



WPE Post-event Report

RESURGENCE - CORNERSTONE - R3VOLUTION

Circularity in Industrial Water

25 June 2025 #1



Water Projects Europe

Circularity in Industrial Water

 25 June 2025  9:30–11:45

 Online

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Introduction

Industrial water use accounts for nearly half of all withdrawals in Europe, putting pressure on water and energy systems. In the context of the European Green Deal, the Zero Pollution Action Plan, The Water Resilience Strategy, and mounting scarcity, shifting from linear “use-treat-discharge” practices toward reuse, resource recovery and digital optimisation is no longer only a technical challenge but a policy and market imperative.

In collaboration with A.SPIRE under the Processes4Planet (P4P) partnership, on June 25, 2025, the RESURGENCE project organised the first Water Projects Europe (WPE) event of the three sister projects: RESURGENCE, R3EVOLUTION, and CORNERSTONE. The session explored the increasingly critical topic of circularity in industrial water use—an issue made urgent by climate-driven water scarcity, rising industrial demand, and tightening regulatory pressures across the EU. A total of 105 participants registered for the webinar, with 13 viewers following the live stream on YouTube and 476 viewers on LinkedIn.

The full recording is available here: <https://www.youtube.com/watch?v=pvXGF2C-M5U>.

This WPE edition launched a new annual cycle of two strategic clustering events focused on water-related R&I projects. Beyond showcasing each project, this WPE edition set the stage for sustained collaboration and knowledge exchange. As the projects progress, these clustering efforts will be essential to amplify results, address shared challenges, and build scalable, resilient solutions for Europe’s industrial water future.

As organiser, RESURGENCE not only presented its own technical approach but also facilitated dialogue with sister projects R3EVOLUTION and CORNERSTONE, building early collaboration on digital tool integration, harmonised KPIs, and shared pathways to policy and market impact. This proactive role positions RESURGENCE as a pivotal enabler in Europe’s transition toward a circular, resource-efficient, and climate-resilient industrial future.

The event spotlighted the three newly launched Horizon Europe projects the sister projects funded under the call HORIZON-CL4-2023-TWIN-TRANSITION-01-40 - “Sustainable and efficient industrial water consumption through energy and solute recovery” (Processes4Planet partnership). Managed by A.SPIRE,

these sister projects reflect the EU's ambition to steer process industries toward climate neutrality, circular resource use, and global competitiveness.

CONTEXT

Against this backdrop, the session explored how cutting-edge innovations can unlock smarter water reuse, energy recovery, feedstock reclamation, and digital optimisation across diverse industrial contexts. At the heart of the discussion were the three sister projects, each offering a complementary approach to industrial circularity:

CORNERSTONE Integrates innovative technologies into existing industrial wastewater systems to recover water, energy, and solutes, advancing practical solutions for circularity across multiple sectors.

R3VOLUTION Deploys breakthrough membrane-based technologies and AI-driven tools to achieve over 90% water reuse, alongside effective solute and heat recovery—a step-change in industrial water management.

RESURGENCE Implements advanced technologies to enable water reuse, energy recovery, and feedstock valorisation, building seeds for circularity that connect industries, urban systems, and value chains.

About A. SPIRE

A.SPIRE is the European association managing the Processes4Planet (P4P) public-private partnership with the European Commission. It represents ten process industry sectors, including chemicals, steel, minerals, food, paper, ceramics, and water, accounting for around 20% of EU manufacturing. It funds and coordinates research, innovation, and demonstration projects that bridge technology development with large-scale industrial deployment.

Agenda

09:30 – 09:45

Opening & Keynote

Driving Industrial Water Transformation

- Welcome Address – Water Europe Representative (5 min)
- Keynote Speech – Circular Economy and the EU Industrial Strategy (15 min) EC/A.SPIRE-PROCESSES4PLANET

09:45 – 10:00

Session 1

R3VOLUTION – Reuse, Resource, Recovery

- Project overview: revolutionize industrial water management
- Optimising Industrial water recovery: digital process assistant (DPA) and membrane-based solutions
- scaling impact: demonstration sites and industrial replicability

10:00 – 10:15

Session 2

CORNERSTONE – Integrated solutions for water, energy and solute recovery in industry

