

Biogas and Fertilizer from blackwater, lawn cuttings and grease trap residues in a district of Hamburg

Saskia Hertel, Stefan Deegener, Ina Körner

Hamburg University of Technology, Institute of Waste Water Management and Water Protection, Bioconversion and Emission Control Group, saskia.hertel@tuhh.de

The research project KREIS focuses on the combination of renewable energies and innovative wastewater systems. In order to archive that HAMBURG WASSER introduced a new wastewater management, called the "Hamburg Water Cycle®" (HWC), which is to be realized in the Hamburg district of Jenfelder Au.

HWC contains a separate treatment of greywater and blackwater. Vacuum toilets are used to concentrate the blackwater. Biogas will be produced from the blackwater in an anaerobic digestion process.

The daily amount of blackwater will be about 12 m³ (DM: 0.6%; oDM: 63% DM; N: 1.5g/l; P: 0.2g/l), to increase the amount of biogas co-substrates will be added. Grease trap residues from restaurants and canteens (DM: 5%; oDM: 90% DM; N: 0.1% DM; P: 0.1% DM) and lawn cuttings (DM: 37%; oDM: 78% DM; N: 2.5% DM; P: 0.3% DM) have been selected. An inventory study showed that a sufficient quantity of lawn cuttings is available within a 5 km radius.

The lawn cuttings must be pre-treated for wet fermentation. Two options were investigated: press juice and shredding of the fresh and silage lawn. Batch test are used to determine the biogas potential of the substrates; blackwater 500 l/kg oDM; grease trap residues 1000 l/kg oDM; lawn cuttings 500-700 l/kg oDM.

The effects of the composition of the substrate mixture and the retention time on the quantity of biogas and process stability have been studied in continue operating reactors. First experiments have shown that a stable process (biogas production 800 l/kg oDM) is possible with a mixture of blackwater, lawn cuttings and grease trap residues in a ratio 1:1:1 by retention time of 55 days.

Furthermore the nitrogen and phosphorus potential of the digestate will be determined. It can be transformed into a mineral fertilizer. In this way an integral utilization of organic waste will be possible and the energy consumption of waste water treatment can be reduced.