETIP-PV are at present the only tools for knowledge exchange, yet those are limited in time and scope, while network and related platforms appear in literature as prominent tools to pursue in such knowledge exchange at EU level.

This deliverable shows the first outcomes of the Symbiosyst project network and platform called "Cross European Cooperation for Agri-PV development" aiming at creating the first cross European platform and network dedicated to Agri-PV for knowledge exchange.

# 2. TOWARDS A EUROPEAN COMMUNITY FOR AGRIVOLTAICS

With reference to the experience of the Italian Network Sustainable Agrivoltaics, the Symbiosyst project launched in September 2023 (M9) *the "Cross European Cooperation for Agri-PV Development".* The network was launched during the European Photovoltaic Conference in Lisbon (EUPVSEC, 18-22 September, 2022). The cooperation is approached in a multi-disciplinarity and trans-disciplinarity knowledge exchange, therefore aiming at the engagement of actors and stakeholders at different levels and at the differentiation of knowledge per regions at least for those topics and issues related to the Symbiosyst project objectives 5-6-7. The network objectives are the following:

a) search for relevant Agrivoltaic experiences and pilot plants in all EU regions as for example other Agrivoltaic projects funded by Horizon EU (or other programs), stakeholder networks, pilot developers, etc.;

b) good practices knowledge sharing and spillover effects among difference disciplines;

c) transfer the knowledge in new Agri-PV experiences;

d) setting an EU community on Agri-PV based on the differentiation of regional knowledge;

e) make EU regions emerge as main actors in the regulation and planning of Agri-PV systems.

The methodological framework is reported in the image below (Figure 1). The framework foresees a call for Agri-PV experiences, started in Lisbon in September 2023, the call is continuous and lasting as long as the project. Interested actors and stakeholders that want to share Agri-PV experiences subscribe to the cooperation by following a QR code giving access to a questionnaire. In the questionnaire subscribers are asked to give their generalities, including the name of the institution, firm, enterprise, association etc., specify the field of competence or

background (energy, agriculture, landscape planning and design) and to mention one or more critical topics/issues in Agrivoltaics development. The mentioned topics/issues are at the base of the knowledge exchange: training webinars for the project partners and the cooperation subscribers are regularly organized on Agri-PV topics/issues inspired by the knowledge demand requests. Furthermore, at regional level, subscribing actors and stakeholders are involved in the Symbiosyst project through demo field visits and workshops in South Tyrol (Italy), Catalonia (Spain), Calabria (Italy), and also in the country where the demo owner with the closed greenhouse is located (Tasks 6.4 and 8.4 in WP6).

Since its launch the cooperation is considered as a tool for Symbiosyst dissemination and communication in a mutual relationship. The Symbiosyst project final event is intended to serve as the first gathering of the cooperation subscribers. It was scheduled to take place in Brussels, Belgium, in November 2026; however, the date may be postponed following recent developments in the project status. Among the other project WPs and tasks outcomes, a strong focus is on the differences in between the involved EU regions (NUTS2 regions) in the planning and regulating of Agri-PV systems and in the role of different actors and stakeholders.