- Project overview: circularity in wastewater treatment
- Building the CORNERSTONE: technological integration and digital tools for a cross-sectoral shift
- Implementing circular solutions in industrial wastewater: challenges and opportunities

10:15 – 10:30

Session 3

RESURGENCE – Embracing Circularity in Industrial Water Use

- Project Overview: Industrial Water-Energy-Feedstock Circularity
- Innovative Technologies & Case Studies
- From Vision to Reality: Seeds of Hubs for Circularity (S4C), Model & Digital Tools

10:30 – 11:45

PANEL Session

Shared vision: enabling circular industry through efficient water management

- Industry needs and policy levers
- Projects collaborative roadmap and replication potential
- Q&A + Mentimeter

11:45 – 12:00

Closing remarks and takeaways

Keynote

Mateo Pastur (CETAQUA/Veolia)

Strategy Manager at VIA and water sector representative on the Board of Directors of A.SPIRE / Processes4Planet. With a strong background in industrial water management and cross-sectoral collaboration, he brings both technical insight and strategic vision to advancing circularity and sustainability in Europe's process industries.

The keynote began with an introduction to A.SPIRE—the European association that manages the Processes4Planet (P4P) public-private partnership with the European Commission. This partnership drives research, innovation, and demonstration projects, bridging cutting-edge technological developments with large-scale industrial deployment. Presenting the Strategic Research and Innovation Agenda (SRIA) 2050, three major targets for the process industries were highlighted:

Targets

- Net-zero greenhouse gas emissions by 2050
- Near-zero landfilling and water discharge
- Global leadership in climate-neutral and circular solutions while maintaining global industrial competitiveness

These ambitions respond directly to three overarching challenges for the process industries: the high climate impact of industrial activities, the linear use of resources with limited circularity, and the need to secure global competitiveness and investment (Figure 1 shows the A.SPIRE SRIA 2050, linking each ambition to its corresponding challenge).

Main challenges	Ambitions
High climate impact, particularly greenhouse gas emissions	Climate ambition: Achieve net-zero GHG emissions. In 2020, process industries in Europe emitted approximately 750 million tonnes of CO ₂ per year; the target is to reduce this to net-zero by 2050
Linear resource use, with insufficient circularity	Circularity ambition: Close energy and feedstock loops via sustainable and circular business models, achieving near-zero landfilling and near-zero water discharge
Global competitiveness and securing investment	Competitiveness ambition: Position Europe as a global leader in climate-neutral and circular solutions, with a strong emphasis on generating markets for the innovations developed

