

# Circular Agronomics Tech Study

## Vacuum Degasification of Agricultural Digestate

*Pilot plant in Brandenburg (GER)*



### PONDUS-N

Overfertilization with nitrogen compounds leads to eutrophication of soil and water bodies. To prevent irreparable damages to ecosystems, innovative technology that recovers nitrogen has to be applied to the massive volume of agricultural digestate. The decoupling of digestate and inorganic nitrogen allows for flexible fertilization and minimizes undesirable losses to the environment while still providing all necessary nutrients to the soil.

The PONDUS-N process patented by Pondus® Verfahrenstechnik GmbH aims at recovering ammonia from agricultural digestate, food waste or sewage sludge as base materials for industrial fertilizer production. The process can be operated both continuously and as a semi-batch. Scale-up provided, the process is planned to be suitable for unseparated solid-liquid streams. It is expected to be integrable as both sidestream and mainstream application in existing biogas plants.

A thermo-alkaline pretreatment is used to increase the content of free ammonia, which is then driven out in the degasification column by a recirculated gas stream or external air input while negative pressure is applied. In the absorber it is contacted with spray sulphuric acid. The resulting di-ammonium sulphate (DAS) can be used as a source material for fertilizer production.

In the scope of Circular Agronomics, a pilot plant with a capacity of 1 m<sup>3</sup> storage volume and a maximum continuous flowrate of 0.15 m<sup>3</sup>h<sup>-1</sup> has been installed in Berge, Brandenburg (GER). The Berlin Centre of Competence of Water (KWB) has since conducted promising batch trials. With surface increase due to the introduction of an air stripping gas flow, more than 90 % of NH<sub>4</sub>-N can be eliminated in 90 min (70 °C, 310 mbar p<sub>abs</sub>) from 40 L of agricultural digestate. Stripping CO<sub>2</sub> before alkaline treatment shows a reduction up to 66 % of NaOH needed.

#### Operating conditions

T	45–70 °C
Pabs	310–800 mbar
pH	7.5–10
HRT	90–120 min

#### Chemicals required

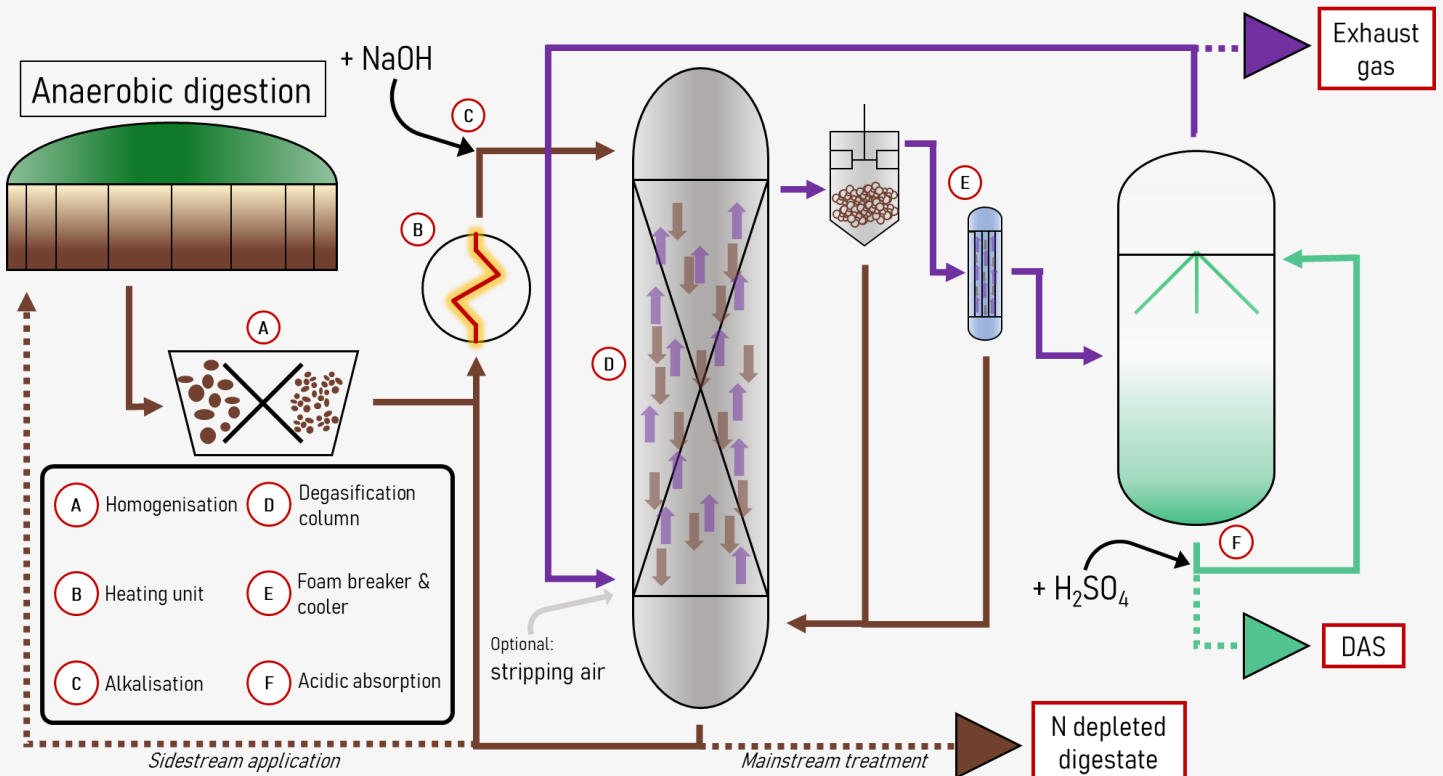
NaOH	2.5–4* g L <sup>-1</sup> (pH 9) <small>*after CO<sub>2</sub> stripping</small>
H <sub>2</sub> SO <sub>4</sub> (96 %)	3–4 mL L <sub>Substrate</sub> <sup>-1</sup> (0.5 mol mol <sub>NH<sub>3</sub></sub> <sup>-1</sup> )

#### N depletion (batch)

Removal efficiency	up to 90 %
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# PONDUS-N



## Unique Selling Points



- ➔ More than 80 % removal of inorganic N achievable
- ➔ Treatment of mixed solid-liquid phases or centrate with high dry matter content
- ➔ Internal recirculation of counter gas flow can eliminate need for external air input
- ➔ Production of source materials for mineral fertilizers
- ➔ Decoupling N from digestate helps comply EU Nitrates Directive