Sustainable Agrivoltaic Integration Challenge: SUS.AV.I

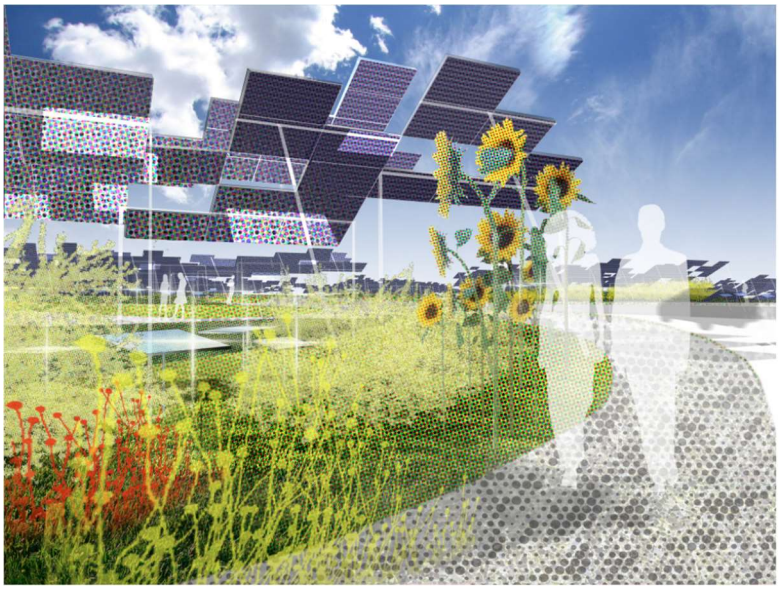
Multifunctional Landscape and Social Planning
CHALLENGE
Planning and Setting Up the UCSC AV Urban Garden
(Piacenza, IT)

SUS.AV.I Student Award

OBJECTIVES OF THE CHALLENGE

Agrivoltaics (AVs) are renewable energy systems that combine food production with electricity generation from solar photovoltaics (PV). AV systems, contrary to PV plants that are optimized for the conversion of solar radiation to power, integrate and balance the production of electricity with that of agricultural products, also considering the provision of other ecosystem services and social acceptability.

Research and development on AVs have increased steadily in recent years to address the questions: "How is crop production affected under PV panels?" and "How can energy and food production be co-optimised on the same land?" Beneath solar PV panels, crop production can increase, decrease or remain unaltered depending on the crop species, the design of the PV system and local environmental conditions. The design is particularly important when considering social acceptance, one of the main bottlenecks of AVs, and the successful integration of AVs in the landscape.



Rendering of the University of Buffalo challenge.
Available at http://www.balmori.com/portfolio/university-of-buffalo-solar-park?rq=buffalo

The main aim of this challenge is to design innovative AV systems that integrate the advantages of AV technologies seamlessly with the surrounding landscape, generating new possibilities in terms of shared public spaces for interaction and social value creation.

In order to achieve this, the core idea of SUS.AV.I is based on a new vision of AV as not only being environmentally and economically sustainable but also representing a resource for the community where it is inserted, following a broader take on the idea of ecosystem value. The proposal should integrate the highest CSR criteria.

In light of this, the projects will have to be organized functionally around the concepts of urban food production, social integration, community gardens, meeting points for the university community, zero km market, research, learning and networking space. The projects can also implement nature-based solutions. The AV system should therefore turn into, more appropriately, an urban AV garden.

In this context, **the final objective of the projects is to design and detail a rendering for the AV plant that will be built at the Università Cattolica del Sacro Cuore (UCSC), campus of Piacenza**.

The competition is intended for students who are interested in making a contribution in the field of PV integration, sustainable urban agriculture and landscape design.

