

TECHNOLOGY FOR N RECOVERY AS ENRICHED PELLETIZED DIGESTATE FROM ANIMAL MANURE + BIOWASTES WITH "ARBIO AND NPIIRIK-PROJECT" CO-DIGESTION + SEPARATION AND BACKMIXING PROCESS



Keywords: • digestion • hygienisation • backmixing • pelletising • recuperation NPK and C

Key facts:

- **Technology category:** co-digestion + digestate post-treatments separation, concentration and backmixing
- **Input material:**
 - animal manure
 - organic waste (conform Vlarema and positive list FOD)
- **Output products:** digestate incl high N/P-dried digestate-pellets
- **Capacity:** production of 90.000 tonnes digestates per year further post-treated to
 - dried (pelletised) digestate: approximately 5.000 tonnes dried digestate/Y of which approximately 1.500 tonnes optimised (NPirriK pellet) with 5/3 N/P-ratio
 - effluent: 20.000 tonnes/y
 - water: 26.000 tonnes/y
- **Focusing geographical areas:** EU28
- **Technology status:** TRL7
- **EC/MS Authority permits:** 'Omgevingsvergunning'



Summary of the technology:

Technological elements of the recuperation proces at Arbio site are:

- Belt filter press
- Biology (°effluent)
- Reverse osmosis (Turbin)
- Backmix (Dorset GP) + belt dryer + pellet press
- Chemical air scrubber + 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 under pressure typically 10 to 100 bar through membranes with pore size 0,1 to 1 nanometer. After the reverse osmosis on the one hand water is obtained and on the other hand, the concentrate – an ammoniacal nitrogen containing liquid (average 10 kg NH₃/1000L). The RO is a high-pressure RO with a capacity of 10.000 L water/h where calcium is removed by a patented mechanical process. Next - for management of the technical challenge which is clogging of the membranes - an extra filtration steps is built in: ultrafiltration or microfiltration - before being pushed through the membranes at around 80 bar. 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.





In the backmix, the solid fraction digestate and the wet mineral concentrate are more specifically mixed so that the mineral concentrate attaches itself to the (dry matter of the) solid fraction. 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.

Competitive position and advantages:

- Cost and environmentally friendlier post-treatment of liquid fraction: smaller % of liquid fraction digestate goes to biology process (nitrification-denitrification)
- Salts/nutrients 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.
- Dried digestate (pellet) with higher N/P-ratio: 4/3 tot 5/3 : (80-90% DW) thus increasing value of fertiliser pellets
- Low salinity effluent - no crop 'burning' when using effluent
- Irrigate farmland around Arbio with the low-salt effluent and thus save on transport.
- Water (dischargeable in surface water /for irrigation of nearby fields)

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