# Sustainable Treatment of Landfill leachate with Membrane Processes

The compliance of the EU regulations including the Landfill and Urban Wastewater Treatment Directives demand for the application of technologies that allow in a cost effective way the sustainable treatment of the leachate generated as a by-product in landfill sites.

Membrane processes (NF, RO) have been successfully applied in the treatment of landfill leachate since the quality of the treated liquid fulfills the discharged limits stipulated by the corresponding environmental authorities. However, the landfill leachate treatment processes are characterized by their high energy demand especially for the treatment of the retentate generated during the membrane stages which results in elevated operational costs.

Even though, the application of the EU Landfill directive has led to the reduction of leachate volumes across the union, still there is a need for finding ways that allow not only the further reduction of the generated concentrate but also the application and implementation of alternative technologies that can lead to a more sustainable membrane treatment process.

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Our general objective is the development of projects related to the application and implementation of alternative technologies that can lead to a more sustainable approach for the treatment of landfill leachate with membrane processes.

Currently Offered Topics for Master Thesis:

- Removal and potential recovery of calcium as an anti-scaling alternative in the treatment of landfill leachate with membrane processes.
- Simulation of $CaCO_3$ precipitation for its removal and potential recovery from treated landfill-leachate.
- Removal and recovery of ammonia from treated landfill leachate by the use of hollow fiber membrane contactor systems.
- Simulation of a membrane contactor unit for the removal of ammonia from treated landfill leachate.
- Optimizations of a nitrification fix bed biofilm reactor implemented as an alternative step during the treatment of landfill leachate in a pilot plant membrane process.

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