Company: Enel Green Power
Project name: AgriPhotoVoltaic – Sustainable multipurpose land use and biodiversity preservation
Project location: Spain, Greece, Italy

Please provide a short project description (5 lines) with link to any webpages which provide more detail:

The AgriPhotoVoltaic demo program, launched in 2021, is focused on the possibility to make agricultural activities coexist with utility-scale ground-mounted photovoltaic plants, adopting sustainable practices regarding land use and improving the ecosystems' biodiversity of the site. Nine testing sites are involved in Europe (i.e. Spain, Greece and Italy), with different climate areas and plant layouts. The crops under the testing phase are different species, from aromatic to medicinal herbs, food plants, cosmetic crops, fodder and melliferous flowering mix to also encourage the establishment of pollinator species. In addition, a network of proximity sensors, integrated with the more innovative remote sensors, based on the estimation of indexes developed on the basis of satellite images, have been implemented, in order to monitor the effects on the agricultural and solar side. The program, in fact, promotes the integration and coexistence of multiple businesses on the same land but also is fostering the adoption of advanced farming techniques with high-tech and digital tools for the benefit of the farming partner who can thus improve their competitiveness in the market.
Specific solutions to safeguard local biodiversity and improve ecosystem services within the plant and marginal areas have been implemented, through the creation of specific corridors between the PV module rows or dedicated biodiversity hot-spot. High-tech hives have been also installed, to assess the environmental health status of the surrounding areas, through the monitoring of the bees as biosensors.
EGP is promoting also a multi-stakeholder approach, evaluating new and sustainable business models, involving local farms and communities with the aim to foster a diversified land use, improve ecosystem services and create shared value.

1. What are the technologies involved in this project (hydro, wind, grids, hybrid projects [e.g., agrisolar])?
   The technology involved is photovoltaic.

2. How did you take into account the relevant biodiversity and environmental protection legislation in this project? During which phase of the project were these considerations analysed and integrated into the project? Did you anticipate concerns around biodiversity and environmental protection for this project, and if so, what did that process look like and during which phase of the project did this occur?
   Before implementing the tailor-made solutions of the demo tests in each plant, detailed environmental and ecological assessments have been carried out, taking into account also the surrounding areas and the specific vocation. This preliminary information has been used for the design of the demo tests, differentiating the targets of the crops/habitats implementation, not only for agricultural activities (crops, grazing, etc.) but also to preserve the wildlife habitat and biodiversity and improve the ecosystem services.

3. What makes this project innovative?

   The innovation introduced by EGP concerns the development of agro-zoological solutions that can be integrated with new large photovoltaic plants (called "ground" plants), without

requiring significant changes in plant layout and/or panel density. The solutions under study provide for the occupation of the free spaces between the rows of single-axis trackers with low plantations, so as not to create shading on the panels. The tests are located in different climate regions and are evaluating the impacts of different agricultural activities in different solar technologies (fixed and on trackers), panels (monofacial and bifacial), and layouts (different distances between modules rows). The crops under the testing phase are different species for different markets, from aromatic to medicinal and medical herbs, food plants (vegetables, pulses, etc.), cosmetic plants (aloe, etc.), fodder plants and flowering plants to also encourage the establishment of pollinator species. In addition, proximity sensors, integrated with the more innovative remote sensors, based on the estimation of indexes developed on the basis of satellite images, have been considered.

4. Did you collaborate with stakeholders outside of your company (authorities, local communities, NGOs, etc.) and if yes, with whom? Can you describe your experiences with these external stakeholders? Were you able to integrate community concerns into this project?
   The experimentation is being developed thanks to partnerships with universities and research institutes, industrial companies, engineering firms, non-profits, and startups, on the basis of Open Innovability® approach, which aims to seek out the best ideas and resources also outside of the Company. In this way, very specific and complementary fields of expertise have been brought on board to ensure a global approach in the definition of the experimental program. Moreover, external factors to the selected sites have been considered, with the aim to promote a diversified use of land, improve ecosystem services and create shared value for the local community through a multistakeholder approach that can engage a multitude of interested parties. The real involvement of the local stakeholders will be implemented after the experimental program completion, when the results and the mutual benefits of the integration of the two businesses, the energy and the agricultural production, will be fully assessed.

5. How did data enable this project and what data did you collect? Of the collected data, what was provided to regulators and authorities as part of the permitting process?
   A network of sensors is used to monitor the effects on the agricultural and solar side.
   The program, in fact, not only promotes the integration and coexistence of multiple businesses but also is fostering the adoption of advanced farming techniques with high-tech and digital tools for the benefit of the farming partner who can thus improve its competitiveness in the market. A further development that could be imagined is the creation of new professional and skilled figures such as the agri-photovoltaic operator, who is also capable of specific O&M actions. The adoption of this model could also help to minimise the abandonment of agricultural areas and create new development opportunities for neighbouring areas.
   These data will not be provided to regulators and authorities, since the experimental program is carried out on a pilot scale in PV plants already in operation.

6. Please describe the experiences surrounding the permitting process for this project, including any bottlenecks you faced:
7. Please describe any permitting bottlenecks this project faced specific to land use change:
8. Did you receive public funding for this project? If so, please describe from which funding source (local, national, EU-level, international) and the application process you faced in

attempting to secure this funding (including any special requirements conditional to the funding programme):
No public funding have been received for the project development and execution.

9. Please choose at least **one** of the following questions to answer which is relevant to this project:
10. Does this project regenerate previously degraded natural habitats or ecosystems? If so, how was this achieved or how did your company integrate this restoration into the project?
11. OR
12. Does this project protect or provide alternative, undisturbed, comparable habitats for protected species? If so, how is this achieved or how did your company integrate this protection into this project?
    Specific solutions to safeguard local biodiversity and improve ecosystem services within the plant and marginal areas have been implemented, through the creation of specific corridors between the PV module rows or dedicated biodiversity hot-spot
    In one site, for example, in the free areas between two rows of panels, techniques have been tested to protect and improve the habitat of steppe birds, which are naturally resident in this area. All this is possible through the implementation of a leguminous species, which provides food for this species of birds and which, by promoting the oxygenation of the soil and avoiding the formation of weeds, favours their nesting.
    In another one, EGP has realized a biodiversity hot-spot in a marginal area, restoring a strip of semi-natural grassland, typical of the surrounding ecosystems, maintaining as far as possible the ecological continuity with the surrounding context, providing space, habitat and forage for pollinator species (bees, butterflies, etc.) and improving the general ecosystem services of the area
    A number of high-tech hives have been also installed, to assess the health of the surrounding environment, through the analysis of the bees' state of health, which can be considered biosensors.
13. OR
14. If a previous project was found to be environmentally detrimental and your company was able to course correct to not only mitigate, but reverse the negative effects, how was this achieved?
15. OR
16. Did this project take into account effects on soil composition or the GHG impacts of land use change? If so, does this project comply with existing regulations around maintaining soil quality or land use, or does this project go beyond what is required? If so, what did you do in excess of the existing regulations?

17. Photos (if available):