

Innovative Silo for the Supply of Wood Chip (SISE)

Summary

The SISE platform, the Catalan acronym for Innovative Wood Chip Supply Silo, is an automated logistics warehouse for chip distribution, which allows quality chips to reach all points of the region, thus optimising the biomass distribution chain and reducing the CO₂ footprint from transport.

The SISE platform has a storage capacity of 190 m³ chips. The chips are supplied in 90-m³ trailer trucks from the main production plant in Celrà.

Next, small, authorised local trucks (30-40 m³) are responsible for local distribution from the SISE platform to the end customer's silo.

The SISE platform works without personnel thanks to an automated system that allows the persons responsible for transport, whether loading or unloading the chips, to work without additional help.

The platform automation provides significant flexibility in wood chip delivery times to customers' silos, as it depends only on local carriers unloading over short distances.

Automation and absence of staff with the SISE platform means a monitoring system had to be developed which was capable of predicting and managing demand, learning automatically as the platform delivers chips to customers, thereby optimising the transport flow to ensure the silo always has enough chips.

The SISE platform is strategic for the development of biomass as renewable energy.

Objectives

1. Build an innovative prototype for the supply of wood chips.
 - 1.1. Draw up a master plan.
 - 1.2. Provide a demonstration location.
 - 1.3. Stable turnkey installation of the demonstration silo.

2. Analysis of the operation of the prototype.

- 2.1. Confirm that quality and technical specifications of the fuel in stock are maintained within the silo.
- 2.2. Assess the degree of satisfaction among the logistics operators. (who load the silo).
- 2.3 Assess the degree of satisfaction of the local distribution network. (who unload and make delivery to the end customer).
- 2.4 Assess the degree of satisfaction of the end customers.

3. Optimise the distribution of the forest wood chips.

- 3.1. Reduce the carbon footprint in the biofuel value chain.
- 3.4. Estimate the increase in competitiveness of the company promoting the solution.

4. Impact and dissemination of the results of the project.

- 4.1. Estimate the potential for job creation in the region where the silo is installed.
- 4.2. Estimate the creation of new local market niches through the installation of the silo.
- 4.3. Analyse the relevance of the technology internationally.

Description of the actions carried out in the project

The actions involved in the SISE project started with drawing up a master plan to provide the technical documentation for its construction. At the same time, while the master plan was being produced, a field study was carried out in order to find the ideal location to build it. Building started once the master plan was complete, the location established and all administrative documents were prepared.

Now built and in the testing phase, its operation is being analysed. No mechanical deficiencies or problems that impede loading and unloading have been observed.

Analyses were also carried out to ensure the chips in the SISE maintain their quality standards and technical specifications.

At the same time, a survey system analysed the degree of satisfaction among both logistics operators and end customers.

Finally, the carbon footprint before and after the implementation of the SISE was calculated.

Final results and practical recommendations

The most conclusive end result from the SISE platform shows that this new logistics distribution model reduces CO₂ emissions by over 110%.

A standard 7-tonne load of wood chips at 30% humidity transported 120 km by pneumatic truck with 30 m³ (24.59 MWh) of storage capacity, where the chips are kept until delivered to the end customer, produces 94.67 kg of CO₂ emissions, while with the SISE system, a standard 7-tonne load of wood chips at 30% humidity over 120 km, 100 km by trailer (90m³) to the SISE and 20 km by 30-m³ pneumatic truck (24.59 MWh) to the end customer, produces 44.51 kg of CO₂ emissions. Thus the SISE system cuts CO₂ by 50.16 kg per trip (113% reduction in CO₂ emissions using the SISE).

A further conclusive result found there were no significant differences after testing chip samples obtained from the SISE, based on current regulations (UNE-EN-ISO 17225, UNE-EN-ISO 18122, UNE- EN-ISO 18125, UNE-EN-ISO 18134), hence the chip maintains its quality and technical specifications within the SISE.

Conclusions

General conclusions regarding the use of biomass as fuel are:

- It reduces greenhouse gas emissions
- It reduces external energy dependence by improving supply security and internalising the energy bill.
- It improves sustainable forest management.

Regarding the SISE system in particular, it maybe be concluded that:

- It ensures regularity and homogeneity of supply. A frequent problem with the supply of wood after the 9-month drying period is that it does not coincide with the period of demand for wood chips in a region (mostly in colder periods).
- Biomass reaches the end customer's silo with:
 - A smaller CO₂ footprint.
 - Guaranteed quality.
 - Fast order delivery response.

- It boosts the number of potential customers, who would otherwise not consider biomass as a fuel, thus helping reach established countrywide penetration targets for renewables.
- Quality biomass is provided throughout the country.
- Data on chip quality and real-time consumption are obtained, which were hitherto unavailable outside the academic world.
- Greater reliability, as it is a non-seasonal supply.

Leader of the Operational Group

ORGANISATION: SALA FORESTAL SLU

E-MCONTACT E-MAIL: salaforestal@salaforestal.com

Other members of the Operational Group (not recipients of the grant)

ORGANISATION: Forest Science and Technology Centre of Catalonia (CTFC)

CONTACT E-MAIL: pere.navarro@ctfc.es

ORGANISATION: Polytechnic University of Catalonia

CONTACT E-MAIL: frederic.horta@upc.com

Subject area(s) of application

- Agricultural production system
- Agricultural practice
- Agricultural equipment and machinery
- Livestock farming and animal welfare
- Vegetable production and horticulture
- Landscape / Territorial management
- Pest and disease control
- Fertilisation and nutrient management
- Soil management
- Genetic resources
- Forestry
- Water management
- Climate and Climate Change
- Energy management
- Waste and by-product management
- Biodiversity and environmental management
- Food quality/processing and nutrition
- Supply chain, marketing and consumption
- Competitiveness and agricultural and forestry diversification
- General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
GIRONA	RIPOLLÈS, GARROTXA, Cerdanya
BARCELONA	Berguedà, Osona

Dissemination of the project (publications, seminars, multimedia, etc.)

In-house media, dissemination to potential customers (leaflet).

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): June 2018	Total budget: €181,250.00
Completion date (month-year): October 2020	DARP funding: €72,318.75
Current status: Executed	EU funding: €54,556.25
	Own funding: €54,375.00

With funding from:

Project funded through Operation 16.01.01 (Cooperation for Innovation) through the Catalan Rural Development Programme 2014–2020.

Order ARP/133/2017 of 21 June, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ARP/1868/2017, of 20 June, announcing the call for the grant.