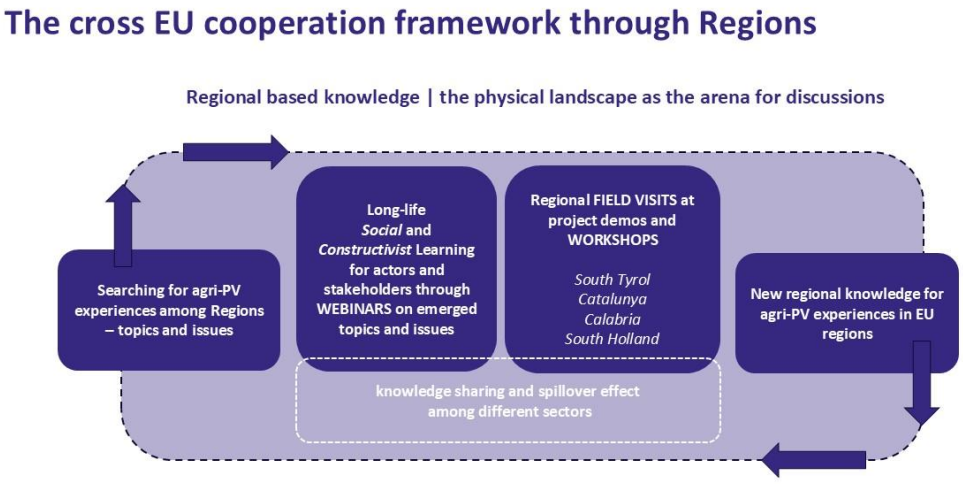



*Figure 1. The framework of the cross European Cooperation for agri-PV systems.*

# 3. FIRST OUTCOMES

In December 2024 (M24) the cooperation reached the number of 81 subscribers. The image below (Figure 2) shows the provenience of subscriber actors and stakeholders distinguished per NUTS 2 EU regions, extra EU and International. This distinction was based on the address of firm/institution/enterprise headquarters and main acting areas. Those considered international are actors whose headquarters are set in different countries around the world. The highest demand of knowledge comes from Italian regions, Apulia on top, 14 subscribers, on total 57, then from Spanish regions, Murcia on top, 12 subscribers on total 57.

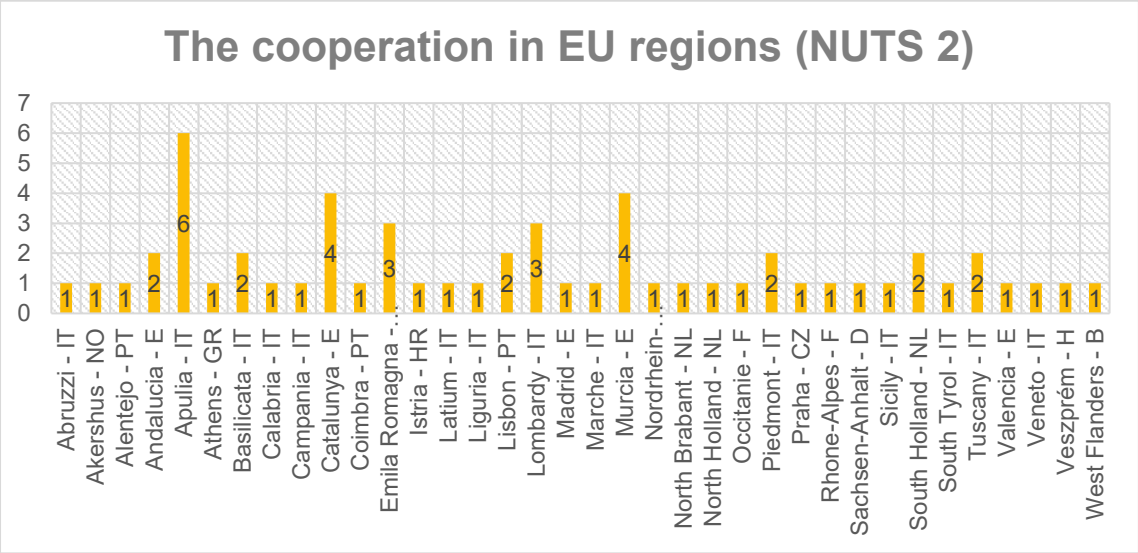



*Figure 2. Number of subscribers from EU regions.*

Ten subscribers are part of multinational companies, while extra-EU countries, Algeria, Cameroon, Mozambique and Zimbabwe are represented from one subscriber, while India and United Kingdom by two subscribers, and Turkey by three subscribers. The image below (Figure 3) reports on the distribution of the field of competence/background (energy, agriculture, landscape planning and design). The majority of subscribers comes from the energy field of competence.

