



SYSTEMIC
Circular solutions for biowaste

Factsheet
SYSTEMIC Outreach Location

Biogas plant Bojana (Čazna, Croatia)

A short introduction to Bojana

Bojana is a Croatia biogas plant located in Čazna. The plant is operational since October 2014 and localized in a region characterized by agriculture and intensive cattle farming, which creates a manure surplus of manure in this area. The plant is operational since 2013 and has a treatment capacity 85.000 tonnes/year.

28.000 MWh of electricity is produced per year (Table 1). The heat from the CHP is used to evaporate the manure and to dry the digestate.

Table 1. Technical information of the biogas plant

Date of construction	2014
Size (MWel)	2
Volume (m ³)	12.000
Digester type	Thermophilic digestion



Feedstocks

Bojana receives solid cow manure from farmers in a radius of 10 km. No gate fee is charged for the manure, which makes up for 55% of the total amount of feedstock yearly processed (Table 2). 42% is corn silage. Animal manure and vegetal residues are digested together (co-digestion).

Table 2. Origin of feedstock

Type	Mass per year
Corn silage	28 kt
Cow manure with hay	37,8 kt
Total	65,8 kt

Biogas production

Each year, the plant produces 8,76 Mm³ of biogas. The biogas is converted in 2 CHPs with a capacity of 2MW into 16.400 MWh electrical and thermal energy per year.

8% of the electricity produced is used on site and 92% is put on the grid. 53,4% of the heat is used to warm up the digesters. Plans are made to use the rest of the heat for drying corn and Bojana is considering to invest in an orchard and a fridge for fruit.

Table 3. Yearly biogas production and average composition

Component	Estimation
CH ₄ (%)	55,3
CO ₂ (%)	44,5
H ₂ S (ppm)	118
O ₂ (%)	0,04
Total biogas production (Mm ³)	8,76
Biogas per tonne of feedstock (m ³ /t)	131

Biogas plant Bojana (Čazna, Croatia)

Current process and disposal routes for end products

Cow manure and corn silage is digested and 65,6 ktonne of digestate is produced per year. This is separated with a screw press to 84,66% liquid fraction, which is stored in a lagoon and 15,34% solid fraction, stored in an open warehouse. Both are used for land spreading on the 1500 ha of partner lands, surrounding the biogas plant. Currently, Bojana has agreements with farmers to exchange digestate is for cow manure (feedstock) and only transport costs are taken into account.

Table 4. Average composition of the recovered products

	Digestate		
	Before separation	Liquid fraction	Solid fraction
Mass (kt)	65,6	55,54	10,06
pH		7,91	8,58
Dry matter (%)		5,6	26,7
Kj-N (%)		0,33	0,58
NH4-N (%)		0,12	0,11
P-total g/kg		0,70	2,08
K ₂ O-total g/kg		2,35	2,52

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

Nonetheless, feed in tariffs are getting lower and dairy farming is starting to expand in the area. Bojana would like to be prepared for the future by creating a sustainable business case that further optimizes their production and reduces waste.

Creating a fertilizer that is more balanced for the demand of the crops (barley and corn) could render higher crop yields and therefore Bojana recognizes that nutrient recovery from the digestate could create an added value for the company. With regard to this, Bojana is interested in nitrogen stripping technology.

Current problems and obstacles

At the moment, disposal of digestate is no issue due to a lot of arable land to spread it on and cattle farmers providing constant feedstock.

Therefore, Bojana thinks that investing in nutrient recovery techniques is not yet profitable for them at this moment.

Nonetheless, they would like to learn from the demo plants and other outreach locations and exchange practical experience on nutrient recovery technologies before considering an investment.