byosis

part of saur mission water

ByoFlex® Nitrogen Recovery Stripper System

Boosting the circular economy via a proven, robust and revolutionary ByoFlex® stripping system, recovering ammonia from highly contaminated substrates into a valuable circular resource.

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Resource recovery from ammonia

With the rising demand for circular resources to reduce nitrogen and CO_2 emissions, stripping technology can be applied to turn waste streams into valuable resources.

Based on optimizing resource value and operational digester challenges, the ByoFlex® - a system from NSI Byosis - recovers ammonia from highly contaminated substrates. This can maximize biogas production while reducing discharge costs simultaneously.

NSI Byosis combines and translates its extended knowledge of digestion and fermentation processes into practical and feasible solutions. Byosis offers solutions that considerably improve the efficiency and capacity of the digestion process, presenting a perfect alternative for anammox.

Your ByoFlex® benefits

- **Reduces** N_2O and CO_2 footprint: avoid conventional nitrogen oxidation.
- **Reduces** the risk of clogging due to a robust and patented design.
- **Reduces** discharge and treatment costs for nitrogen to the sewer or river.
- **Removes** highly concentrated ammonia streams and difficult digestate substrates from wastewater sludge or manure.
- **Reuses** centrate water to improve biogas digester performance by lowering the N-content through the treatment of recycled dilution water.
- **Recovers** a valuable liquid circular fertilizer: ammonium sulphate or ammonium nitrate.

«**The ByoFlex®** system reduces discharge costs and recovers nitrogen to be used as a valuable fertilizer»

Turn nitrogen challenges into a solid circular business case

"A 5-step approach to solve your nitrogen challenges"

1. Investigate the current situation: new build or existing plant?
2. Solve ammonia, energy and/or system challenges.
3. Optional: pilot and/or mobile water solution.
4. Design and build ByoFlex® sytem.
5. Smart operation and maintenance to reduce OPEX costs.

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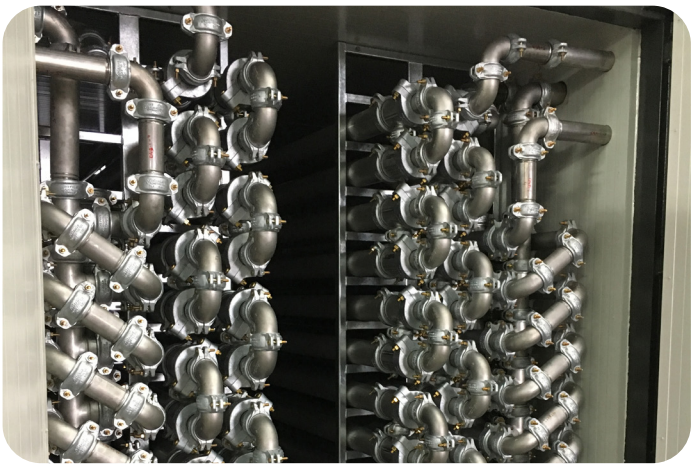
ByoFlex® Process Description

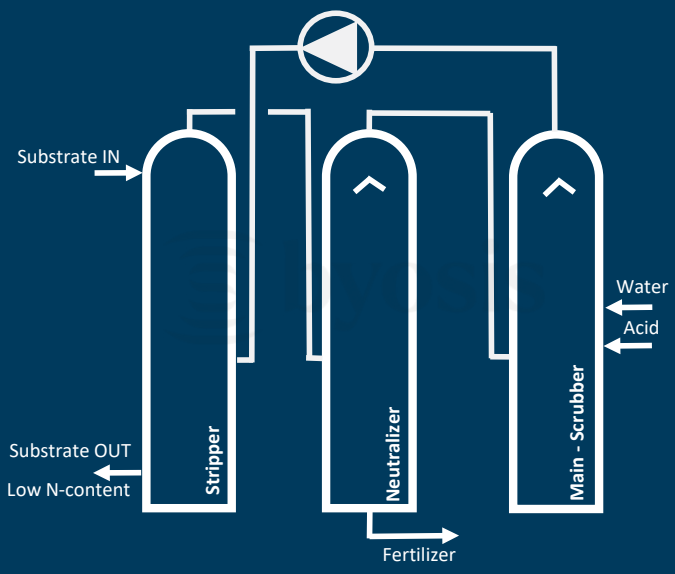
- After heating, the substrate is pumped into the top of the stripper, where air is blown through the substrate in counterflow mode. Ammonia (NH_3) is captured by the air.
- The air, (partially) saturated with water vapor and ammonia, is blown through a series of two ammonia scrubbers. There, the ammonia is removed from the air with sulphuric acid and water to form ammonium sulphate or, alternatively, nitric acid can be used to produce ammonia nitrate. The air is reused to save energy costs. Only a very small bleed stream is applied to prevent the build-up of undesired components.
- With the ByoFlex® system, a transparent, liquid, pH neutral ammonium sulphate with 8% nitrogen and 40% dry matter is produced. This is a high-quality fertilizer. The clean, yet moist, air is fed back to the stripper. In case of ammonia nitrate, a fertilizer with >15% N is possible.
- In a wet environment, the gaseous ammonia (NH_3) is in equilibrium with ammonium (NH_4^+). At higher temperatures or higher pH-values, the equilibrium shifts to ammonia that can be captured by the air.
- If desired, the heat can be recovered by exchanging incoming and outgoing substrate streams to and from the ammonia stripper. NSI Byosis has developed a special type tube-in-tube heat exchanger, 100% modular, demountable and expandable.