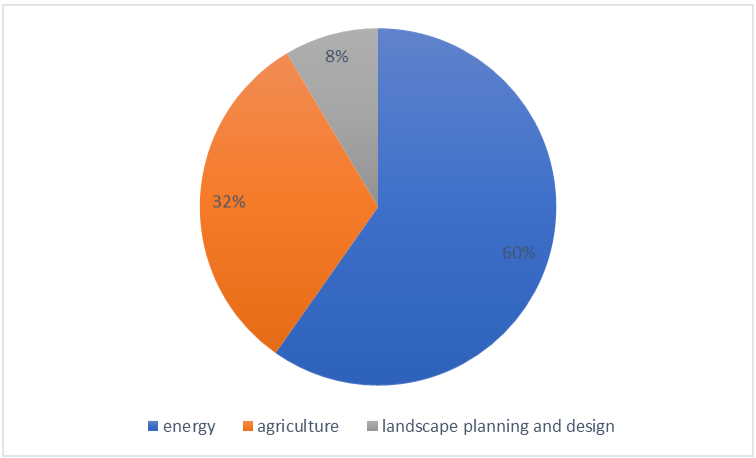



*Figure 3. The distribution of field of competence among the total of 81 subscribers.*

The image below (Figure 4) reports on the combination of subscriber target group (see D 8.1) per field of competence.

In the agriculture, energy and landscape planning and design fields of competence there is higher demand of knowledge among the market actors than in the scientific community.

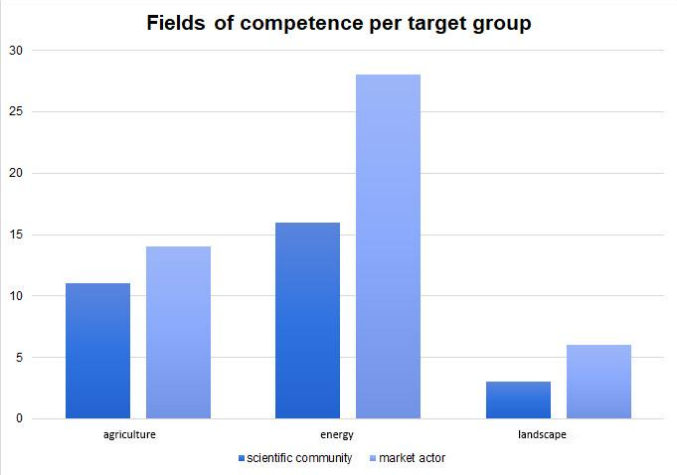



*Figure 4. The combination of subscriber target group per field of competence*

The table below (Table 1) summarizes the main knowledge demand emerged among subscribers from different target groups and fields of competence and an indication of dedicated webinars.

*Table 1: The knowledge demand emerged after 15 months of activities of the cooperation*

| Knowledge demand | Main target group/ field of competence | Dedicated webinar at M24 | Explanations |
|---|---|---|---|
| Sharing data | Scientific community/Energy and agriculture | 08.06.2023 Webinar" Open Science in Horizon Europe" | Researchers active in Agri-PV research and looking for data from different applications in crops and landscapes |
| EU policy and regulations | Scientific community/Agriculture | To be set | Researchers investigating the way to integrate Agri-PV in agriculture policies and regulations at regional level |
| Landscape integration of Agri-PV and Biodiversity, Rural Development | Scientific community/Landscape planning and design | 09.11.2023 Webinar "Biodiversity and agrivoltaics: above and below the ground line" \| 06.06.2024 Webinar "Benefits for sustainable farming and ecosystem functions in Agrivoltaic systems" | Researchers or landscape architecture firms investigating the relationship in between Agri-PV and regenerative farming and nature development and the way Agri-PV cans support landscape restoration and rural development |
| Effects of Agri-PV on crops | Market actors and scientific community/Agriculture | To be set | Market actors looking for demonstrators that can provide data on the effect of |

| | | | |
|---|---|---|---|
| | | | Agri-PV systems on different crops. A special attention is to Mediterranean crops that agriculture market actors think Agri-PV could protect from climate change phenomena |
| Modelling and optimization of Agri-PV | Scientific community/Energy | To be set | Researchers interested in modeling approaches for Agri-PV systems |
| Design of the layout and mounting structures | Market actor/energy | To be set | Market actors as industries active in the construction of mounting structures for Agri-PV and interested in new input and date to enhance structures and layouts |
| Monitoring | Scientific community/energy | 17.10.2024 Webinar "Parameters and tools for monitoring Agrivoltaic systems" | Researchers developing methodologies for monitoring Agri-PV systems and creating lists of KPIs. |

At present subscribers from the different target groups are invited to join Symbiosyst training webinars. Webinars are gaining popularity, reaching the minimum average number of 200 subscribers each time.

