



SYSTEMIC

Circular solutions for biowaste

Factsheet
SYSTEMIC Outreach Location

Emeraude Bio-énergie (Lamballe, France)

A short introduction to Emeraude Bio-énergie

Emeraude bio-énergie is a collective project initiated by Dénitral, subsidiary of the Cooperl group .

Created in the 1990s to solve the problems of lack of spreadable surfaces, Dénitral is now specialized in the implementation of organic slurry treatment plants on pig farms.

Emeraude Bio-énergie will be located in the municipality of Lamballe, in the industrial site of Ville Es Lan City, 2 km from the agglomeration, right next to the Cooperl's main slaughterhouse. This project will complete the environmental center, which already receives the organic materials collected from Cooperl pig breeders and waste streams from the meat processing industry.

Table 1. Technical information of the biogas plant

Characteristics	
Date of construction	2017
Size (MWel)	5,3
Volume (m ³)	14,700
Digester type	Mesophilic digestion

Feedstocks

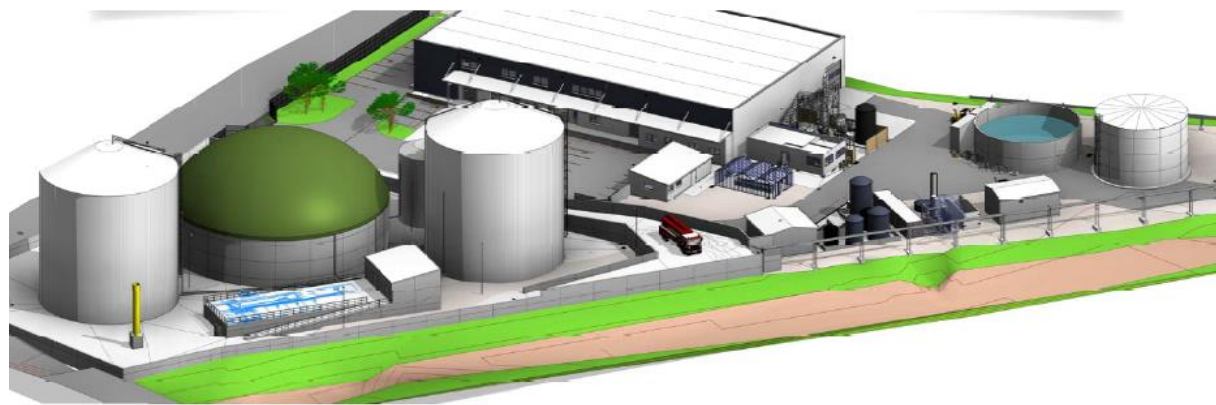
25% of the input of the digester is the solid fraction of pig manure, which is supplied by a hundred farms (average size of 100 sows) mainly located in the department of Côtes d'Armor. A lot of these farms work with the TRAC system (V scrapping separating), which integrates manure separation in the building.

40% of the feedstock is slaughterhouse wastewater of the Cooperl slaughterhouse and 25 % recycled water from the liquid fraction of the digestate (Table 2).



Table 2. Origin of feedstock

Type	Mass per year
Slaughterhouse waste water (6-8% DM)	65 kt
Solid pig manure (30% DM)	38 kt
Recycled water for dilution	53 kt
Total	156 kt





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Biogas production

530 m³ of bio-methane/h is purified and directly fed into the gas grid where it will circulate with natural gas and can be directly distributed and used by consumers in Lamballe and its surroundings. This will represent 79 million kilowatt hours/ year, i.e. the annual natural gas consumption of about 3100 single-family homes.

The biogas is not valorised by means of a CHP to produce electricity because the current process, where bio-methane is injected directly is more suitable for large installations and guarantees a better energy efficiency.

Table 3. Yearly biogas production and average composition

Component	Estimation
CH ₄ (%)	66
CO ₂ (%)	32,2
H ₂ S (mg/m ³)	61
O ₂ (%)	0,11
Total biogas production (Mm ³)	4,8
Biogas per tonne of feedstock (Nm ³ /t)	30,7

Current process and disposal routes for end products

The existing reception infrastructures on the industrial site will be modernized and the feedstocks, already stored on the site, will be transported by hermetic pipes to the digester.

The digestate is separated by a centrifuge in a liquid fraction and a solid fraction. Ammonia in the liquid fraction is removed by an ammonia stripper/scrubber and recovered as an ammonia sulphate solution.

The ammonia-free liquid fraction is further treated in a waste water treatment to dischargeable water which is reused for the operation of the cooperative's industrial sites (non-food processes).

The solid fraction is transported to Fertilal (on the other side of the railroad) where it is dried and sold as natural fertilizers.

Table 4. Average composition of the recovered products

	Mass (kton/year)	Dry matter (%)	N- total (g/kg)	P ₂ O ₅ (g/kg)	K ₂ O-total (g/kg)	
Digestate	Raw digestate	156	7,5	6	4,1	2,3
	Solid fraction after centrifuge	35,802	23	9,7	13,7	1,37
	After drying	13,316	85	21	46	26
	Liquid fraction after centrifuge (+polymer)	170,015	1,8	3,2	0,7	1,7
	AmmS-solution	7,205		7,7		
	Dischargeable water	91,383				

Current drivers for interest in Nutrient Recovery and Reuse (NRR) Technologies

- With Emeraude bio-énergie, Dénitral wants to consolidate its activity and go further in the protection of the environment by valuing the waste it collects.
- In SYSTEMIC, they would like to compare the digestate treatment cost of evaporation and stripping and find out the benefits of commercializing ammonia sulfate solution or in crystallized form.
- Also, they want to learn from the experiences of other outreach locations about main problems during construction and implementation on big projects.