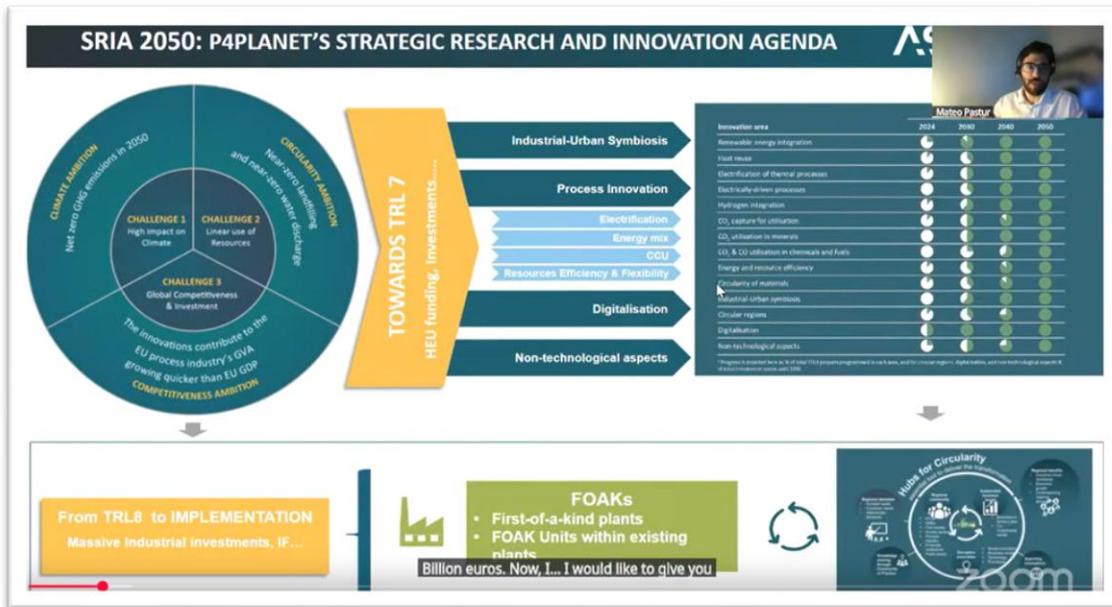


Figure 1 A.SPIRE SRIA 2050

Mateo then linked this directly to the EU Water Resilience Strategy (WRS), explaining how water circularity is a cornerstone for achieving both P4P’s mission and Europe’s broader climate and resource goals. These objectives align with the WRS target to reduce industrial wastewater discharge by 90%, recognising that wastewater is far from a waste stream – it is a valuable resource for energy recovery, access to critical raw materials, and process resilience. Achieving this requires industry to commit to “Water Efficiency First”, a guiding principle prioritising four sequential actions for industrial water management:

Four sequential actions for industrial water management

- 1. Reduce consumption**
Begin by cutting unnecessary water use
- 2. Increase efficiency**
Deploy smarter systems and processes to get more output from less water
- 3. Reuse water**
Transition from single-use to circular use, redirecting water within the system
- 4. Expand supply**
Only after optimizing usage should alternative sources (e.g., rainwater harvesting, treated effluent) be tapped

This hierarchy flips the old model where supply expansion came first, where industry must first optimize before tapping new sources. As shown in Figure 2, the “Water Efficiency First” principle places demand reduction at the heart of water resilience, followed by efficiency improvements, water reuse, and finally supply expansion as the smallest, last-resort measure.



Figure 2 “Water efficiency first” Principle

Mateo also explained the four principles of the WRS and their translation into industrial action:

Principle	Action
Water efficiency	Using less water for the same or better results, cutting both consumption and costs
Reducing pressure on water resources	Limiting withdrawals from stressed sources
Restoring aquatic ecosystems	Ensuring water use supports ecological health
Securing safe and affordable water for all	Reinforcing social and environmental responsibility

To meet these goals, innovation is essential in four areas, with large-scale water reuse, alternative sourcing, and advanced digital solutions playing a key role in building a water-smart, climate-resilient industry.

Innovation needs

- **Resource efficiency** – industrial–urban symbiosis and by-product valorisation

- **Energy transition** – electrification, a diversified energy mix, and carbon capture and use

- **Digitalisation** – accelerating change and optimising processes

- **Non-technological enablers** – governance, skills, and societal collaboration

In closing, Mateo reiterated that these ambitions and innovation needs are not only a response to pressing challenges, but also an opportunity to create long-term value. By treating industrial wastewater as a strategic resource, Europe can secure alternative water supplies, generate renewable energy, recover critical raw materials, and reduce environmental pressures, while reinforcing industrial independence and competitiveness. The work being carried out in RESURGENCE, CORNERSTONE, and R3VOLUTION can turn collaborative research into concrete, large-scale solutions, offering a forward-looking vision where technology and cross-sector partnerships transform constraints into lasting benefits for European industry.

Main Session

REVOLUTION

Eric Santos (CETAQUA)

Project Coordinator of R3VOLUTION, bringing extensive expertise in water process engineering and innovation management. His work focuses on advancing high-performance, scalable solutions for water reuse, solute recovery, and energy efficiency in industrial environments.

Water scarcity affects 20% of Europe’s territory and 30% of the Eu population every year. There is a compelling need to manage existing water resources and respond effectively to the current water challenges, especially considering that industrial activities account for nearly half of all water withdrawals in Europe, placing heavy pressure on both freshwater ecosystems and energy systems.