Industry Applications

" Addressing the needs of municipal and industrial wastewater treatment plants to turn nitrogen challenges into a true circular business case, through recovery of a valuable fertilizer"

- Industrial wastewater treatment plants
- Municipal wastewater treatment plants
- Food waste and manure digesters



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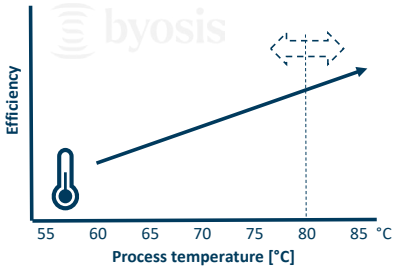
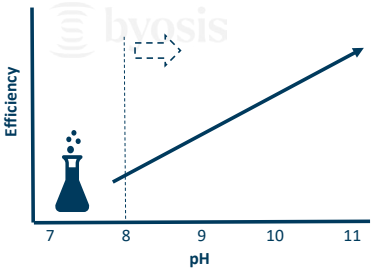
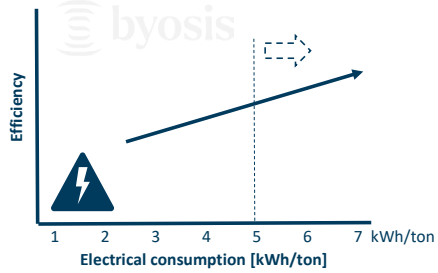
ByoFlex® Process Overview





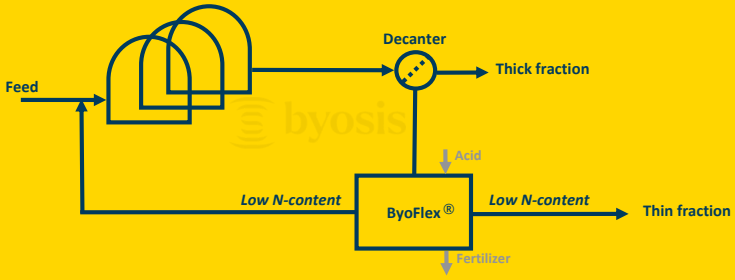


Typically, a minimum removal and recovery rate of 70-85% N-NH_4 **leads to the best ratio between CAPEX and OPEX**, but higher recovery/removal percentages are also possible.

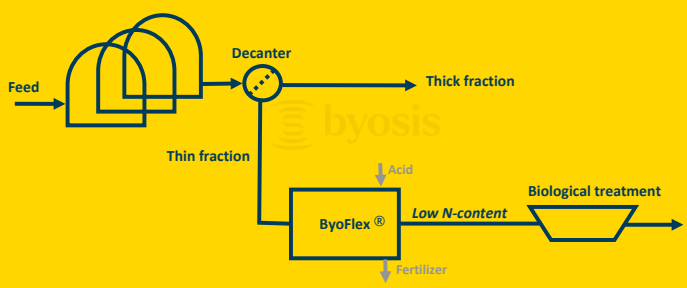
The stripping efficiency is strongly dependent on the temperature and pH-level of the substrate and the fan's electrical energy consumption.

ByoFlex® configuration examples

Reduce operational cost: Controlling the N-content in the digester



Reduce treatment cost, reduce N-content: back-end treatment



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Sewage sludge digestate
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ByoFlex® 4x20

Poultry manure
The Netherlands

ByoFlex® 2x10

Food waste & manure digester
Italy

ByoFlex® 2x10

Poultry manure
Northern Ireland

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