

TRAINING MATERIAL

Title:

Technology for N recovery as enriched pelletized digestate from animal manure + biowastes with "Arbio and NPirriK-project" co-digestion + separation and backmixing process (ID: 269)

Training:

What is the technology?

Solid fraction digestate enriched by backmixing N-rich RO-concentrate from liquid digestate followed by drying and pressing to pellets

Who is the vendor of the product/technology?

Arbio (<https://www.vlaco.be/vlaco-vzw/producten/arbio-by>) designed the digestate post-treatment process flow using essential technologies such as a reverse osmosis (RO) and a backmix.

Which other technologies are provided by the vendor?

See above-mentioned websites of Arbio.

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

Anaerobic digestion leads to energetic recuperation in the form of biogas (for CHP-based production of green electricity and heat) and digestate (usually for further posttreatment). Drying allows lowering transport costs of manure/digestate. NpirriK leads to a cost and environmentally friendlier post-treatment of liquid fraction: smaller % of liquid fraction digestate goes to biology process (nitrification-denitrification).

Salts/nutrients are transferred from the liquid fraction to the solid fraction, more specifically by mixing concentrate (RO) with the solid fraction and drying to about 90% DM. Main end product is a dried digestate (pellet) with higher N/P-ratio: 4/3 à 5/3 with high dry weight matter (80-90% DW) thus increasing value of fertiliser pellets Also NpirriK creates a lower salinity effluent inducing lower risk of crop 'burning' if used as effluent. The closer by these irrigated farmlands the larger the potential of saving on transport costs.

How does the technology work?

Technological elements of the digestate post-treatment are: belt filter press, biology, reverse osmosis, backmixer, belt dryer, pellet press, chemical air scrubber and biobed. After separation of the digestate via a sieve belt press and further separation in a decanter (settler) the most liquid part of the liquid fraction goes to a reverse osmosis (Turbin). Reverse osmosis (RO) involves physical separation in which all particles and macromolecules are retained through membranes. After the reverse osmosis on the one hand water is obtained and on the other hand, the concentrate – an ammoniacal nitrogen containing liquid. The RO is a high-pressure RO where calcium is removed by a patented mechanical process. The subsequent backmixing is performed through an installation which distributes the mineral concentrate (N and K) over the solid fraction just before it goes to a (belt) dryer. This allows a dried digestate (pellet) to be obtained with a much higher N/P ratio. The ratio between the solid fraction and the mineral concentrate is determined by speeds of jacks and pumping of the supply to the backmix. Lastly Arbio operates an exhaust air treatment system through which the air consecutively passes a chemical scrubber and a biobed – guaranteeing low maintenance, low counter-pressure and thus lower (energy) costs.

How/where to use the technology?

The NpirriK is particularly interesting in regions with a high manure pressure, green energy support measures, and/or periodical droughts. The NpirriK closed process set-up implies reducing emissions making it suitable for areas with strict emission regulation. 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 (Arbio) RO and backmix: RO: 200.000€ (VAT excluded) (source: TURBIN) and Backmix: 35.000€ (VAT excluded) (source: DORSET GP)

OPEX for economical industrial scale additional post-treatments (RO & backmix): between 0,5€/ton and 2 €/ton¹ ingoing liquid fraction digestate.



For more information: https://nutriman.net/farmer-platform/technology/id_269