



## Innovative technologies for resource efficient cities - REUCITY

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### **Abstract**

This project aims to deliver tools and technologies that will facilitate decentralized and efficient management of natural resources, i.e. water, food and energy in urban areas. These technologies typically include separation of domestic waste flows, i.e. to grey water (GW) (water from showers, baths, hand washing basins, washing machines), black water (BW) (water from toilets) and bio-waste, as it considerably enhances the extraction of resources from waste. Of many technologies available MBR is generally found as very reliable, however not economically feasible for small scale applications. In this proposal we aim to shift this common opinion by first optimizing the technology from energy use perspective and second by coupling it with other technologies in order to provide more complete urban sustainable solutions. Basic motivation behind integration of technologies is that MBR is not used and valued in its full potential. Considering the benefits of applying MBR for grey water treatment, not only that the load to sewer systems is reduced and less water is spent, the high quality and safe water provided by MBR can and should be used for efficient urban food production and/or irrigating green areas. Hence, benefits like reducing urban heat islands (resulting in less energy for air conditioning), healthy and local food and reducing food miles should be taken into account when valuing MBR. This proposal has three objectives:

- Optimize the operation of membrane bioreactor (MBR) technology for GW treatment so that it produces sanitary safe water for multiple uses, like flushing toilets or irrigating green spaces, is robust and still economically feasible for small scale applications in an urban environment. Demonstrate its operation on a real-case.
- Develop an integrated design framework (IDF) for decentralized management of resources in urban areas, by coupling the developed MBR with complementary existing technologies in order to provide solutions that maximize materials cycling. These are: technologies for BW treatment, bio-waste recycling (composting, anaerobic digestion), rain water harvesting (RWH) and urban farming.
- Opportunity mapping: map potential sites in selected case study according to their suitability for applications of sustainable concepts including their properties and feasibility for retrofit, costs and benefits, public acceptance, potential users (e.g. private homes, schools or social housing) and potential investors. This could serve as an analysis of the market potential for the future product(s).

The project will connect with related on-going projects at the host institution (LEQUIA) as well as with other European projects. Implementation site will be shared with recently approved FP7 WATER-INNO-DEMO project **demEAUmed**, where water source separation (GW and BW) has already been performed. Additionally, demEAUmed will implement a whole range of innovative water (re)cycling technologies, which will enable coupling (at least partly) with proposed technology. Results of the project will be disseminated among relevant groups and networks and thorough exploitation plan elaborated and implemented.