## BENEFITS

**The project contributes to the security of supply and reduces the dependency on raw material imports**
Critical raw materials for the European Union, such as magnesium, boron, scandium, gallium, vanadium, indium and lithium, will be recovered (as well as other non-critical but strategic elements such as rubidium and molybdenum)

**Production of a new local source for valuable raw materials**
Helping the European industry to shift towards a circular economy

**An enormous potential source of minerals and metals**
Compared to conventional mines, seawater desalination plants are multi-mineral and are an enormous potential source of minerals and metals as 19,744 plants are installed worldwide (and with an annual growth rate of app. 7.8% yearly, according to the International Water Association, 2017)

**New technological solutions available**
For separation mechanisms, concentration and crystallisation – not only for desalination plants but also for other processes that generate low concentration elements, like waste from mining effluents.

**New technologies with minimum environmental footprint**
New technologies developed by the project have a minimum environmental footprint: low reagent consumption and environment-friendly reagents

**Waste streams recycled**
Some of the waste produced is regenerated (solvents and chemicals) and re-used in the process thus minimising consumption of reagent and the release of wastewater streams

**On-site chemical production reducing reagents consumption**
Some chemicals required – such as sodium hydroxide for magnesium precipitation – are generated as a by-product in other stages of the process. They are fed into the process loop thus reducing reagents consumption and their associated production impacts.

**Desalination efficiency: 80% recovery of fresh water**
A sharp increase in water desalination efficiency – 80% recovery of fresh water for consumption against 50% or less today.

**Reduction in the brines discharged in the sea**

**Fostering industrial symbiosis and cross-sectorial collaboration**
among seawater desalinisation constructors and operators and raw materials providers and distributors.

SEA4 VALUE
Mining value from brines

## PARTNERS

Sea4Value brings together 16 partners from Spain, Germany, Italy, Belgium, Ukraine, Netherlands, Finland and Switzerland to develop and upscale technologies to sustainably mine raw materials from brines.

eurecat – Centre Tecnològic de Catalunya
aqualia
UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH
UNIVERSITÀ DELLA CALABRIA
KU LEUVEN
SEALEAU – next generation desalination. circular.
Universität Bremen
TECNICAS REUNIDAS
LUT University
DECHEMA – Gesellschaft für Chemische Technik und Biotechnologie e.V.
CWP – CATALANWATERPARTNERSHIP
European Desalination Society
OMSA
WATER ENERGY INTELLIGENCE
ESCI – European Science Communication Institute

## FOLLOW OUR JOURNEY

www.sea4value.eu
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# SEA4 VALUE

Mining value from brines

Recovery of minerals and metals from brines produced in seawater desalinisation plants, turning them into the third source of valuable raw materials in the European Union

**16** partners
**08** countries
**10** new technological solutions
**09** extracted minerals / metals

## PIONEERS

Most projects and technologies dealing with metal and mineral recovery from brines, focus on individual elements, which makes the process economically unfeasible. Sea4Value goes **one step further:** it draws on a combination of advanced separation technologies and seeks to design a technical and economically feasible process for **multi-element recovery.**

## BRINE MINING PROCESS

**Multi-mineral production of 9 metal and minerals**

**Modular and flexible**

**Cost-effective**

## 10 TECHNOLOGIES

### PRE-TREATMENT

Nanofiltration membranes for monovalent and multivalent ions separation

### CONCENTRATION

Advanced membrane crystallisation

Advanced multi-effect distillation

### SELECTIVE RECOVERY

Ion-selective polymer inclusion membranes

Electrodialysis with bipolar membranes

3D-printed adsorption modules

Ionic liquid solvent extraction

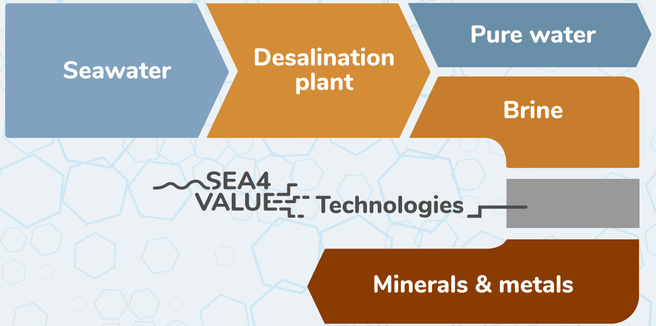
Binary extractant solvent extraction

Synergic solvent extraction combined with solvometallurgy

Non-dispersive solvent extraction

## APPLYING A CIRCULAR SUPPLY MODEL

Seawater brines as a resource of raw materials recovery




## 9 EXTRACTED MINERALS / METALS