

TRAINING MATERIAL

Title:

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 (ID: 263)

Training:

What is the technology?

Co-digestion + digestate posttreatments separation, drying, MBR and RO

Who is the vendor of the product/technology?

Agrogas (<https://www.facebook.com/Agrogas>) designed the digestate post-treatment process flow using essential technologies (post-bioreactor) such as a screw and sieve belt press, biology, Membrane Bioreactor (MBR) and a reverse Osmosis (RO) unit

Which other technologies are provided by the vendor?

See above-mentioned websites of Agrogas.

Which are the advantages of the technology and the problems addressed?

Anaerobic digestion (AD) is a well-established method for the treatment of organic (waste) streams and for biogas generation. AD leads to an energetic recuperation in the form of biogas (for CHP-based production of green electricity and heat) and digestate (usually for further posttreatment). Compared to the initial feedstock the digestate is homogenised, mostly hygienised (cfr EC1069/2009 (animal by-products)), and has a higher nutrient replacement value due to a partial transfer of the organically bound N to ammoniacal nitrogen.

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. Finally a dischargeable effluent is producend which further facilitates the cost reduction of output management.

How does the technology work?

Agrogas' digestate fractions come through several mesophilic and thermophilic digesters and separation, drying, MBR (membrane filtration) and/or Reverse Osmosis (RO): the digestion and post-treatments occur along a 'vegetal line' or a 'manure/other animal byproducts'-line which are completely separate lines. This allows to offer two different types of digestate to the market: with a non-animal manure-status or with an animal manure-status.

In the vegetal line: the (two times fermented) digestate is separated via a screw press into a liquid (or 'thin') fraction and solid fraction. The liquid fraction of the vegetal line is sometimes mixed with the hygienised liquid 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 under go 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, gastrointestinal contents 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 and a solid 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. These post-treatments allow Agrogas to reduce volume and transport cost for NPK and organic carbon, and to increase product shelf life. 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. Agrogas treats 70.000 t/y into 60.000 t/y liquid fraction digestate (including concentrated and/or, thickened effluent) and 3.000 t/y dried digestate, leaving 1.000 to 2.000 t/y raw digestate and/or solid fraction digestate.

How/where to use the technology?

Agrogas technological setup is interesting in regions with a high manure pressure, green energy support measures, and/or periodical droughts. More generally this technology offers solutions for intensive husbandry and manure/substrate drying in any EU region. Furthermore the high quality fertilizer can replace the production and/or use of artificial fertilizers in such regions where local availability of nitrogen fertilisers is valued.

Authority permits?

At least an environmental license/permit for installing this technology will have to be asked & obtained from the local authorities. This legislation and authority depends on the specific EU region. For example in Flanders an 'omgevingsvergunning' will be required from the Department of Environment, taking into account BAT (best available technologies) guidelines and recommendations of other advisory bodies.

How much does it cost?

CAPEX for economical industrial scale: besides AD units (foundations, bioreactors, main hall, storage: 1,8 mio €) Agrogas had digestate posttreatment units built: sieve belt press (554.500€), drying installation, biological water purification (410.000€), membrane filtration (343.000€), RO (220.000€) excl installation, tubing and automatisisation costs

OPEX for posttreatment consumables (sieve belt press and water treatment) are 0,50 €/m³ (FeCl), 3,50 €/m³ (polymers), 0,75 €/m³ (changing membranes), 0,25 €/m³ (anti-scaling product), 0,15 €/m³ (waxfilters), 0,85€ €/m³ (chemical cleansing), 1,50€ (carbon source)



For more information: https://nutriman.net/farmer-platform/technology/id_263