

## Process-plants treating organic waste and municipal sludge - Producers of Green Energy, fertilizers and Bio Products.

Recovery of resources from wastewater streams is the foundation for circular economy (Sustainable promoting resource recovery and green energy production). Energy is one of the most important resources recovered from wastewater (WW) treatment. Wastewater utilities are increasingly looking for innovative and cost effective energy management opportunities to reduce operating costs and mitigate contributions to climate change. Recovering energy from the carbon content of municipal wastewater sludge by anaerobic digestion (biogas production) is today the state-of-the art. With the present knowledge, municipal treatment plants are able to become energy neutral. Co-digestion of municipal wastewater sludge and organic waste streams gives the treatment plants the opportunity to increase production of green energy, which can be utilised for different purposes.

R&D challenges is including optimization of the co-digestion process of different organic waste streams. In a holistic approach, energy recovery should also be accompanying by nutrients recovery (Phosphorus) and utilisation of other valuable bio products from the digestion process.

The project, which is partly funded by COWIfonden, includes co-operation between Aquateam COWI, which is COWI's R&D company in water and environment in Oslo, Aalborg University in Copenhagen, COWI's Water and Wastewater Competence in Denmark, Sweden and Norway, Bergen municipality (WW) and IVAR (Inter-municipal WW company in Rogaland, Stavanger).

The COWIfonden project has a limited budget, but it supports ongoing fundamental long term R&D at Aalborg University, focusing on optimisation of energy production and bio-products from co-digestion of municipal sludge and waste from the fish industry. Aquateam COWI and participants of a newly financed Regional Research Foundation-project from Vestlandet (Norway) carry out associated applied R&D: "Utilisation of waste from marine food production to regional renewable energy". Other participants are the College of Bergen and University of Stavanger, involving their Bachelor and Master students, IVAR and Bergen. IVAR is planning to optimise production of fertilizers and renewable energy to the district's inhabitants (1.5 mill kWh/year) and to reduce CO<sub>2</sub> discharges with 80 %. The energy produced, will be utilised for district heating. Bergen municipality is optimising energy production for use in the city's buses, and wants to test different types of organic waste to obtain this.

The R&D, financed by COWIfonden, will form the foundation for an R&D consortium of COWI and Scandinavian/European/American Universities with the aim of developing "The wastewater treatment plant for the future". We are also hunting for R&D cooperation within EU.