

## Business model keys of the composting plant in Alcarràs

Alcarràs is one of the municipalities in Europe where the cattle industry has the largest weight. Nearly half a million animals are bred there every year. In this area, over 150 family businesses of different sizes dedicated to this field are in operation. Due to their activity, a very significant amount of cattle manure is generated, and producers must handle it.



*Figure 1. Alcarràs municipality*

One of the key factors to put forward a collaborative model, in which different actors are involved (associated to the different steps and dimensions of the value chain), was the willingness to contribute to develop a circular bioeconomy system full of opportunities. For instance, farmers were able to improve the environmental sustainability of the farms and achieved an improvement in profit.

In 2022, a composting plant was launched as a test by SAT Alcarràs Bioproductors. It brought together 150 families who run cattle and pig businesses in the municipality, and who joined forces to collectively manage the manure generated. The composting plant boasts an area of 1.5 hectares (3.7 acres) in an estate of 17 hectares (42 acres) which has meant an investment of €1.5m.



### **KEY WORDS**

Composting, organic fertilizer, manure

### **COUNTRY**

Spain

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*Figure 2. Alcarràs composting plant*

The plant in Alcarràs manages around 27,000 tons per year, the solid fraction of cattle and pig manure. The quality of the solid fraction collected in farms changes throughout the year because the humidity of the fraction is lower in summer. The amount to be composted accounts for 30% of the solid fraction that is collected in the associated farms, while the remaining 70% is handled by the businesses themselves through its use as fertilizers in fields.

The value chain starts at the farms, with the separation of manure to solid and liquid fraction. Next, a transport company hired by the plant collects the solid fraction and transfers it to the treatment plant in Alcarràs. The transport fee is the same for all farmers, regardless of the distance from the processing plant. As much as possible, the profit generated by the plant is used to pay for these costs.

Once the material coming from the farms reaches the composting plant, the solid fraction of manure gets mixed with the biomass originating from the cleaning of parks and gardens. The biomass used is stored indoors separately from manure and is ground in order to include it in the trench.



*Figure 3. Biomass storage site*

This mix, which is carried out depending on the features the client is looking for, means a significant improvement in the compost properties.



*Figure 4. Piles mixing the solid fraction of manure and biomass*



*Figure 5. Piles at the site*

Piles in the trenches are formed placing first a layer of ground biomass in order to prevent mouthpieces of the air circulation system from getting blocked. Around a month later, this mix is moved to another trench, and after another month, the procedure is considered to be finished. During the composting period, the sprinklers installed in the trenches moisten the material, while probes help monitoring moisture content and oxygen to control the composting process.



*Figure 6. Mouthpieces of the air circulation system*

Next, the material goes to a drum screening process. If it passes the screen, it is considered as final product and it is stored in a different place within the plant. If it fails to make it through this process, it goes back to the piles.

In order to carry out this operation, the plant owns a loader, a drum screen, and sensors for humidity, temperature and oxygen that monitor the composting process.

As a result, different kinds of quality organic fertilizers are obtained. Some of them are suitable for the organic production and are used either in the crop field or for sale, mainly for the French market.



*Figure 7. Final product*

At the moment, taking into account the good results achieved so far, the farmers themselves have promoted an expansion and diversification of the current procedures.

On the one hand, an expansion of the composting plant is being planned, and on the other hand, installing a biogas plant is being processed by the local administration. This would enable SAT Alcarràs Bioproductors to have the energy community status, turning farmers into their direct managers.

The electricity generated would go to both, the electricity network, and farmers. Furthermore, thanks to the conversion process, denitrified water would be obtained, which could be used for irrigation.



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## **PRACTITIONERS' FEEDBACK & MOTIVATION FOR DEVELOPMENT**

The project of a bio-based products plant in Alcarràs was raised 17 years ago, aiming to guarantee a treatment for the effluent generated in cattle and pig farms. This common need prompted the two main associations of stockbreeders in the municipality to unite.

