

Concept Note: Technical Applications for Cleaning water & Recover raw materials (TACR) proposal for the I-3 Strand 2A call 2025

The water management, wastewater treatment and reuse standards in Europe face specific challenges closely linked with climate change and pressures caused by growing number of population. Among those are water scarcity, sludge management, pollution with micropollutants that harm public health, cyber security and improving energy efficiency of waste water treatment plants, in order to align it with the EU's policy objectives such as Circular economy action plan, Green Deal, Net Zero industries act, Critical Raw Materials act as well as Urban Waste Water Treatment Directive, NIS2 on Cybersecurity Directive and Regulation on Minimum Requirements for Water Reuse and Drinking Water Directive. To comply with the objectives of these EU policies, member states and its regions will have to implement and invest in new technologies, that is why we propose the project TACR based on the already successful collaboration initiated under the Water Smart Territories S3 Partnership.

At the same time, the mining industry is increasingly vital due to the global demand for critical raw materials. The EU Critical Raw Material sets ambitious targets to increasing extracting activities, which are vital to achieving the digital and green ambitions and its ambitions related to Open Strategic Autonomy. At the same time, water management remains a pivotal challenge in mining processes. Mining operations require significant quantities of water for activities. Securing this water without depleting local water resources or disrupting community access remains a major concern. In mining activities there are also pollution risks which lead to water contamination in the acid mine drainage, tailings leachate and chemical use. Water is also a significant part of the mining waste that can be used as a resource material for strategic raw materials recycling.

Digitalization holds the potential to revolutionize how water processes are managed, not only in the mining sector, enhancing efficiency, sustainability, and resource optimization. It can also contribute to the resilient mining infrastructure.

The consortium will focus on the uptake of digital innovation of the water processes to reduce harmful environmental impacts of the mining processes. For that purpose, we will instal new value chains based on a unique combination of know-how and expertise between more developed regions (Brussels, Aragon, Pohjois-Pohjanmaa, Lapland and less developed regions (East Slovenia, Andalusia, South Central region of Bulgaria – Plovdiv, North Portugal), with the advisory support of IDEA, a company with a long track record managing innovation and interregional collaboration projects.

The “Technical Applications for Cleaning water & Recover raw materials” (TACR) proposal is a response to the growing demand for the digitization of water management

processes in the mining industry. Digitalization will help optimize the water treatment process, resulting in reduced use of treatment chemicals, decreased energy consumption, the potential for partially closed water circulation, improved recovery of side minerals due to less contaminated water being discharged into nature, better yields of enriched materials, and a significantly lower environmental footprint.

An innovative approach to (mine) water and waste management lies in comprehensive analyses of environmental and technological conditions as well as quantitative and qualitative parameters of mine water, including the support of online monitoring at different stages of the water circuit and decision-making systems based on artificial intelligence (AI), Big Data and the Internet of Things (IoT).

Enhanced water recycling and reduced polluting practices are essential to lowering the burden on depleting freshwater resources and achieving public acceptance of modern mining. In developed countries, mines will face tightened environmental regulations. Therefore, they want to act responsibly to achieve positive public perception and ensure smooth interactions with regulators in the future, while maintaining their competitive position as the provider of vital materials that support fundamental human needs. Taking environmentally friendly actions before regulations are implemented is a wise precaution. The TACR project will support SMEs to create solutions for (mining) operations to take steps towards an AI-assisted water treatment process control system that aims to partially close water circulation. Water and water containing waste can be recycled when a validated digital twin of the water system is utilized, enabling optimized water treatment processes. This project aims not only to make mining operations more efficient and environmentally friendly, but also to empower small businesses across the EU27 to play a more prominent role in the sector.