



WHERE TWO WORLDS MEET



Placing agriculture at the heart of the energy transition, Voltalia is pursuing the objective of associating the world of energy and agriculture through its strategy, activities, and projects, to find new solutions to current and future challenges.

The company develops virtuous models of operating collaboration between agricultural and photovoltaic (PV) production, by combining the uses of the same land, and jointly builds these models with the various players in the agricultural sector – respecting the various deadlines of all involved.

Through its ground-mounted solar power plants, multiple actions have been implemented, with projects in the communes of Brignoles and Le Castellet in France. In these locations, grazing agreements have been established with local shepherds, and also a partnership with a beekeeper has been reached, so that he can set up his hives within the fenced enclosure of the park. The shepherds also take advantage of the secure areas provided by the solar parks so they can graze their herds in optimal conditions, which allows a space of tranquillity from the dangers of predators.



T **Luce Reboul, Voltalia, France,** considers the combination of agriculture and photovoltaic production, to maximise land use whilst obtaining renewable energy.





Figure 1. Canadel solar power plant located in Brignoles, in the Var department, France.

This mode of operation is based on a win-win principle, because on the one hand, the shepherd and his herd benefit from a fenced enclosure ensuring security, but also from free fodder areas, and on the other hand Voltalia limits the use of mechanical mowing, and its carbon impact.

Complementing the production of renewable energy production, complete agricultural activities are found on spaces that were not initially intended for agricultural use. In addition to the production of green electricity, these projects have consequently enabled areas to be reopened to agriculture.

Connecting agriculture and innovation

For several years now, Voltalia has also been increasingly committed to the development of an innovative agrivoltaic solution to support farmers in the emergence of a new agricultural model that is more sustainable and more respectful of the environment.

These projects, developed during national calls for tender, allow Voltalia to be part of a recognised research and development approach. Importance is given to the initiation of innovative and experimental projects whose production systems vary from one farmer to another (arboriculture, horticulture, market gardening, etc.).

Indeed, through these projects, Voltalia is keen to transmit conclusive and robust summary reports, within the scope of the agronomic monitoring that it has carried out with partner agronomic research organisations and entrepreneurs. To be able to guide change in agricultural practices, Voltalia aims to be a player in the creation of a database that can be used by the various agricultural sectors. The reference agricultural technical institutes will thus benefit from feedback on the agrivoltaic solutions that are increasingly present in our environment.

Installation of the agrivoltaic concept

These agrivoltaic installations consist of systems that make it possible to couple secondary PV production to a main agricultural production, by allowing a provable operating synergy. These innovations concern PV systems equipped with tools and monitoring services to optimise agricultural and electrical production.

The current concept consists of setting up a PV structure above agricultural areas, high enough (for example 4.5 m at the lowest point, under a trellis), to allow the passage of agricultural machinery, without restricting the farmer from working his land. The tracker modules are drivable, in order to optimise the agricultural production, if necessary.

The primary objective is to protect cultures from climatic changes and hazards, which are becoming more and more frequent and devastating.

Several projects with operating systems have already been designated awards of this call for tenders, and one of them is currently under construction. Some examples are outlined next regarding current operating systems that have been highly successful.

Farming

An agrivoltaic field project with an installed capacity of 3 MW on approximately 4.5 ha. was selected as the winner. Located in the commune of Saint-Etienne-du-Grès, France, this project is being carried out in collaboration with a farmer specialising in the production of salads.

The research themes include assessment of the pedoclimatic context under the agrivoltaic structure, as well as monitoring the growth and development of salad varieties that are 'sensitive' to high temperatures.

The project is of interest to the farmer because his salads will be protected from the burn of the sun; he will be able to produce heat-sensitive salad varieties even in the summer time; water needs and irrigation costs will be reduced; and that a fixed irrigation system that does not need to be dismantled will be in place.

Arboriculture

Another project with an output of 3 MW and installed on approximately 5.2 ha., located in the commune of Salon-de-Provence, France, concerns the implementation of the agrivoltaic solution and will be carried out on an arboricultural production system. The farmer will produce peaches, apricots, and cherries.

The research topics are based on the evolution of production yields thanks to the protection of fruit trees and their respective productions during climatic episodes (hail, rain, wind, etc.), as well as the diversification of production (old varieties).

The project is of interest to the farmer because his orchards will be protected against the increasingly frequent climatic hazards (hail, drought, heat wave, etc.); the effect of wind will be limited; water requirements will be reduced; and production workshops diversified.

Viticulture

A partnership with a winery near Narbonne, in the Aude, France, has been concluded in the context of the development of an agrivoltaic project. It will cover a power of 3 MWp and a surface area of 4.6 ha. of vineyards to be replanted. As with all the other projects, agronomic monitoring is being set up with partner research organisations, and the project will be based on a control area cultivated under the same conditions but not covered by agrivoltaic trackers.

The project is of interest to the farmer because the vines will be protected against the recurrence of climatic hazards (hail, drought, heat waves, etc.) and damage to crops will be limited; there is the possibility to integrate

anti-hail nets and/or an irrigation system; the acidity of the grape varieties will be preserved and optimised; fruit ripening will be controlled and sugar and alcohol levels regulated; soil evapotranspiration will have better management; the effects of wind can be limited and water requirements significantly reduced; and virtuous wine production can be developed by mixing hand-picking and green energy production.

Long-term objective

Through these various projects, Voltalia continues its commitment to the creation of an agrivoltaic reference system and the company has a real desire to bring viable and sustainable solutions to the agricultural world by creating efficient models that can be duplicated and adapted on a case-by-case basis. Through these projects, Voltalia is committed to the energy transition, but also to the agricultural transition, and it participates in the development of references for the agrivoltaic sector.

Reinforcing its aim to become a sustainable land developer, Voltalia is actively working on the development of larger scale agrisolar parks and is focusing its reflection on livestock farming systems and field cultures (cereal cultures). The objective of these parks is to perpetuate agricultural activities in place on the territory, which are often in decline and suffer from various problems – including increasingly recurrent extreme climatic hazards, lack of takers in view of difficult working conditions, water-related problems, economic difficulties, and more. These parks can also make it possible to reopen abandoned agricultural areas, which are often deserted and reinvested by the forest. Through these projects, Voltalia redevelops these lands and allows young farmers, for example, to set up at a lower cost.

Future research and development

Voltalia plans to set up an experimental station in 2021 where research and development work will be conducted in partnership with recognised technical agricultural institutes in France. Initially, the objectives will be to study the behaviour of bovine herds on a small scale PV power plant (approximately 5000 m²), in order to study animal wellbeing and to adapt the design of the agrisolar power plants accordingly, and secondly, to conduct a monitoring of the plant cover. A control zone without panels will be set up in the continuity of the station, in order to make comparisons between results. These experiments will take place over several years, but initial results are expected in the first year. For this experiment, Voltalia has partnered directly with a breeder so that it can be carried out under real operating conditions and meet the actual challenges of agriculture.

Beyond the production of green electricity, there are many issues to consider: secure these agricultural activities, develop solutions for the climate crisis, help the young farmers to access to the land, and create solutions to improve the production performance. These challenges are dealt with and managed in co-operation with all the actors of the agricultural sector. 🌍