water mining
value for society

Building a water-smart economy & society in the context of circular economy

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Delft University of Technology

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9 June 2022
Processes4Planet Forum

ASPIRE
PROCESSES4PLANET RESEARCH ASSOCIATION

Processes4Planet

The Partnership Objectives

Processes4Planet, the successor to the Horizon 2020 SPIRE Partnership, will aim to achieve three general objectives:

1. **Developing and deploying climate neutral solutions**: P4Planet aims to contribute to the climate neutrality of the overall European economy by bringing technological and non-technological innovations to readiness for subsequent deployment.
2. **Closing the energy and feedstock loops**: process industries will develop and deploy sustainable circular business models through technological and non-technological innovations, cross-sectoral collaboration and engagement with the local ecosystem. This will help them evolve towards resource circularity and improved resource efficiency. P4Planet aims to achieve near-zero landfilling and near-zero (waste) water discharge in 2050.
3. **Achieving global leadership in climate-neutral and circular solutions, accelerating innovation and unlocking public and private investment**: innovation is needed to make climate-neutral and circular solutions more attractive. The competitive position of the European process industries will benefit from global leadership in these economically attractive solutions, as well as from a strengthened integration in the economic fabric of European regions and the Member States.

TU Delft

*"**WATER-MINING**: Next generation water-smart management systems: large scale demonstrations for a **circular economy** and **society**"*

Grant Agreement No 869474

water mining

value for society

€19M

Budget

DEMO Case Studies

Desalination
Sea-mining

Lampedusa
Italy

Almeria
Spain

Urban wastewater
Urban-mining

Delft
The Netherlands

Faro
Portugal

Larnaca
Cyprus

La Llagosta
Spain

Industrial used streams
Industrial-mining

Rotterdam
The Netherlands

India

Industries are looking for ways to
close the loop and move to a
circular &
carbon neutral economy

50 kt NaCl salt
100 kt $CaCl_2$ salt
But how to reuse 3,000,000 m^3 of wastewater, containing salts and organics?

Port of Rotterdam

FROM INDUSTRIAL WASTEWATER TO CHLORINE

THE PROJECT

A demonstration project for wastewater circularity is set to take place in the Rotterdam Industrial area. The salt wastewater (or brine) from Westlake Epoxy's plant at Pernis, is treated with the aim to produce high purity brine which can be a source of salt and water for Nobian's nearby Chlor-Alkali plant.

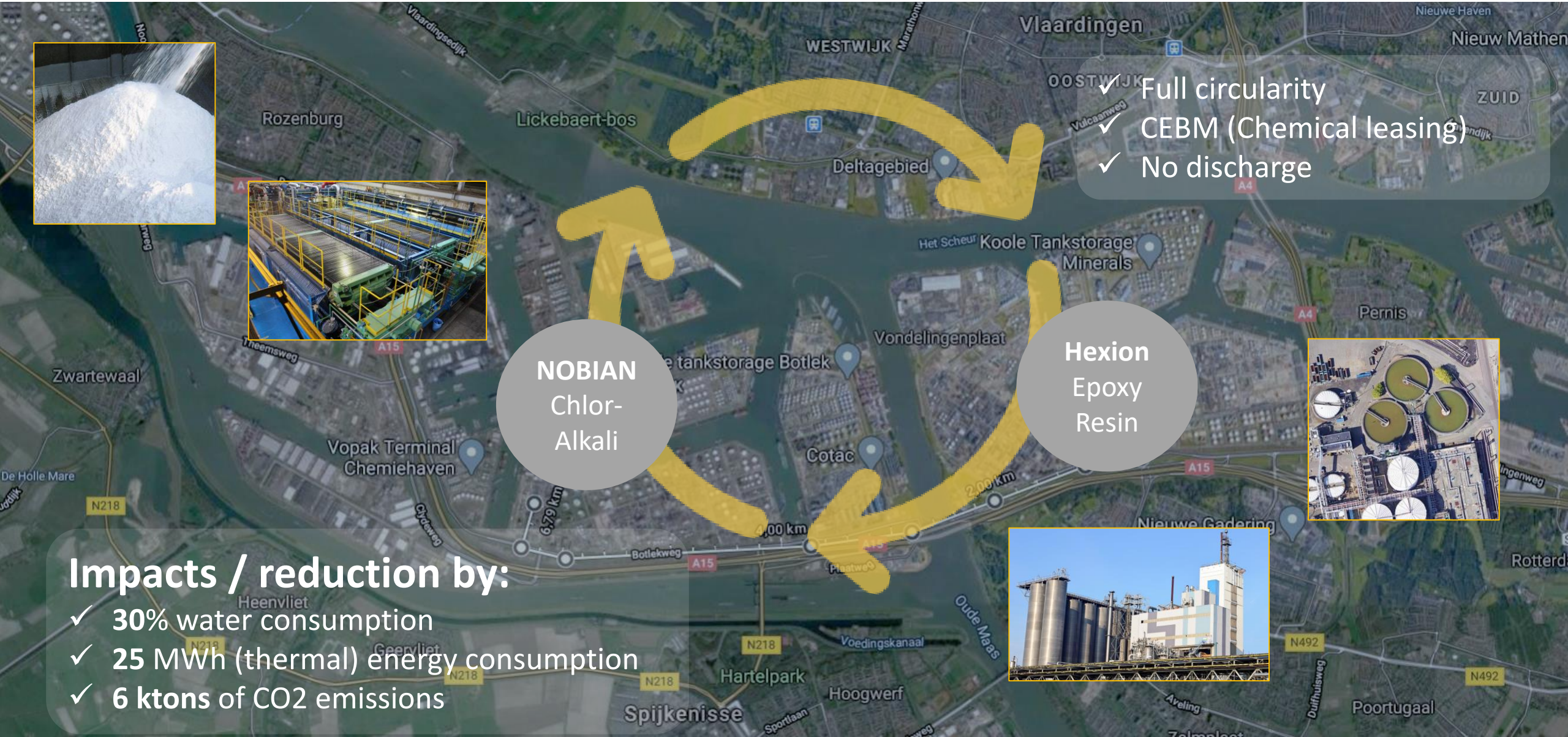
The Water Mining project does not focus only on the technical feasibility. It takes a co-design approach, involving stakeholders through a 'Community of Practice', exploring all aspects relevant to full scale implementation of the technology and the market acceptance of the products. The demo is part of project 'Water Mining', a TU Delft led EU Horizon 2020 project.

