

## **Watintech**

### **Smart decentralized water management through a dynamic integration of technologies.**

The WATINTECH project proposes a combination of concepts of sewer mining with urban run-off treatment in decentralized treatment facilities to enhance the recovery of valuable resources including water, methane (heat, energy) and value-added chemicals, either extracting or producing them from the fluxes inside a sewage pipe. It is also postulated that this combination improves the management of centralized wastewater infrastructures under variable weather events (such as heavy rain episodes combined with long dry periods). The impact of sewer mining and wastewater characteristics on downstream wastewater treatment plants (WWTP) will also be analysed. In an ideal scenario, besides generating the value-added products for local reuse, decentralized treatment will also impact positively on the existing centralized sewage collection and treatment facilities, an aspect rarely taken into account in the design of decentralized infrastructure.

WATINTECH summons an inter-disciplinary consortium offering capabilities that cover the whole R&D value chain - from fundamental research to market uptake. The project will advance the state-of-the-art of novel technologies to achieve five main objectives in four experimental work packages (WP 1-4) employing different size laboratory and pilot-plants and one theoretical work package modelling process innovations and providing system wide optimization (WP 5). A brief description of these five WPs follows:

WP 1 Decentralized water reclamation: Forward Osmosis (FO) filtration, preconcentrating raw wastewater for anaerobic treatment (WP2), production of reclaimed water, and the use of constructed wetlands (CW) for treating alternatively urban run-off and nutrient rich waste streams from the anaerobic process. Evaluating the medium and long-term performance of the technologies, draw solution selection and regeneration, and the impact of evapotranspiration rates, salinity and nutrients in the CW plants.

WP 2 Decentralized energy recovery from sewage: use of a lab scale anaerobic membrane bioreactor (anMBR) to maximise the energy recovery from concentrated wastewater from the FO unit (WP1); study of temperature variations and hydraulic retention time on methane production and membrane fouling; insertion of an electrochemical cell via a recirculation loop to oxidise sulphide at the anode to avoid methanogenesis inhibition.

WP 3 Value-added products from sewage to control sewer corrosion: study of the production of caustic soda at the cathode and oxygen at the anode during its regeneration of the electrochemical unit applied in WP2; long-term evaluation of the use of these products to minimize sulphide production in a lab scale sewer rising main.

WP 4 Impact of sewer mining on WWTP optimization: study of the impact of sewer mining on downstream wastewater treatment processes and in particular the nitrification/ denitrification pathway for N and P removal under low COD loading, high pH etc; optimize energy efficiency and reduce greenhouse gas emissions.

WP 5 Mathematical modelling and system-wide planning: develop novel dynamic mathematical models of the novel processes. These models, together

with different criteria (environmental, technical, economic and social) will be integrated in a decision support system for planning centralized/decentralized urban water systems under different scenarios. Prof Rodríguez-Roda will lead WP 6 (project management and exploitation) with strong support of his institution's administrative team dealing with all financial, administrative, and legal aspects of the project including intellectual property management. A scientific board will be constituted by including a senior scientist of each institution. The scientific board will be the main decision-making group to keep the project on track and manage any risks. An advisory and stakeholder board will be constituted to guide and advise upon technical challenges and appropriate dissemination and exploitation strategies.