Technology for N recovery as mineral concentrate, ammonia water and ammonium sulphate from manure/digestate by VP-Hobe manure and digestate valorisation system

Keywords: *• RENURE • Mineral-concentrate • Evaporator • Reverse Osmosis • N-recovery*

Key facts:

- → **Category of the technology**: Physic-chemical nitrogen recovery from manure, digestate and wastewaters: separation, stripping and membrane processes
- → **Input:** Manure or digestate
- → **Output product(s):** Mineral- and Potassium-concentrate, NH3-water, Ammonium sulphate, Clean dischargeable water
- → **Available capacity:** 50.000, 125.000, 250.000 ton/year
- → **Focusing geographical areas**: Netherlands Belgium Germany and other
- → **Technology status:** all technology TRL 9, Evaporator TRL8

Summary of the technology:

Solid-Liquid-separation: Separation takes place in a flotation unit and in a belt filter press. The manure is separated into a solid and a liquid fraction. A flocculant is added. In the flotation system, small air bubbles bring particles to the surface of the tank where it forms a layer of sludge. This layer is scraped off and de-watered in the belt filter press into a solid fraction of 30% dry matter (DM).
Reverse Osmosis (RO): A RO processes the liquid fraction (1,7% DM) into a retentate concentrated-N/K2O product (3,4% DM) and a permeate product to be processed in the clean water production.
Evaporator/ Stripper/ Scrubber (ESS): The RO-concentrate or thin fraction will be further de-watered in an evaporator. The liquid passes through a falling film evaporator with mechanical vapour recompression. Heating the liquid in the evaporator causes water to evaporate. A vacuum lowers the boiling point, less energy is needed than when evaporating at normal atmospheric pressure. The ammonia in the incoming liquid is removed from the product flow by stripping and concentration into NH3-water (14% N). The evaporator further produces a Potassium concentrate (25% DM), ammonium sulphate by scrubbing the vapour coming out of the evaporator. And condensate.
Clean water production (RO-IE): The condensate from ESS unit and the permeate from the RO is cleaned in the RO water polisher and the ion exchanger to achieve the right quality for discharge into surface waters.

Competitive position and advantages:

- → High dry matter % in the solid fraction
  - No use of iron salts which makes solid fraction better stackable or processable and no fixation of phosphorus by iron
- → Low dry matter % of the liquid fraction
  - Makes concentration via RO possible (No UF needed)
  - Makes higher concentration in Evaporator possible
- → Robust proven technology operated at own processing plants
- → Lowest possible operational costs (energy, additives)
- → Options. Only Solid Liquid plus RO or plus Stripper or plus Evaporator

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