

Demo physical plants and protocols (D4.1)

This deliverable presents the demonstration plants developed within the R3VOLUTION project and their deployment across four industrial case studies.

What is the deliverable about?

D4.1 describes the physical demonstration systems that validate the R3VOLUTION technologies at pilot scale across four industrial sectors: bio-based chemicals (Bloom), petrochemicals (Repsol), pulp & paper (Felix Schoeller) and steel (Celsa). It provides an overview of the demonstration plants, including the treatment trains, pilot equipment, implementation status, deployment schedule and high-level operational protocols.

What challenges are addressed?

Industrial water reuse requires the integration of multiple treatment technologies into robust pilot systems capable of operating under real industrial conditions. The demonstration plants address challenges related to:

- integration of different membranes and supporting technologies;
- adaptation to site-specific industrial requirements;
- commissioning and safe operation of pilot systems;
- validation of water reuse and resource recovery concepts at TRL 6.

What is the innovation/outcome?

The deliverable defines four integrated demonstration plants combining advanced membrane technologies with complementary treatment processes tailored to different industrial sectors. The demonstrations will:

- validate complete treatment trains at pilot scale;
- demonstrate water reuse and resource recovery under industrial conditions;
- provide operational protocols and deployment plans for safe implementation;
- generate the technical basis for large-scale industrial replication.

Case study

 Bio-based (Bloom)

 Petrochemical (Repsol)

 Pulp & Paper (Felix Schoeller)

 Steel (Celsa)

Treatment train

 NF → MD

 CP → UF → GAC → NF → RO → MC → MD → EDBM

 MF → UF → NF → RO → MD

 UF → NF → RO → IEX

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