## 3.1. RELATION WITH OTHER ACTIVITIES IN THE PROJECT

Table 2 presents the main links between Deliverable D6.5 "Best Practice and Demo Catalogue" and the other activities carried out within the SYMBIOSYST project.

The Cross-European Cooperation contributes to D6.5 by facilitating the exchange of knowledge and experiences at regional level and by promoting initiatives of local relevance, such as demonstrator field visits and co-design workshops implemented under Task 6.4.

Furthermore, the survey conducted within the Cross-European Cooperation includes open-ended questions through which participants can report existing Agri-PV systems known to them. The information collected through this process may provide additional case studies and examples to be included in the Best Practice and Demo Catalogue.

*Table 2: Relation between current deliverable and other activities in the project*

| **Project activity** | **Relation with current and future deliverable** |
|---|---|
| WP6 tasks<br>Task 6.4 *Supporting the interaction with stakeholders and* | D6.5 Best practice and demo catalogue due at the end of the project (M48). This deliverable is a book, collecting a selection of examples of best practices of agrivoltaics, based on an |

| | |
|---|---|
| *fostering participation* and Task 6.5 *Best practices and demo catalogue* | appropriate analysis, descriptive methodology and selected key-messages. |

# 4. DISCUSSIONS AND FUTURE EFFORTS

After approximately 15 months of Cross-European Cooperation activities, two main challenges were identified.

The first challenge relates to the way stakeholders approach Agri-PV knowledge and information. Feedback collected through subscriptions, interactions and survey responses indicates that many stakeholders tend to focus on specific disciplinary aspects according to their professional background, such as energy, agriculture or policy-related topics. However, Agri-PV systems require the integration of knowledge from multiple disciplines, including agriculture, energy, environmental sciences, economics, landscape planning and social sciences.

This finding highlights the importance of promoting interdisciplinary approaches and facilitating dialogue among stakeholders with different expertise. In particular, there is a need to strengthen opportunities for cross-sector knowledge exchange and mutual learning.

The second challenge concerns the further consolidation of the Cross-European Cooperation as an active and sustainable network. While the initiative has attracted interest from different stakeholder groups, continued efforts are needed to increase participation, stimulate interactions among members and strengthen its role as a platform for knowledge exchange on Agri-PV systems.

**Lessons Learned**

The activities implemented during 15 months of Cross-European Cooperation demonstrated the value of combining different dissemination and engagement formats. In particular**, webinars** organised within the framework of the Cross-European Cooperation have provided opportunities to address Agri-PV topics from multiple perspectives and to connect expertise from different fields.

*Table 3: List of webinars organised by ETA up to M24*

| Date | Title |
|---|---|
| 8/06/2023 | Open Science in Horizon Europe |
| 9/11/2023 | Biodiversity and agrivoltaics: above and below the ground line |
| 6/06/2024 | Benefits for sustainable farming and ecosystem functions in agrivoltaic system |
| 17/10/2024 | Parameters and tools for monitoring Agri-PV systems |

Feedback from participants suggests that future online events could further enhance interaction among attendees, for example by allocating additional time for discussions, questions and

exchanges of practical experiences. Such approaches may contribute to fostering interdisciplinary dialogue and increase the added value perceived by participants.

**Future Actions**

To address the challenges identified above, SYMBIOSYST will continue to develop activities aimed at strengthening stakeholder engagement and knowledge exchange.

Particular attention will be dedicated to **regional demonstrator field visits** and co-design workshops organised in collaboration with WP6 activities. These events provide opportunities for stakeholders from different sectors and backgrounds to meet in person, exchange experiences and discuss opportunities and challenges related to Agri-PV deployment at local and regional level.

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