FURTHER INFORMATION

Site and technical constraints

- Site coordinates: 45°02'15.8"N 9°43'46.1"E
- The future use of the agrivoltaic plant is already partially determined: It will host experimental field trials, it will produce food for the canteen of the university, there will be a social garden available to the local community and the plant will also be a demonstration to showcase agrivoltaic solutions. The maximum capacity of the AV plant will be 500 kW.
- The project will be built with REM TEC Agrovoltaico® technology. This technology consists of a biaxial system, placed 6 m above the ground, able to maximize energy production. The presence of bi-facial photovoltaic modules (605 Wp, model 3D-T2.1) enables the maximisation of electricity production per unit area. The trackers number will be 34, oriented 131° N.
- The project plan and specification to the modules will be attached to this document. It must be noted that the plan is not to scale.

The three-dimensional AV pattern (normalized “pore space”, being the pore space in between the PV modules and in between the PV modules and the ground) corresponds to certain spatial configurations of an AV system.

The orientation of the pattern stripes (the PV modules), which until now is mainly related to energy performance issues, with the 3D Agrovoltaico Technology can be varied to meet other objectives, such as the creation of pathways in designed areas of the landscape for people to walk on. The density of the PV pattern influences the amount of the yearly irradiation, while specific pattern configurations (geometrical arrangement of the PV modules) influence the homogeneity of the irradiation on the ground (which affects crop production). The height of the PV modules from the ground influences the degree of connectivity (the degree to which the landscape facilitates or impedes movement among resource patches) of the system.

The project presented for this challenge can deviate from the one that will be developed at UCSC. The size can vary from 300 to 500 KWp. Thanks to the double axis technology, the orientation of the trackers can also be modified without significant variation in electricity generation. Preferably, the trackers should be grouped in blocks of 4, or multiples of 4.

The distance between arrays of trackers can vary from 15 to 20 meters (reducing the distance only cause small reduction in energy generation). The height of the trackers can vary from 5 to 6 meters.

N.B.

The area is intended to be a public space, therefore safety requirements must be respected.

ORGANIZERS & SPONSOR

Organizer: Università Cattolica del Sacro Cuore, Sede di Piacenza in the framework of AgriVoltaics2022 conference

Sponsor: REM TEC s.r.l. , Asola (IT)

TECHNICAL SPECIFICATIONS & SUBMISSION REQUIREMENTS

Language: The official language of the competition is English.

Technical documents:

- General photos of the area of the plant, specific plan of the area;
- General and local norms to respect;
- Specifics of the 3D-T2.1 AV panels;
- Measurements of the lot and AV plant.

REQUIRED PROJECT OUTPUT

a) REPORT
One merged PDF file, not over 10 MB, of max. 6 pages where the detailed solution will be presented. The file must include all aspects of sustainability (social, environmental and economic).

b) RENDERINGS
At least 3 renderings, described in detail and conceptually linked to the report. There is no preferred format. Additional material, such as drawings, sketches and schemes are allowed but should be included as supplementary material.

A **motto**, both for the graphical and the textual part, representing the spirit of your project should be included, together with the **group leader's name**.

PARTICIPATION AND FINAL PROJECT SUBMISSION

In order to participate, an email should be sent to: info@agrivoltaics-conference.org

The subject of the email **should include "SUS.AV.I" and the groupleader's surname. The email should contain the names of all project members and the project motto.**

All projects must be submitted via email **by 10th June 2022, 12:00 CEST at the latest**.

EVALUATION AND FINAL PHASES

After a first evaluation of the completeness of the submitted projects, the selection of winners will be based on the following criteria:

- Uniqueness, innovation and general quality of the proposal, with particular attention to the social and landscape integration of the AV;
- Maximisation of ecosystem services;
- Extent of nature-based solutions approach employment;
- Compatibility with the already established intended uses;
- Clarity and cohesiveness of the proposal and the supplementary material.

The final score will be determined from a maximum of 20 points.

WINNING PROJECTS

The two top ranking projects will win a monetary prize of 1000 and 500 Euros respectively. The award ceremony will take place on 17th June 2022 in the afternoon session on landscape integration as the final event of the Agrivoltaics2022 Conference in Piacenza. During the session, the two winner groups will have a chance to give a short oral presentation of 10 minutes on their project.

The winners will be notified by email before the conference.

Best of luck!

The UNICATT and AgriVoltaics2022 Organizing Team