SYSTEMIC
Circular solutions for biowaste

Biogas plant Makassar (Torregrossa, Spain)

A short introduction to Biogas Plant Makassar

Som Energia, a non-profit green energy consumption cooperative owns the biogas plant Makassar, which is operational since end 2013. The biogas plant is located in the municipality of Torregrossa (Catalonia), an area with intensive pig breeding and slurry treatment plants.

Daily monitoring of the operation of the plant is carried out by Som Energia by means of a remote monitoring system and follow-up meetings with the plant operators.

Table 1. Technical information of the biogas plant

Date of construction	2013
Size (MWel)	0,5
Volume (m^3)	17,000
Digester type	Mesophilic digestion

Feedstocks

The plant is located close to a pig farm which supplies pig slurry (60% of the digester's input). Organic biological waste contributes for 40% of the yearly feedstock and the biogas plant receives a gate fee for processing this waste (Table 2).

Table 2. Origin of feedstock

	Mass per year
Vegetal fat	1,2 kt
Municipal waste water sludge	4,5 kt
Water with oil form the food industry	2,4 kt
Organic household waste	2,4 kt
Water from vegetable extracts	1,5 kt
Pig slurry	17,8 kt
Total	**29,8 kt**

Biogas production

The biogas is cleaned by an active carbon filter and valorized in a CHP. Green electricity is injected to the grid. The thermal energy is used to heat up the digesters and on the neighbouring farm.

In 2017 Biogas Plant Makassar produced 2.701 MWh and is estimated to produce 3.200 MWh in 2018.

Table 3. Yearly biogas production and average composition 2017

Component	Estimation
CH_4 (%)	65-75
CO_2(%)	30-50
H_2S (ppm)	0-25
O_2 (%)	0,02
Total biogas production (Mm^3)	1,275
Biogas per tonne of feedstock (m^3/t)	42,78

Horizon 2020

*The H2020 EU-project SYSTEMIC (**Sy**stemic large **s**cale eco-innova**t**ion to advance circular **e**conomy and **mi**neral re**c**overy from organic waste in Europe) receives funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation under Grant Agreement no. 730400*

Factsheet
SYSTEMIC Outreach Location

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Current process and disposal routes for end products

Pig slurry and organic waste are received in concrete ponds and metal tanks in the floor. They are pumped to the mixing tank and from there to the digesters.
These are working in series and are equiped with a gasometer of double cover to store the gas. After a retention time of approximately 40-60 days the digestate passes to the open lagoons (11000 m³) until it's collected for application to field. No disposal costs are charged.

Table 4. Average composition of the digestate in 2017

	Digestate
Mass (kt)	29,8
NH4-total g/kg	0,003
P_2O_5-total g/kg	0,409
K_2O-total g/kg	1,096
Spread on (ha)	524

Drivers for interest in Nutrient Recovery and Reuse (NRR) Technologies

- The changes in the new tariff framework (Royal Decree 413/2014) force Som Energia to find the balance between the operating costs, the electrical production and the number of hours of operation but always with the objective of producing the maximum amount of green energy possible.
- Digestate has no (negative or positive) value in Spain and the land to spread the digestate on in the area is limited.
- Appliction of digestate is becoming more complicated
- There are no subsidies for biogas in Spain

To improve their business case with regard to these problems, Som Energia applied as an outreach location in the SYSTEMIC project and hopes to find out if nutrient recovery could provide answers.

However, the technologies proposed by SYSTEMIC should be easy to fit into their current plant design and its environment and cost of operation and transport of end products should be acceptable within the current business model.

The technologies should prove to be mature and based on real experiences but above all that the resulting products have a defined and studied marketing route.

Separation of the digestate f.e. by means of a centrifuge is a simple way to introduce nutrient recovery.

Ammonia losses could be reduced by covering the digestate lagoon, installing air washers and learning more about NH_3 emmision poor application techniques.

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