R3VOLUTION targets advanced membrane-based technologies for water reuse, solute recovery (including caustic soda, acids, and ammonia), heat recovery, and the removal of hazardous substances from industrial wastewater streams. Its approach combines novel nanocellulose membranes, ceramic filtration, and membrane distillation with AI tools, digital twins, and decision-support systems for process optimisation. Core objectives include designing integrated wastewater treatment trains, developing high-performance membrane materials with optimal functionalisation and configuration, and creating a smart digital tool for decision support, risk management, and optimisation of water, solute, and energy recovery. The R3VOLUTION toolbox will be demonstrated at four industrial sites in the chemicals, bio-based, pulp & paper, and steel sectors, aiming for over 90% water reuse, more than 80% heat recovery, and high recovery of critical solutes. Figure 3 illustrates the first steps of the project’s methodology.

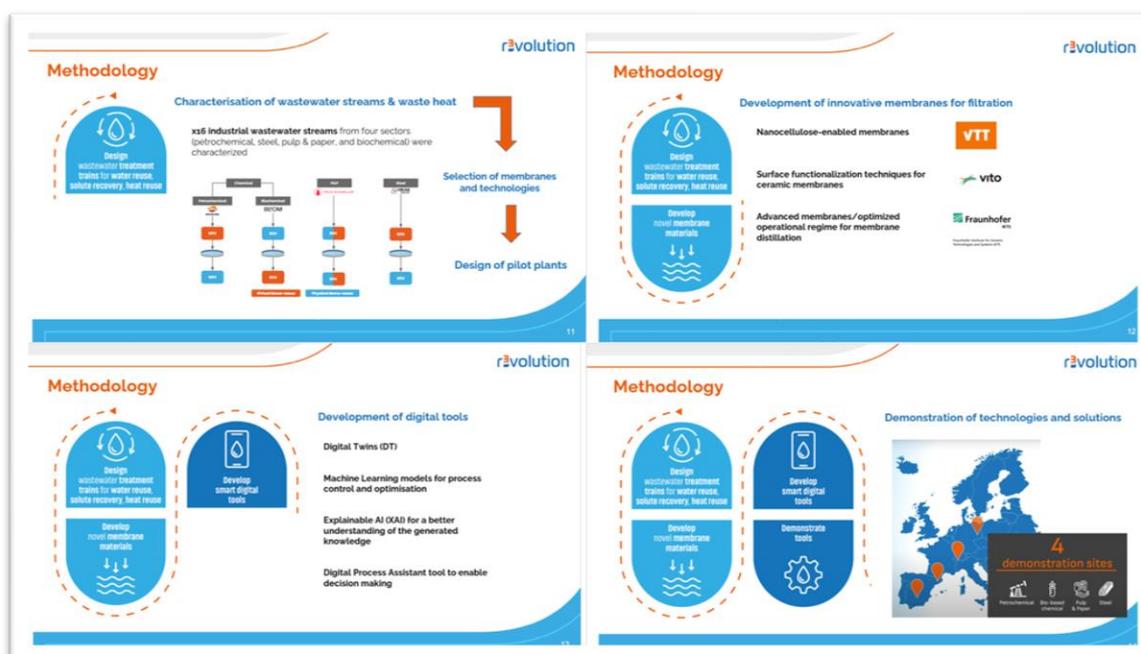


Figure 3 R3VOLUTION methodology to reach the project’s outcomes

CORNERSTONE

Sakis Jensen (Aalborg University)

Project Coordinator of CORNERSTONE, with expertise in industrial water management and system integration, focusing on modular solutions that combine water, energy, and solute recovery for cross-sectoral application.

Industrial water use accounts for nearly half of all withdrawals in Europe, creating significant stress on freshwater ecosystems and energy systems. Addressing these challenges requires adaptable solutions that can be deployed across diverse industrial contexts while delivering high resource efficiency and low environmental impact.

CORNERSTONE takes a modular approach to integrating innovative technologies into existing industrial wastewater systems in the chemicals, steel, and pulp & paper sectors. The project deploys six technology modules—including nanofiltration, membrane bioreactors, heat exchangers, and membrane crystallisation—enhanced by AI optimisation, sensor integration, and digital twins. Core objectives include designing flexible technology combinations matched to industrial needs, developing robust decision-support and sustainability assessment tools, and enabling zero-liquid discharge scenarios through optimised integration. Validation will be supported by full lifecycle and economic analyses, ensuring that solutions are scalable, cost-effective, and environmentally sound. Figure 4 illustrates the modular methodology underpinning the project’s outcomes. It presents the Decision Support Tools (DSTs) framework developed by CORNERSTONE, illustrating the step-by-step process from mapping and auditing to optimisation and competency development. These tools aim to guide industries in implementing circular water stewardship, resource recovery, and integrated water–energy management.