TIME LINE

The demonstration is planned between Q2 2022 and Q2 2023 at Westlake Epoxy's site in Pernis, Rotterdam, The Netherlands.

Rotterdam Port

TU Delft · NOBIAN A Nouryon company · HEXION Responsible Chemistry



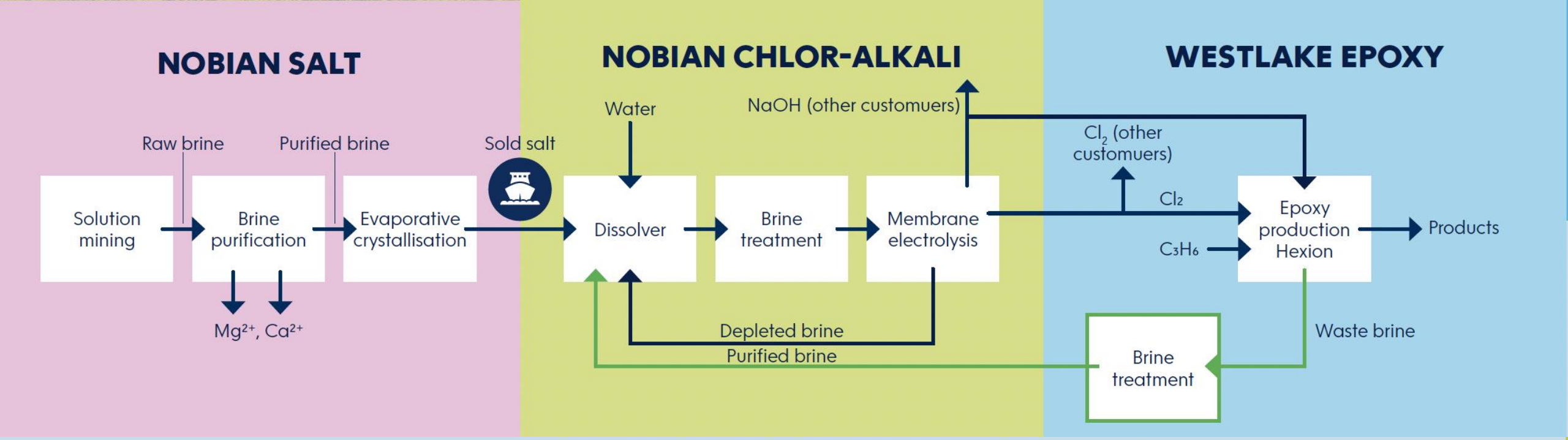
- ✓ Full circularity
- ✓ CEBM (Chemical leasing)
- ✓ No discharge

