

Recovery and utilisation of nutrients for low impact fertiliser



Technology fact sheet – Anaerobic Membrane Bioreactor

Recovery of biogas and liquid nutrient rich effluent from domestic wastewater

An anaerobic membrane bioreactor (AnMBR) combines anaerobic processes and membrane micro or ultra-filtration within a single step, providing separation of sludge and clean water, and achieving the decoupling of the hydraulic and solid retention times. Anaerobic processes consume less energy compared to aerobic systems, since no oxygen is needed for the removal of organic matter. Moreover, anaerobic processes transform biodegradable organics into a biogas stream, mostly composed of methane and carbon dioxide. Bioenergy, as heat and electricity, can be harvested from the biogas, while most of the nutrients are conserved and liberated in the liquid effluent (permeate) as ammonium and phosphate. Microbiology quality of the permeate is excellent, with undetectable presence of suspended solids, which makes it suitable for reusing the water and nutrients embedded in the effluent in agriculture (fertigation). The combination of AnMBR and fertigation reduces CO₂ emissions due to the organic matter valorization and the partial avoidance of mineral fertilizer requirements. Additionally, the anaerobic process is acknowledged for its low excess sludge production. In Run4Life, an AnMBR submerged configuration with ultrafiltration flat sheet membranes is applied to treat blackwater from office buildings collected using conventional toilets.

Key facts

- Small footprint with low sludge production
- Operation at high biomass concentration
- Liberate nutrients (ammonia and phosphorus) to soluble form for subsequent recovery or direct application (fertigation)
- High quality permeate: suspended solids, virus and bacteria free

Application in Run4Life demo sites

- Input: black water
- Output: biogas, concentrate (excess sludge), permeate (liquid effluent)
- Applied in Vigo