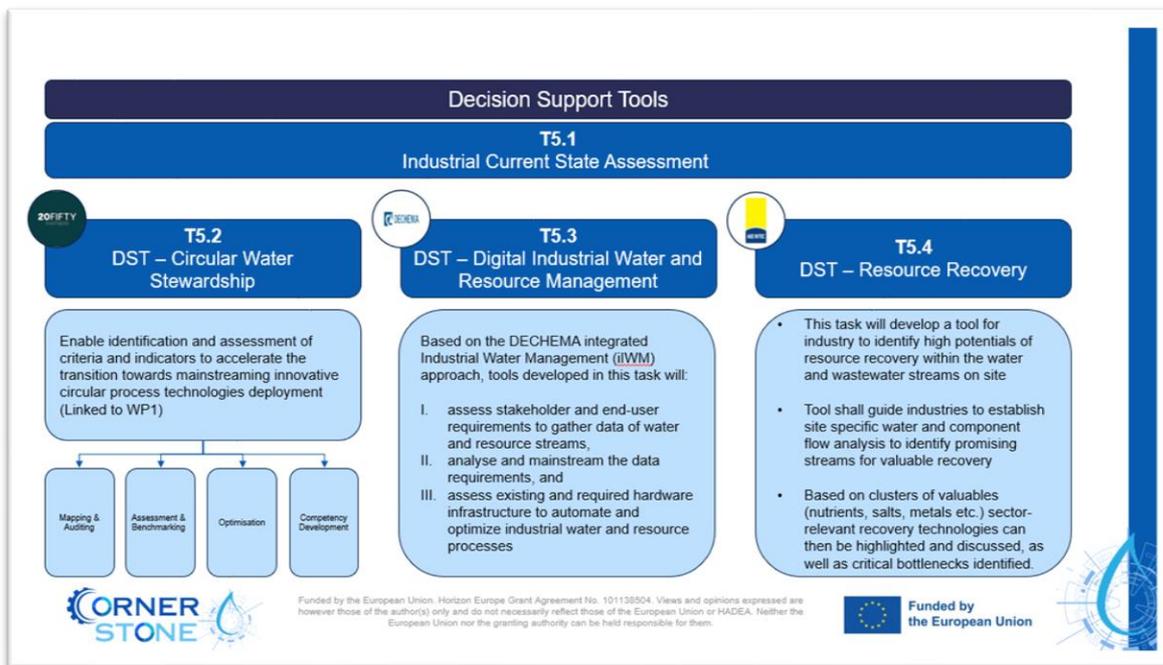


Figure 3 CORNERSTONE Decision Support Tools framework

RESURGENCE

Xuefey Yang (KWR)

Project Coordinator of RESURGENCE, with expertise in integrated water management, innovation coordination, and stakeholder engagement. She connects advanced technical solutions with governance, business models, and industrial–urban collaboration to drive a sustainable and competitive circular economy in Europe’s process industries.

RESURGENCE aims to transform EU process industries into Wastewater Resource Recovery Facilities, contributing to the EU 2050 objectives of climate neutrality, circularity, and competitiveness. The project integrates a portfolio of modular and flexible treatments—including membrane filtration, electrochemical recovery, hydrogen and biogas production, and thermal energy recovery—with digital twins, AI-based decision support, and real-time monitoring to maximise the valorisation of industrial wastewater (IWW).

The ambition is to recover up to 12 types of feedstocks (such as bioactive phenols, biopolymers, cellulose, lignin, latex, phosphate, critical raw materials like magnesium and copper, biochar, and metal-organic frameworks from sludge), reduce utility costs by 20%, and deploy innovations beyond demonstration through spin-offs, joint ventures, IP licensing, and product portfolios.

