

## **TH.E.R.BIO.R**

### **THERMAL ENERGY RECOVERY FROM A NOVEL SEQUENCING BATCH BIOFILTER GRANULAR REACTOR**

THERBIOR focuses on the development, implementation and diffusion of technologies to improve energy efficiency in wastewater treatment plants (WWTPs) using a fully off-grid solar-assisted heat pump (SHP) system, applicable Europe-wide but centred on the Mediterranean region. The THERBIOR project aims to provide solution for the tourism sector, which is characterised by intense seasonal water demand and wastewater discharge. The integration of physical infrastructure such as a highly efficient tubular heat exchanger coupled to a fully off-grid reversible water source heat pump with a pioneering, novel Sequencing Batch Biofilter Granular Reactor (SBBGR) already installed in the Water Research Institute (CNR-IRSA, Italy), which creates new value through reuse and repurposing. This technology may help to produce benefits for local populations in the form of wastewater management, giving people access to clean water, and thus contributing to societal well-being through better human health as a result of better water quality. Projections for future climate change point to increasing resource depletion and water scarcity, which will have a serious socio-economic and environmental impact.

Current global changes (such as climate change and urban sprawl) demand innovative practices to minimise the risks associated with water distribution and storage facilities in urban areas. Consequently, efforts are needed to strengthen public participation and imbue a sense of social responsibility concerning water and energy use, especially regarding freshwater resources, and adapting to the above-mentioned threats. Innovative technologies are required by the water industry to develop products and services fuelling the European economy. The main goal is to reuse the heat from the existing novel SBBGR reactor at CNR-IRSA into a low-temperature air conditioning system capable of covering the cooling/heating (CH) and domestic hot water (DHW) demand of an experimental test laboratory; this will be constructed during the project at the CNR-IRSA site. The system will be backed up by short-term storage based on Phase Change Materials (PCM) to ensure year-round coverage of the experimental lab's CH and DHW demand. After obtaining satisfactory results from the developed prototype, we will analyse this innovative application's viability for incorporation into Almeria's (Spain) and Bari's (Italy) tourist facility network. Our main goal will be to evaluate how much energy we can gain from a specific urban wastewater network to reduce energy consumption (coming from fossil fuels) for cooling/heating purposes in tourist buildings located in the cities. The project also intends to create new business opportunities, notably by supporting SME involvement in local water and solar-energy supply chains. THERBIOR comprises a consortium of 4 European organisations from Spain, Italy and Denmark, combining a wide range of technical, institutional and business expertise. THERBIOR aims to bring together all the specialists required to support and promote a novel technological solution to improve urban wastewater treatment process efficiency with an emphasis on model application under the European Water and Energy Directives.