NOBIAN
Chlor-Alkali

Hexion
Epoxy Resin

Impacts / reduction by:

- ✓ **30%** water consumption
- ✓ **25** MWh (thermal) energy consumption
- ✓ **6 ktons** of CO2 emissions



TECHNOLOGY READINESS LEVEL

1	2	3	4	5	6	7	8	9
Basic principles observed	Technology concept formulated	Experimental proof of concept	Technology validated in lab	Technology validated in relevant environment	Technology demonstrated in relevant environment	System prototype demonstration in operational environment	System complete and qualified	Actual system proven in operational environment
DISCOVERY			DEVELOPMENT			DEMONSTRATION		

Community of Practice

Port of Rotterdam

DCMR milieudienst Rijnmond

evides industriewater

SEALEAU next generation desalination. circular.

TU Delft

HEXION

NOBIAN A Nouryon company

WATER ENERGY INTELLIGENCE

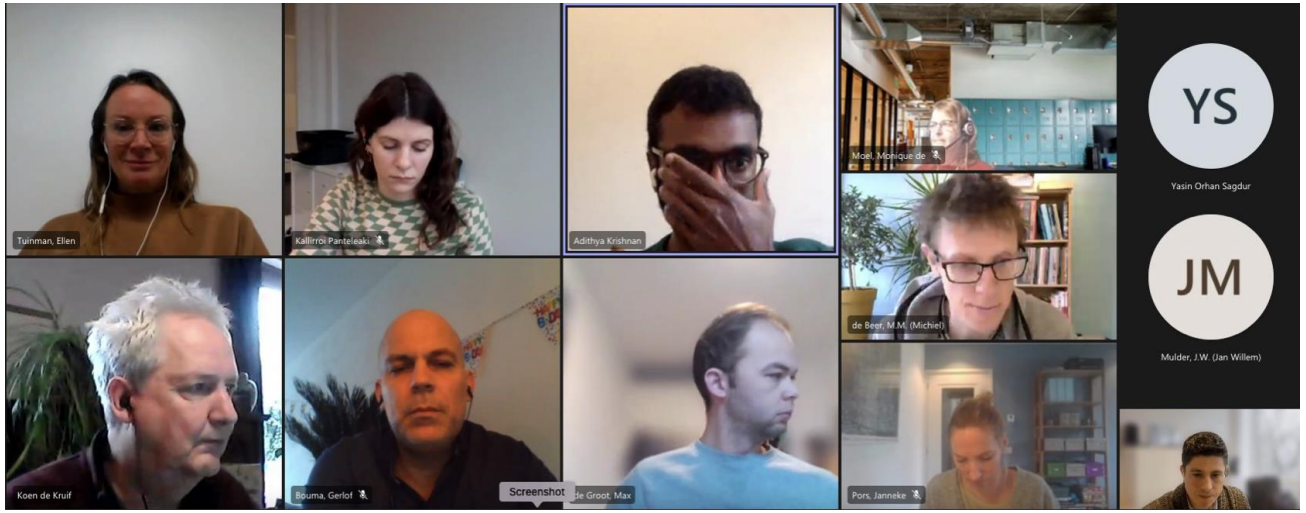
CoP Meetings (~ 6 months)

Date: 4 October 2021

(physical meeting)

Date: 25 January 2022

(virtual meeting)



CoP Vision/Mission (towards H4C)

A body of stakeholders to discuss best practices and provide new insights to enable the transition towards industrial brine reuse in the Rotterdam Hub for Circularity.

To put in place technical, business, social, spatial planning, policy and regulatory instruments to facilitate this transition, and enable future collaboration and implementation.

