

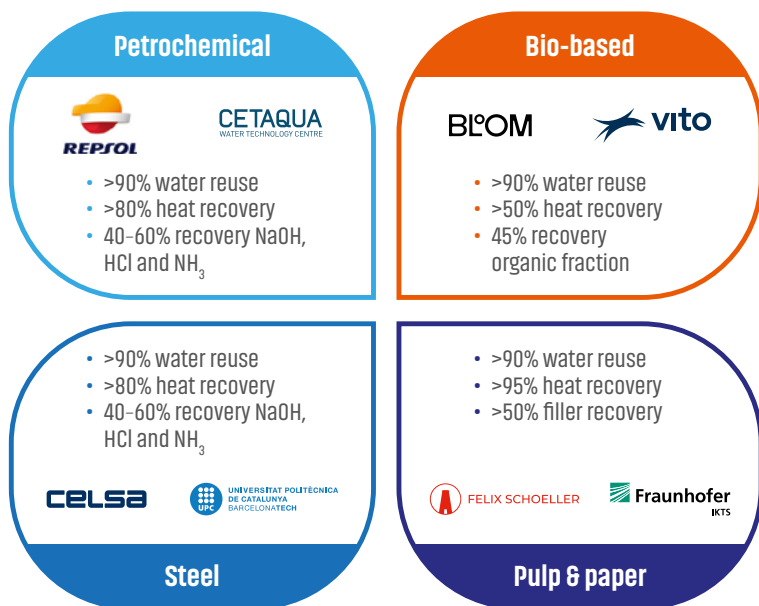
# r3volution

reuse • resource • recovery



The EU-funded R3VOLUTION project is revolutionising industrial water management in Europe. We are developing solutions that enable over 90% water reuse in water-intensive industries, while recovering effluent solutes, reusing waste heat and eliminating hazardous substances.

## Four demonstration cases



The petrochemical, bio-based chemical, pulp and paper, and steel industries are intensive water process industries that produce complex wastewaters. High concentrations of recalcitrant organics, dissolved salts, heavy metals or nutrients result in challenging, complex and costly technical solutions for industrial wastewater reuse. In addition, 20–50% of the thermal energy is lost in cooling processes and through heat losses from equipment and products.

The R3VOLUTION project addresses these issues by recovering value-added solutes and **creating closed loops** within industrial plants. The recovery of water, solutes, and energy will be achieved in separate streams (upstream process) or in a centralised industrial wastewater treatment plant (downstream process). Four physical demonstration cases with high water discharge and complex effluents will develop and test the project solutions and ensure transferability.

# Expected results

Industrial water use has significant environmental, economic, and social impacts. It can worsen water scarcity, pollute resources, and consume large amounts of energy. But membrane-based processes, zero liquid discharge (ZLD) strategies, and hybrid membrane-thermal processes can recover water, solutes, and energy and generate additional revenue.

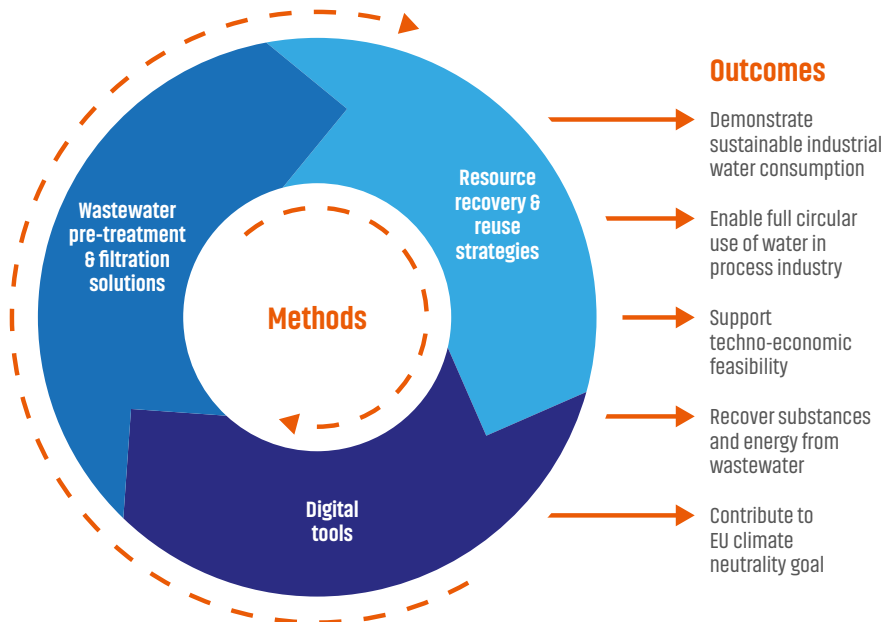
The R3VOLUTION project is developing a solution toolbox that enables more than 90% water reuse in most water-intensive industries, recovers over 45% of wastewater solutes, reuses over 50% of heat and eliminates 100% of hazardous substances.

## The solutions include:

- Cutting-edge membrane separation processes
- Advanced membrane materials
- Tailored membrane-based treatment trains coupled with waste heat
- R3VOLUTION's unique AI-based Digital Process Assistant (DPA), which defines the optimal configuration for each industry to ensure the most efficient, economical, sustainable, and compliant wastewater treatment with minimal disruption.

The solution toolbox is adaptable to different industries and sites, enabling water reuse, solids recovery and energy recovery.

# Main outcomes



reuse ▪ resource ▪ recovery

The consortium covers all the competences needed to develop R3VOLUTION solutions: Membrane technologies and treatment train design, energy recovery and digitalisation (including economic, environmental and social assessments), and dissemination and exploitation activities.



Funded by the European Union



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