

Technology for N recovery as ammonium sulphate from co-digestion of corn silage, chicken manure and other biowaste by BENAS process

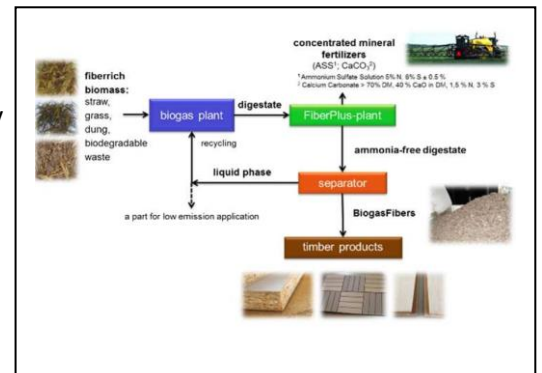
Gesellschaft für Nachhaltige Stoffnutzung mbH



Keywords: Ammonium sulphate • anaerobic digestion • FiberPlus • N recovery

Key facts:

- **Category of the technology:** Physic-chemical nitrogen recovery from manure, digestate and wastewaters: stripping and scrubbing
- **Input:** maize silage and poultry manure
- **Output product(s):** ammonium sulphate
- **Available capacity:** AmS output 5-40 t/d, Lime output 1.5-14 t/d
- **Focusing geographical areas:** EU
- **Technology status:** TRL 8
- **EC/MS Authority permits:** by the regional approval authority



Summary of the technology:

The BENAS biogas plant yearly treats more than 80 000 ton of crop, food waste and poultry manure and produced biogas, mineral N, calcium-carbonate and organic soil fertilisers. With a modified stripping process, it reaches a recovery rate of 80% of ammonia contained in the digestate, which is approximately 200 t/y. It requires the addition of Flue Gas Desulphurisation-gypsum (FGD-gypsum) to produce two marketable fertilizers: 25% ammonium sulphate (AmS) solution and solid calcium carbonate fertilizer (Lime, 70% DM). The use of gypsum increases soil pH, enhances nutrient availability without causing alkalinisation, and also provides Calcium as an important plant nutrient. Moreover, the process does not require any external heat source and relies solely on the exhaust heat from the CHP engine, with an average consumption of 100 kWh/m³ of digestate. The gypsum used for the process comes from FGD of coal power plants.

The process further implements with the FiberPlus System has achieved the production of ammonia-free fibers suitable for different applications in the fiber and timber industries (i.e. fiberboard). Emissions and loss of N are reduced. Recovered nutrients in the system are 67% of NH₄-N as AmS and 6% of NH₄-N as Lime; 6% of P and 5% of K as fibers.

Competitive position and advantages:

- Reduction of emissions (ammonia), loads of groundwater (nitrate) and losses of nitrogen a fertilizer from digestate.
- Reduction of transportation costs and costs for storage of the digestate.
- High potential to increase the yield and to reduce the costs for biogas concepts with nitrogen-rich substrate (e.g. chicken dung).
- Important step for a total treatment to a pure water and for closing fertilizer loops.

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