Its methodology is built around Seeds of Hubs for Circularity (S4C), regional strategic enablers for future industrial and industrial–urban symbiosis. These hubs unite diverse sectors to drive the green and digital transition, fostering interdisciplinary collaboration and closed-loop resource cycles. Figure 5 illustrates the full methodology, from technology integration to hub deployment and market replication.

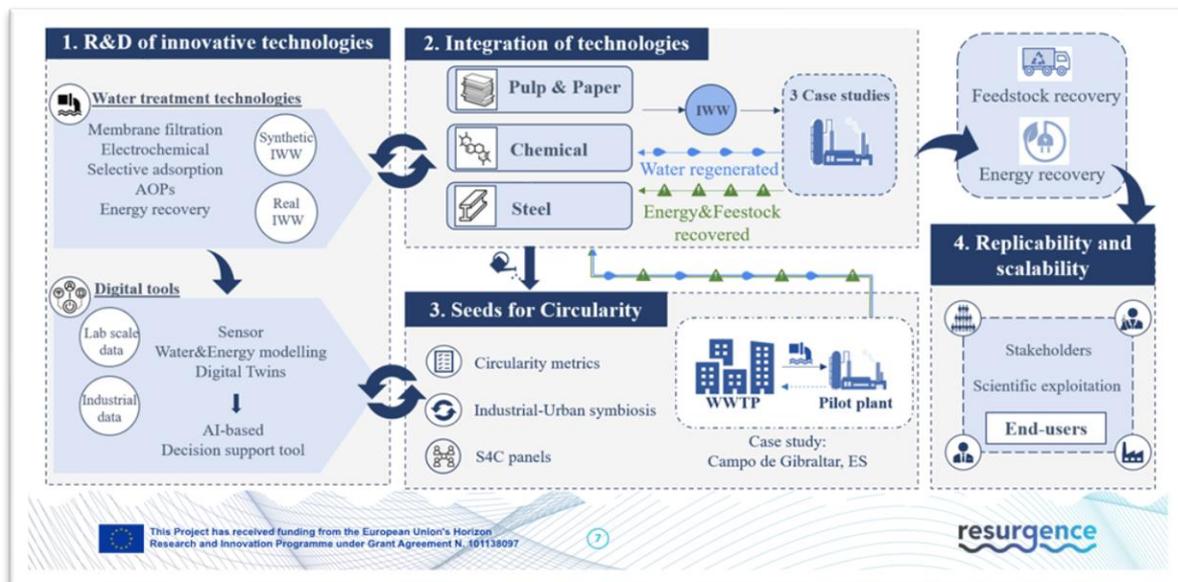


Figure 4 RESURGENCE Slide on project concept and methodology

Case studies will demonstrate these solutions in:

- **Pulp & Paper** – Navigator (Portugal)
- **Chemicals** – Organik Kimya (Turkey)
- **Steel** – Celsa Poland (Poland)
- **Urban-Industrial Symbiosis** – Aqualia (Spain)

Key objectives include

- Deploying cutting-edge water treatment and recovery technologies tailored to different industrial contexts
- Demonstrating integrated solutions at full scale in real industrial environments
- Designing governance and business models that support replication and uptake
- Engaging stakeholders from across the quadruple helix to foster co-creation and policy alignment

The ultimate objective is to fully exploit RESURGENCE’s technological innovations and governance solutions for wide-scale adoption. Figure 6 presents the project’s key innovations alongside the exploitation strategy that will ensure their scaling beyond the demonstration phase.