Arnoldas Milukas...
Arnoldas Milukas,
Head of Unit,
Biodiversity, Circular Economy & Environment,
DG Research
84
PROJECTS
€554M
20140-2020
Marco RA... (Host)
Arnoldas Milukas...
GM
Giorgio Mannina
J
Joep
Stefania ROCCA
A
Admin

CIRSEAU

Building a water-smart economy and society

€84M

BUDGET

water mining value for society

ULTIMATE

REwaise Resilient Water Innovation for Smart Economy

wider uptake

B-WaterSmart

European Commission

ULTIMATE

water mining
value for society

B-WaterSmart

REwaise
Resilient Water Innovation for Smart Economy

CE-SC5-04-2019

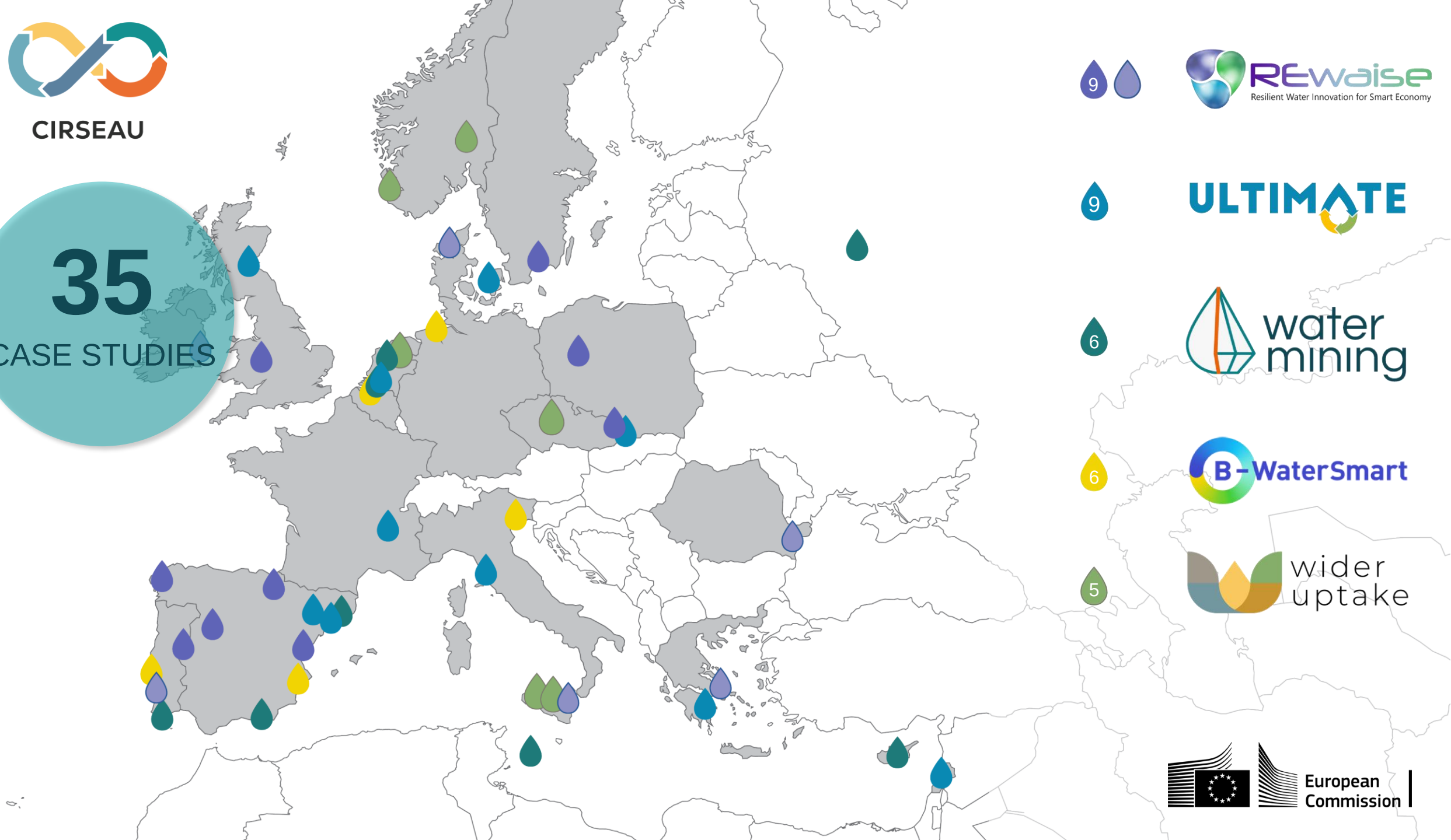
EU contr.: **€71.5M**

Total: **€84.0M**

wider uptake

CIRSEAU

35
CASE STUDIES



WATER INNOVATION EUROPE 2022

SIDE EVENT

WATER PROJECTS EUROPE

co-hosted with Water Europe and WATER-MINING project

How can innovation projects support a Water-Smart Industrial Emissions Directive?

Discussion between five Case Studies

14 June 2022 from 14:00 to 16:00 CET

Thank you!

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www.watermining.eu