

TECHNOLOGY FOR N&P RECOVERY AS LIQUID OR DRIED DIGESTATES WITH "AGROGAS" SEPARATION, DRYING, MEMBRANE FILTRATION AND/OR REVERSE OSMOSIS COMBINED WITH POST-TREATMENT SYSTEM



Keywords: • green energy • hygienisation • separation • drying • recuperation NPK and C

Key facts:

- **Technology category:** co-digestion + digestate post-treatments separation, drying, MBR and RO
- **Input material:** animal manure, organic waste (conform Vlarema and positive list FOD), energy maize
- **Output products:** digestate post-treated digestates including liquid fraction and dried digestate
- **Capacity:** production of 60.000 t/y liquid fraction digestate (including concentrated and/or, thickened effluent), 3.000 t/y dried digestate, and 1.000 à 2.000 t/y digestate and/or solid fraction digestate
- **Focusing geographical areas:** EU28
- **Technology status:** TRL9
- **EC/MS Authority permits:** 'Omgevingsvergunning'



Summary of the technology:

Besides 4 digesters, storage spaces, etc the main technological elements of the recuperation/post-treatment processes at Agrogas site are:

- sieve belt press (Bellmer (<http://www.solis.nl/producten/zeefbandpers/>))
- drying installation
- biology unit
- MBR Unit
- RO unit

Anaerobic digestion (AD) is a well-established method for the treatment of organic (waste) streams and the generation of biogas for the production of renewable energy. Besides manure and organic industrial (food) waste streams also energy crops are routinely processed through a mesophile and/or thermophile digestion process. The anaerobic digestion process is a natural process in which various microorganisms break down biodegradable organic material under anaerobic conditions and convert it (10-15%) into biogas – a mixture of carbon dioxide, methane and limited amounts of other components – and (85-90%) into digestate. Compared to the initial feedstock the digestate is homogenised, mostly hygienised (cfr EC1069/2009 (animal by-products)), has a higher NRV (efficiency) due to a partial transfer of the organically bound N to ammoniacal nitrogen.

Agrogas has two separate digestion and post-treatment lines: one purely vegetal proces line and one animal by-products/manure proces line.

In the vegetal line: the (two times fermented) digestate is separated via a screw press into a liquid (or 'thin') fraction. The thin fraction of the vegetal line can be disposed of usually on Flemish agricultural soils – sometimes mixed with the hygienised thin fraction of the animal process line. (Both types of) the thin fraction(s) can – depending on the specific needs and wishes of the agricultural and horticultural users undergo further processing by Agrogas, namely a biologic water treatment with membrane filtration (Membrane Bioreactor (MBR)) or reverse osmosis (RO). This MBR permeate or RO concentrate can undergo further evaporation in the thickener.



In the animal line: a digestate is made from manure, animal by-products (cat III), gastrointestinal contents (cat II) and additionally vegetal organic residues and/or energy crops. Given this composition, the final product can only be applied if it complies with regulation 1069/2009. For this purpose the digestate is always post-fermented thermophilic (>55°C) in a thermophilic post-digester. In a further step the digestate is separated in a liquid ('thin') and a solid ('thick') fraction via a sieve belt press. The thick fraction of the animal fermentation line is stored in a separate loading area for drying or for further external processing. The thin fraction of the hygienized digestate with manure is mostly further treated at the biological water treatment plant with membrane filtration (MBR). The permeate that is released during this process can either be removed or further evaporated to thickened permeate with manure.

In the post-treatment polymers are used for the screen (or 'sieve') belt press and iron chloride, antifoam and carbon source for biological water treatment

Competitive position and advantages:

- by having 2 lines of digestion and post-treatment two different types of digestates can be offered to the market: animal manure-status and non-animal manure-status (important since this defines fertilising possibilities especially where nutrient and animal manure pressure is high). The non-animal manure digestion line can be set-up with only vegetal inputs making the digestate potentially usefull in organic ('bio') agriculture.
- Separation and drying reduces volume and reduces transport cost per ton NPK
- A series of consecutive post-treatments allows to produce the digestate for which demand is highest
- Production of a dischargeable effluent further facilitates cost reduction of output management

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