

Pioneer_STP

The Potential of Innovative Technologies to Improve Sustainability of Sewage Treatment Plants

Pioneer_STP addresses the challenges related to wastewater treatment (WWT) from a holistic perspective. Concepts such as resource recovery, sludge management, energy balance optimization, new effluent quality requirements (Emerging Pollutants, EP) and emission of greenhouse gases (GHGs) are compulsory to drive the European water sector to be more innovative, productive and competitive. The project aims at assessing the impact of the integration of (4) innovative Unit Technological Solutions (UTS) (comprising in total 9 technologies), nowadays developed at lab- or pilot-scale, targeted to energy recovery and nutrients removal/recovery, into a Sewage Treatment Plant (STP). Each UTS will be characterised not only in terms of efficiency but also concerning their environmental (LCA, Risk), economic (LCC) and energetic impacts.

Pioneer_STP considers the cross effects (positive and negative) between the different units, in a strategy that goes beyond a focus on a particular unit to a global focus (the entire STP). A number of different layouts including the innovative units will be assessed under a multi-criteria analysis by using a superstructure-based optimization framework. The optimal process design solutions (novel plant flow schemes) will be further optimized by using a dynamic plant wide modelling platform (PWM).

The consortium includes 5 skilled teams from Denmark, Italy, Spain and Sweden, from Academy and Industry, providing a multi-disciplinary approach: Development and full Characterisation of each UTS for Wastewater (Aqualia, KTH, USC), Centrate (UNIVR, Aqualia) and Sludge treatment (USC), Life Cycle and Risk Assessment (USC), Life Cycle Costs Assessment (DTU, USC) and Superstructure-based optimization and Simulation of mass and energy fluxes in the water, sludge and gas streams by means of PWM (DTU). Cooperation is enhanced by a mobility plan focusing on complementary skills. Research results can be transferred in a relative short time period to full scale STPs, an important added value for the stakeholders that support this proposal, including Companies and Water Authorities.