Circular economy through enhanced treatment of municipal wastewaters

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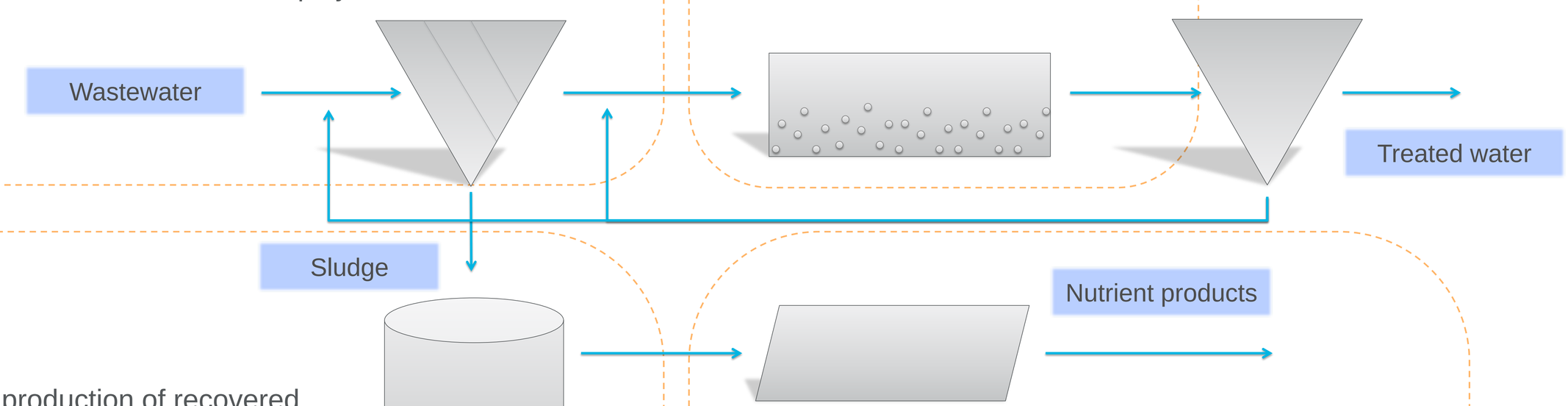
- This project aims to achieve circular economy concept by integrating the management and treatment of municipal wastewaters with biogas and fertilizer production
- The conventional municipal wastewater treatment is focused and optimized in terms of nutrient and total solids removal. Nutrient circulation and energy efficiency are required to increase both economic and environmental sustainability of the overall process
- Drivers for the concept are new wastewater treatment and biogas plant investments in an eco-industry park located in Tampere area, Finland (ECO3, www.eco3.fi)

Primary treatment

- Microfiltration and membrane techniques are tested for the enhanced separation of solids and nutrients from the wastewater before the biological treatment process instead of conventional primary settling
- Recovery of solids and nutrients is tested, e.g., with microfiltration with and without polymers

Aeration

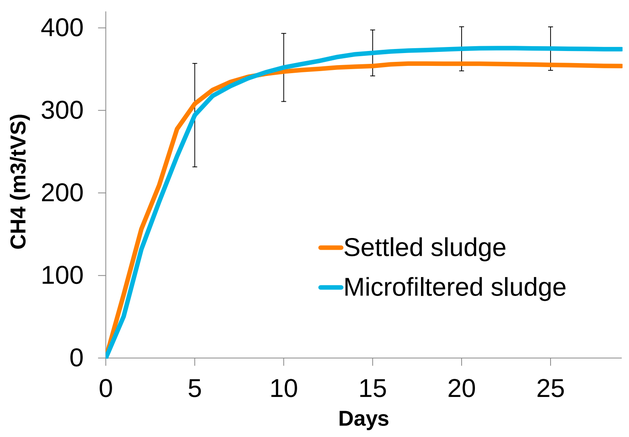
- The increased separation of solids and nutrients in the first phase decreases the aeration required in the biological treatment



Biogas

- Biogas production of recovered sludge after microfiltration is tested in batch and continuous tests and compared with conventionally settled sludge
- In batch tests, the microfiltered sludge had 5% higher methane production compared to settled sludge (Fig. 1)

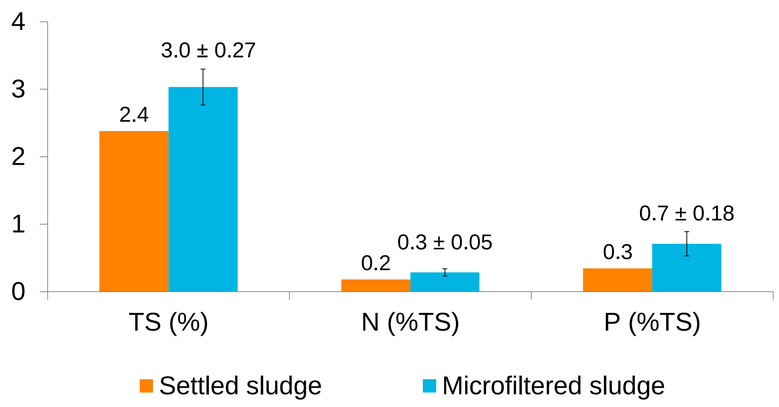
Figure 1. Methane production potential of conventionally settled sludge (354 m^3/tVS) and microfiltered sludge (13 samples, 374 ± 26 m^3/tVS). Standard deviation calculated for 13 different microfltration conditions, plotted in 5-day intervals.



Nutrients

- Microfiltration concentrated solids and nutrients to the sludge more efficiently compared to conventional settling (Fig. 2) indicating increased fertilizer value
- Possibilities for further nutrient processing of digestate nutrients will be further evaluated
  - Use of e.g. ammonia stripping, struvite recovery, evaporation, membrane separation

Figure 2. Characteristics of conventionally settled sludge and microfiltered sludge. Microfiltration was tested in 13 conditions.



This project is implemented in collaboration between Tampere University of Technology and Luke, and funded by the Ministry of the Environment of Finland. Travel grant from Oskar Öflunds Stiftelse sr is greatly acknowledged.