Energy recovery from wastewater - REWATERGY

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The REWATERGY team consisting of various European Universities that will train eight Early Stage Researchers (ESRs) in the development of new technologies to reduce the energy demand in water treatments.

Access to energy and water underpin global economic and social development with an increasing demand of both of them. Simultaneously, we are currently facing the challenge of recycling materials and water of high quality to become carbon neutral by decreasing its energy consumption and CO^2 emissions. The current Water Framework Directive has strict regulations on a wide range of contaminants, and most waste water treatments continuously increase the energy demand of the water cycle. Yet, the EU, and UK in particular, is committed to ambitious targets to reduce greenhouse gas emissions, including the legally binding 2015 Paris agreement. These conflicting interests have motivated REWATERGY, an industrial – academic partnership within the water-energy nexus as part of the Marie Curie Industrial Doctorate training network funded by the European Commission within Horizon 2020. The Catalysis and Process Integration group (led by Dr Laura Torrente) will work together with Rey Juan Carlos University (Spain), Ulster University (UK) and three industrial partners, Delft IMP (Netherlands), ProPhotonix (Ireland) and FCC Aqualia (Spain). The consortium will train eight Early Stage Researchers (ESRs) in the development of new technologies to reduce the energy demand in water treatments while increasing the energy recovery from waste streams inspired by the circular economy concept. All of ESRs will equally spend their time in their associated university and company during their PhD project, getting a balanced training in research skills, technical knowledge and transferable skills with a focus on entrepreneurship, in order to enhance the competence of the European water industry.

Two of the ESRs based at CEB, Rubén Asiaín and Marina Avena are working on the development of technological processes for the energy recovery from wastewater streams. In particular they are investigating ways of recovering urea and ammonia from wastewater to avoid the current formation of waste water streams with high nitrogen content, which currently require large amounts of energy for their treatment. This approach opens the door to extract the high hydrogen content in these compounds for energy generation following the efforts in the group to deploy ammonia as a renewable energy vector.

Such innovative approach for sustainable waste water treatments have a wide range of impact. It can be deployed in the valorisation of high N-content streams in municipal wastewater treatment plants (i.e. centralised systems) but it can also be used in new decentralised systems in intelligent toilets for energy recovery in self-sustained cities. This development has also potential in rural areas (e.g. farms) and the improvement of sanitation in developing countries. REWATERGY will change the social perspective of wastewater from a residue into a sustainable energy source.

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