Factsheet
SYSTEMIC Associated Plant

# Stormossen Ab/Oy (Vaasa/Korsholm, Finland)

## A short introduction

The Ostrobothnia region in western Finland is traditionally a farming region with surplus manure and many crop fields used for food production. In the Vaasa region there is 114 000 inhabitants. The largest energy technology cluster of the Nordic Countries is concentrated in the Vaasa region and focused on solutions for global energy challenges.

At Stormossen waste treatment plant in the Vaasa region the biogas production started 1990. This was the second biogas plant in Europe for digesting biowaste from households. In 2017 Stormossen commissioned the first amine scrubber for biogas upgrading in Finland and the city of Vaasa commissioned 12 modern biogas buses.

## Feedstocks

The digesters are fed with:
50 % food waste to Biogas reactor 2
50 % sludge to Biogas reactor 1

Supplied within a radius of 40 km. plus a few external suppliers of biowaste from approx. 100 km away.

## Biogas production

The biogas production is estimated to 2,6 million Nm³ per year, 61 % methane. Of which approximately:
1,1 million Nm³ per year is upgraded to biomethane and sold as vehicle fuel
1,1 million Nm³ per year is converted in a CHP
0,2 million Nm³ per year is used for heat
0,2 million Nm³ per year is flared away

About 60 % (approx. 4000 MWh) of the electricity is used at site and the rest is fed to the grid, approx. 2660 MWh. The heat from the CHP is used for heating the process water and for keeping the warmth in biogas reactor 1 at 55°C.

Table 1. Technical information of the biogas plant

| | |
|---|---|
| Date of construction | Spring 1990 |
| Size (MWel) | Tot. 1,8 MW / 0,730 MWel |
| Volume digesters ($m^3$) | 3200 m3 |
| Digester type | Thermophilic digestion |

*Table 2. Origin of feedstock*

| Type | Mass per year |
|---|---|
| **Food waste** | 16 kton, DM31% |
| **Sludge** | 16 kton, DM20% |
| **Total** | **32 ktons** |

*Table 3. Yearly biogas production and average composition*

| Component | Estimation |
|---|---|
| $CH_4$ (%) | 62 |
| $CO_2$(%) | 37 |
| $H_2S$ (ppm) | 546 |
| $O_2$ (%) | 0,2 |
| Total biogas production ($Mm^3$) | 2,6 |
| Biogas per tonne of feedstock ($m^3$/t) | Sludge 35<br>Bio 220 |

*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*

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## Current process and disposal routes for end products

The process is divided in two separate process lines one for sludge BR1 and one for BR2. These two feedstocks are separately digestated and never mixed.

BR1, sludge, is delivered to the Stormossen biogas plant by truck from the local waste water treatment plants. At Stormossen it is mixed with warm water and homogenized before pumped to biogas reactor 1, retention time 14 days and temperature 55°C. After the digestion it is dewatered by a centrifuge (with polymer) and then composted together with tree chips, afterwards it is mixed with sand to produce and landscaping product parks and lawns.

BR2, biowaste, is delivered by truck then crushed and plastic etc is separated by screw presses and mixed together with warm water before pumped to biogas reactor 2, retention time 20 and temp 55. The digestate is handled in the same way as for sludge but the end product is a soil improvement compost product, in other words allowed for growing vegetables etcetera in.

The reject water goes to the process water treatment plant for pre-cleaning and then to the waste water treatment plant in the city.

*Table 4. Composition of the recovered products*

| | Mass (kton/year) | Dry matter (%) | N- total (g/kg) | P-total (g/kg) | K-total (g/kg) |
|---|---|---|---|---|---|
| Liquid fraction after centrifuge | 89 702 | 0 | 857 mg/l | 124 mg/l | - |
| Solid fraction after centrifuge | 8437 | 26 | 33 g/kg dm | 26 g/kg dm | 3 g/kg dm |

## Current drivers for Nutrient Recovery and Reuse (NRR) Technologies and goals

**We are interested in nutrient recovery from digestate b**ecause today it is not properly used, and a lot of the minerals are never circulated back to the fields and soils.

Considering our region and the market, products containing N is of most interest.

We just got a similar INTEREG project funded *"Bothnia Nutrient Recycling"* and we would like share best practices and co-operate with SYSTEMIC for finding possible solutions.

STORMOSSEN Horizon 2020

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