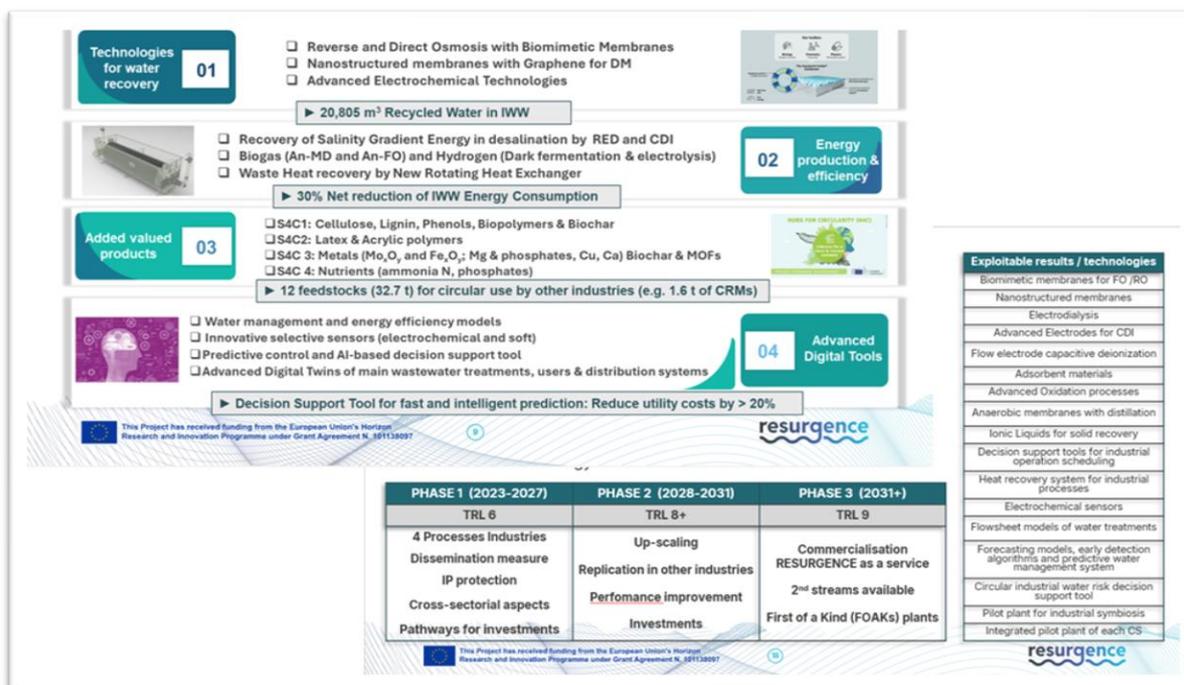


Figure 5 RESURGENCE key technologies and innovations and associated exploitation strategy

Takeaways and Closing Remarks

The panel discussion, moderated by Andrea Rubini, Director of Operations at Water Europe, highlighted a clear alignment among the three projects in both ambition and methodology—particularly in their focus on membrane-based treatment, digital tools, and solutions applicable across multiple sectors. At the same time, each project brings distinct strengths through the specific industrial contexts addressed, the types of solutes recovered, and the business models explored.

Key Takeaways:

- **Synergies:** Shared challenges like high CAPEX, energy intensity, and policy fragmentation can be tackled better through clustering and shared digital frameworks.
- **Scaling Up:** All coordinators emphasized the difficulty of moving from TRL6/7 to full market deployment without **dedicated funding and industrial incentives**.
- **Need for Dialogue:** Cross-sectoral and urban-industrial collaboration are key to ensuring solutions are applicable beyond individual sites.
- **Policy & Investment:** A recurring theme in both presentations and the interactive Mentimeter poll was the **need for stronger EU policy instruments and investment mechanisms** to de-risk implementation.
- **Communication:** Building shared language between scientists, engineers, and industrial operators is critical to bridge the “research to deployment” gap.

The event concluded on a forward-looking note. As the organiser of this first WPE clustering event, RESURGENCE not only presented its technical solutions but also laid the groundwork for sustained collaboration with R3VOLUTION and CORNERSTONE. The follow-up session, planned for 28 July 2025 in the framework of the iWAYS final conference in the UK, will build on the exchanges initiated here—supporting mutual learning, accelerating replication, and amplifying the collective impact of these projects on Europe's transition toward a circular, resource-efficient, and climate-resilient industrial future.

ANNEX

MENTIMETER results

Q.1

Circular innovation in one word

Join at menti.com | Use vote code 5233 5992

Mentimeter

What is the first word or concept that comes to your mind when thinking about circular innovation in Europe ?



