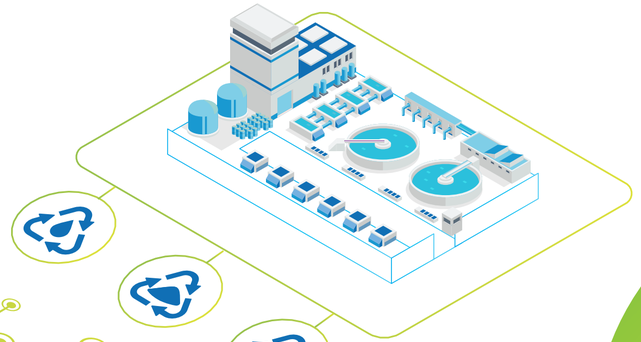
About the project

CORNERSTONE is an EU-funded project with the aim to integrate novel technological and digital developments into the existing industrial wastewater treatment systems for **recovery and recycling of freshwater, energy and solutes**. The overall objective is to achieve long-term circular economy of EU industry via recycling and reusing resources from industrial water and wastewater streams.

Sixteen partners from eight European member states form a multidisciplinary consortium, which includes large enterprises, academia and research & technology organisations. Targeting **steel, Pulp & Paper (P&P), and chemical industries**, CORNERSTONE aligns with P4Planet's objectives, paving the way for circular processes and EU climate neutrality by 2050.



PARTNER

1. Aalborg Universitet, Denmark
2. Technische Universität Darmstadt
3. AEE - Institute for Sustainable Technologies
4. Centre for Research and Technology-Hellas (CERTH)
5. VDEh-Betriebsforschungsinstitut GmbH (BFI)
6. Hüttenwerke Krupp Mannesmann GmbH (HKM)
7. Centre Technique du Papier (CTP)
8. Essity Operations France
9. Covestro Deutschland AG
10. Veolia Water Technologies Techno Center Netherlands B.V. – Biothane
11. MANN+HUMMEL GMBH (MHDE)
11.1. MANN+HUMMEL WATER & FLUID SOLUTIONS GMBH (MNDE)
11.2. I2M GMBH
12. Fundació Universitària Balmes (BETA Technological Centre)
13. DECHEMA Gesellschaft für Chemische Technik und Biotechnologie e.V.
14. 20FIFTY Partners

www.cornerstone-industrial-water.eu

CONTACT

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CORNERSTONE

Combined technologies for water, energy and solute recovery from industrial process streams

CORNERSTONE's goals are to achieve

≥90% Reduction in wastewater

≥50% Reduction in carbon footprint

aiming for Zero Liquid Discharge solutions

OBJECTIVES

- Test, advance, and optimize novel water treatment modules on a laboratory scale and design cornerstone systems in combination with existing industrial processes.
- Test, advance, and optimize smart monitoring tools for the digitalization and intensification of industrial processes.
- Integrate and validate cornerstone system configurations at three demonstration sites (steel, pulp & paper, and chemical industries).
- Quantify the sustainability of cornerstone's solutions in environmental, economic, and social dimensions.
- Develop decision support tools for digitally enabled industrial water, energy, and resources stewardship.

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TREATMENT MODULES

ENERGY RECOVERY
Module 1: non-clogging heat exchanger
Module 2: anaerobic membrane reactor

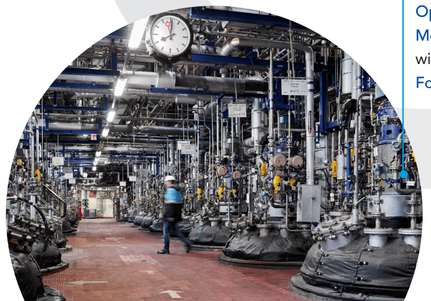
WATER RECOVERY
Module 3: nanofiltration
Module 4: membrane distillation

SOLUTE RECOVERY
Module 5: bipolar electrodialysis
Module 6: membrane crystallization

SYSTEM DEMONSTRATION

CASE STUDY: STEEL INDUSTRY
Operator: Hüttenwerke Krupp Mannesmann (HKM), Germany
Modules combined: Module 1 combined with Module 4 and 5
Focus: Energy, water and acid recovery

CASE STUDY: PULP & PAPER INDUSTRY
Operator: ESSITY
Modules combined: Module 1 combined with Module 3, 4, 5, and 6
Focus: energy, water, acid, and sulphate-compounds recovery



CASE STUDY: CHEMICAL INDUSTRY
Operator: COVESTRO
Modules combined: Module 2 combined with other Modules (tbd)
Focus: chemical energy and water recovery

DIGITALIZATION

- Incorporation of smart monitoring and sensors to optimize treatment processes
- Integration of digital twins for developed technologies and technology trains
- Validation using real data obtained from two demonstration sites

TRANSVERSAL STRATEGIES

Integrated exploitation toolbox
Decision support tools for
- circular industrial water stewardship
- digital industrial water and resource management
- resource recovery

Sustainability assessment
of CORNESTONE technologies in three dimensions: environmental, social and economic

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