The project in Alcarràs is part of the BIOHUB CAT initiative, which is part of a joint effort of several administrations and institutions to develop bioeconomy. BIOHUB promotes the development of bio-industrial estates, among others. In these spaces, synergies between different processes are sought after to add value to local and renewable organic resources, such as manure, but also other surplus resources coming from farming and agro-industrial activities. The initiative of farmers in Alcarràs has prompted them to be the top bio-industrial estate in Catalonia.

One of the main obstacles faced relates to the social acceptance. At the beginning of the project, there was some opposition from neighbors, because they did not exactly know how a composting plant works, and what activities will be performed in the facility, etc. The strategy adopted to overcome it included the organization of countless meetings with the local communities and the local council to explain the aim of the project, the benefits, the activities that would be performed at the plant, etc.

Nowadays, they have been able to turn the situation around and most of the originally opposers are now backing the initiative. It was very helpful to open the plant's doors so that people could visit and learn how the plant works and what materials are treated.

Additionally, the initiative had to deal with the bureaucracy associated when implementing this type of project, which is quite challenging. It implied to submit an endless number of templates and documents, review from experts, and significant resources allocated to the documentation planning and processing. In some cases, the responsibility was shared between different administration departments overlapping over a certain topic, which contributed to increase the difficulty. Therefore, it is quite relevant to be aware of the investment needed in terms of time and economic resources.

Lastly, from the technical side and considering that the initiative was launched 16 years ago, when the project was approved the technology chosen needed to be upgraded since new and more efficient technologies were available.



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## **TRADE-OFFS BETWEEN ECONOMIC, ENERGY AND ENVIRONMENTAL EFFECTS FOR CONVENTIONAL AND IMPROVED BIOMASS HANDLING APPROACHES**

This value chain allows to strengthen the link between rural environment and circular economy through the utilisation of by-products to obtain an organic fertiliser while giving the treatment needed to the manure.

The main benefit of this system that stands out is having found the way to manage the material in the farm correctly and sustainably to use it in the fields. The combination of the composting plant and the use of the liquid fraction by inserting it through the drip irrigation of the fruit trees, as well as the sprinkling of cereal crops has allowed an effective management plan of the by-products obtained from the livestock activity.

Various benefits arose associated to the initiative implementation. The most relevant is to guarantee a treatment for the effluent generated in cattle and pig farms but also the improvement from the environmental and economic point of view related to the use of the liquid fraction as fertilizer thorough the irrigation system or the organic fertilizer used.

In summary, the initiative in Alcarràs has permitted to launch a circular bioeconomy at a local scale and generate new opportunities locally. It has helped reaching a real solution to the need to handle the effluents in farms and has done it in an environmentally sustainable way.

## **KNOWLEDGE TRANSFER POTENTIAL TO OTHER REGIONS**

These different aspects should be considered if the model of this initiative is copied:

- having a high density of farms in the area.
- high degree of partnership among the sector so that they can cooperate.
- willingness and motivation to set it up.

Also, in this case the initiators had to go abroad to learn about different ways to work and different technologies available, but potential replicators could come and visit this plant.



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### SUMMARY

In conclusion, the value chain model based on the development of a composting plant to manage the manure produced in the farms is a model of circular economy that consists of the use of by-products from the cow and pig farms as a source of organic fertilizer. By doing so, the circle is closed, and manure is managed in a sustainable and local way while contributing to grow a green local economy in line with the EU's climate and sustainable goals.

### ABOUT BRANCHES

**BRANCHES** is a H2020 "Coordination Support Action" project, that brings together 12 partners from 5 different countries. The overall objective of **BRANCHES** is to foster knowledge transfer and innovation in rural areas (agriculture and forestry), enhancing the viability and competitiveness of biomass supply chains and promoting innovative technologies, rural bioeconomy solutions and sustainable agricultural and forest management.

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### THE PARTNERSHIP