Q.2

Biggest barrier to scaling up

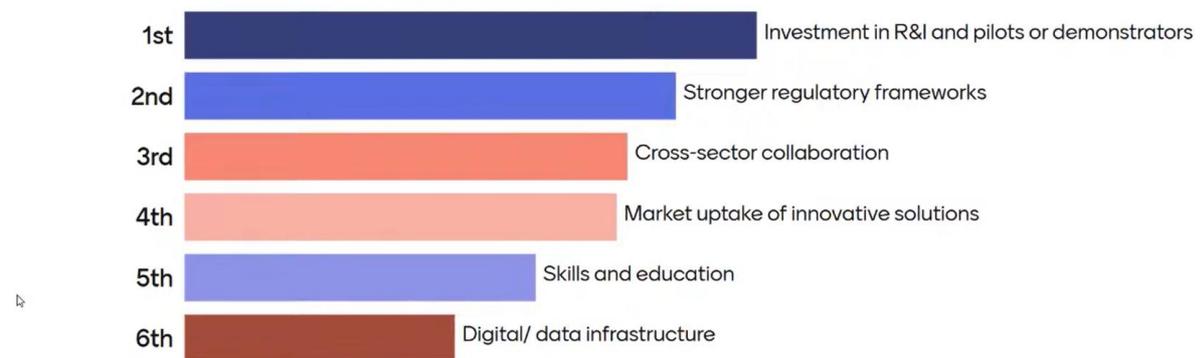
Which area do you believe is currently the biggest barrier to scaling circular solutions across Europe ?



Q.3

Driving systemic circularity

Rank the following in order of importance for driving systemic circularity in your sector

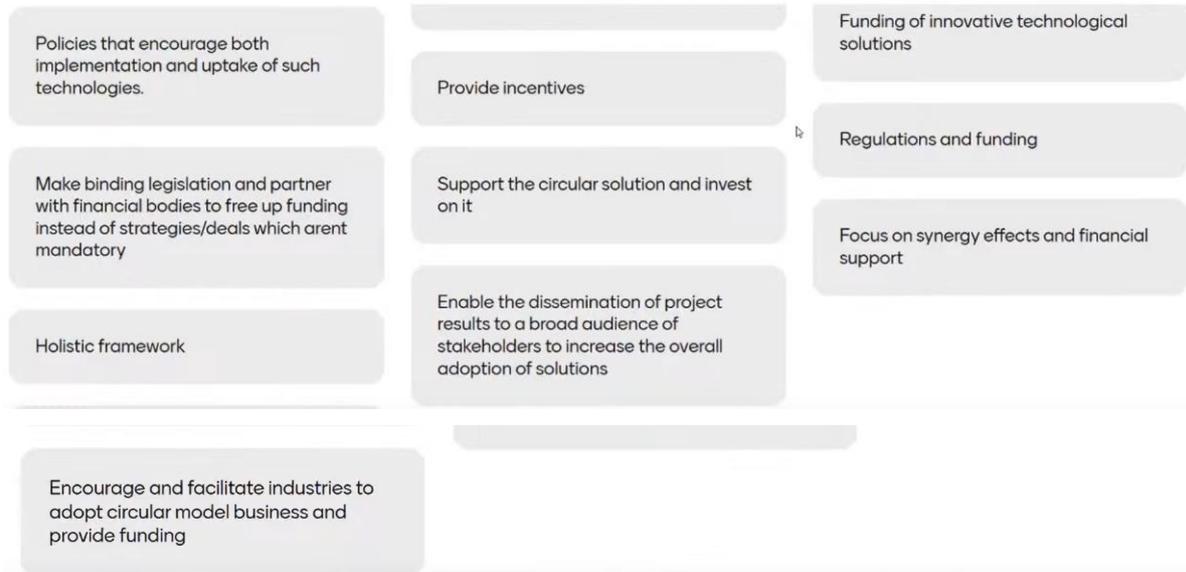


Q.4

Actions to boost the uptake of circular solutions

In one sentence : What is one action the EU should take to boost the uptake of circular solutions ?





✦ 4 groups found

 <p>funding 13 responses "Funding and networking", "Financial support", "Re..."</p>	 <p>incentives 3 responses "Provide incentives", "incentivize", "The EU should ..."</p>
 <p>policy 3 responses "Overarching strategy/policy", "Policies that enco..."</p>	 <p>New responses Uncategorized 1 response "Centralized database of examples of good case ..."</p>