



CORNERSTONE

COMBINED TECHNOLOGIES FOR WATER, ENERGY AND SOLUTE RECOVERY FROM INDUSTRIAL PROCESS STREAMS

OVERALL OBJECTIVE

To **achieve long-term circular economy** of EU industry via **recycling and reusing** resources from industrial water and wastewater streams

≥90%
Reduction in wastewater

≥50%
Reduction in carbon footprint

aiming for Zero Liquid Discharge solutions

FACTS & FIGURES

- 16 partners from 8 countries
- Coordination: Aalborg University, Denmark
- Project Budget: 10.569.803,75 €
- Duration: 48 months
- Start Date: 01/2024
- 6 Treatment Modules
- 3 Case Studies

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**.

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

Communication and dissemination

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

CASE STUDIES



CHEMICAL INDUSTRY

Operator: COVESTRO
Module 2 combined with other Modules
FOCUS: Chemical energy and water recovery



PULP & PAPER INDUSTRY

Operator: ESSITY
Modules combined: Module 1 combined with Module 3, Module 4, Module 5, and Module 6
FOCUS: Energy, water, acid, and sulphate compounds recovery



STEEL INDUSTRY

Operator: Hüttenwerke Krupp Mannesmann
Modules combined: Module 1 combined with Module 4, and Module 5
FOCUS: Energy, water and acid recovery

TREATMENT MODULES

WATER RECOVERY

Module 3: Nanofiltration
Module 4: Membrane Distillation

SOLUTE RECOVERY

Module 5: Bipolar Electrodialysis
Module 6: Membrane Crystallization

ENERGY RECOVERY

Module 1: Non-clogging Heat Exchanger
Module 2: Anaerobic Membrane Reactor



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PARTNERS



www.cornerstone-industrial-water.eu/



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