LAYMAN'S REPORT

WASTE2COAG

Brine and Metal Wastes Valorisation to Produce Coagulants for Wastewater Treatment

www.lifewaste2coag.com

The project LIFE WASTE2COAG has received funding from the LIFE programme of the European Union under the Grant Agreement no LIFE20 ENV/ES/000430.

PROJECT DETAILS

Project name:	LIFE Waste2Coag (LIFE20 ENV/ES/000430)
Project duration:	55 months (October 2021 - April 2026)
Total budget:	€1,564,295 (55% EU funded)
Demonstration sites:	JOVIAR's industrial wastewater treatment plant (WWTP), Spain Gandia-La Safor urban WWTP, Spain Wulpen urban WWTP, Belgium
Partners:	5 partners from Spain, UK and Belgium (coordinator: Global Omnium)
Contact details:	Tatiana Montoya Martínez - Global Omnium idi.residuales@globalomnium.com

PROJECT PARTNERS

Global Omnium Medioambiente, S.L. (GOMSL)
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Valencia, Spain
www.globalomnium.com

AIDIMME Instituto Tecnológico Metalmecánico, Mueble, Madera, Embalaje y Afines (AIDIMME)
Carrer de Leonardo da Vinci 38, 46980 Paterna,
Valencia, Spain - www.aidimme.es

Aquafin NV (AQUAFIN)
Dijkstraat 8, 2630 Aartselaar, Belgium
www.aquafin.be

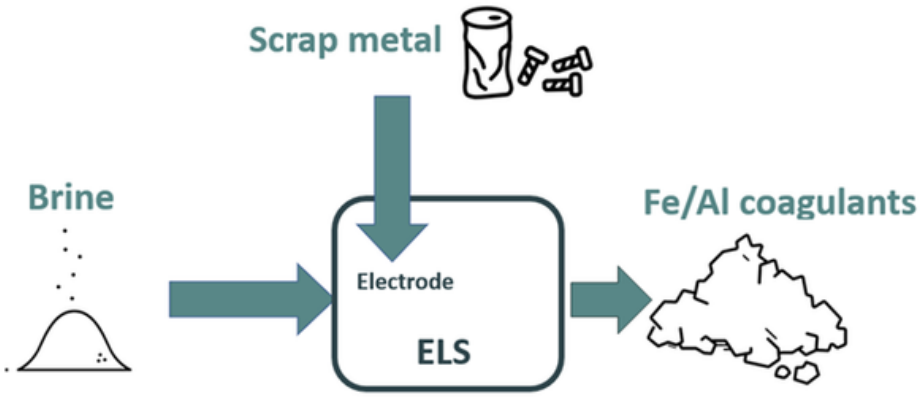
Creaciones Joviar, S.L. (JOVIAR)
C. Huelva 4, 03440 Ibi, Alicante, Spain
www.joviar.com

Isle Utilities Ltd. (ISLE)
Temple Chambers, 3-7 Temple Avenue,
London EC4Y 0DA, United Kingdom
www.isleutilities.com

INTRODUCTION

Scrap metals

By-product metal wastes from the metal production processes. Due to lack of raw materials necessary to maintain an increasing demand for metals, it is essential to find synergies with other industries to promote the reuse of scrap metals and contribute to the circular economy.



Coagulants

Chemical compounds used in water and wastewater treatment to remove pollutants. Recent approaches have focused on minimising the raw materials employed in the production process to reduce the carbon footprint.

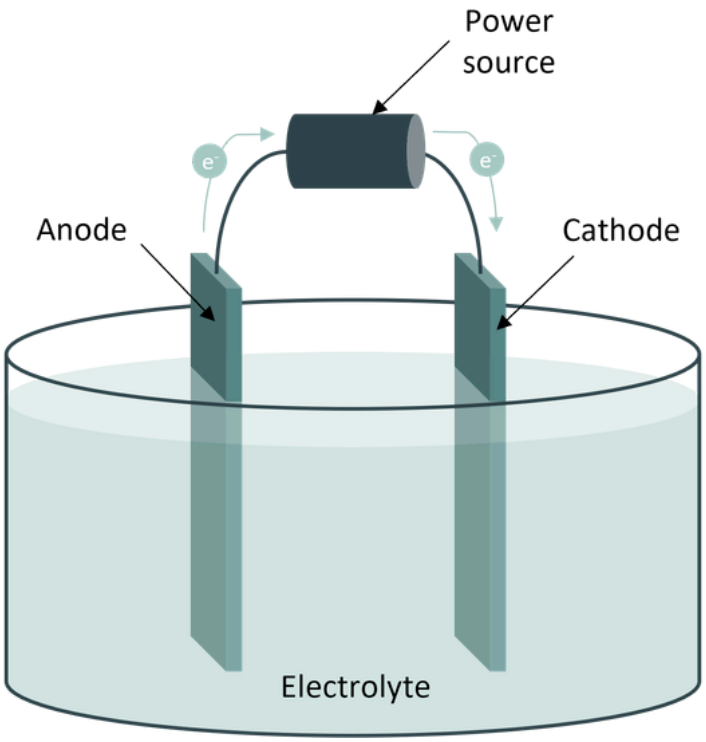
Brines

By-product of industrial processes with high concentration of salts, metals and chemicals. Growing trend of finding alternative uses, turning waste brines into a resource by extracting useful materials.

Why LIFE Waste2Coag matters

LIFE Waste2Coag (Brine and Metal **WASTE**s valorisation **TO** produce **COAG**ulants for wastewater treatment) aims to demonstrate an innovative technology, the **Electrolytic System (ELS)**, based on the **electrolysis of brines and metal wastes** to produce **coagulants** able to remove a range of contaminants in **urban and industrial wastewater**. The LIFE Waste2Coag project offers a sustainable alternative for the **utilisation and valorisation of by-products**, like scrap metals and brines, and provides a **distinct advantage over current coagulant production processes**.

LIFE WASTE2COAG TECHNOLOGY



The working principle of the **Electrolytic System (ELS) technology** is based on the **electrolysis process**. **Waste brines** are the **electrolyte**, while **scrap metals** (mainly iron (Fe) and aluminium (Al)) are shaped into sheets and used as **electrodes**.

As a result, Fe- and Al-based chloride formulations are produced.
These compounds can be used as **coagulants** in WWTPs to remove pollutants.

ELECTROLYSIS

Electrolysis is the use of a direct electric current to drive a non-spontaneous chemical reaction in an ionic conductor (the **electrolyte**), decomposing the substance and producing new products at two **electrodes** (often carbon or metal) immersed in the electrolyte and connected to a power supply.

COAGULATION

Coagulation is the process of adding coagulant chemicals to wastewater to **neutralise** the electrical charges on suspended and colloidal particles, destabilising them so that they can begin to form small clumps, which are then grown into larger, visible flocs in the separate flocculation step and removed more easily.

PROJECT CONCEPT

1 **Design, construction and commissioning of the ELS prototype**

AIDIMME designed the ELS prototype using scrap metals as electrodes, instead of commercial electrodes. The prototype was built by GOMSL.

2 **Optimisation of the ELS prototype operation**

Brines treated in the ELS were characterised. Based on brine characteristics, the ELS operational parameters were optimised to produce coagulants, maximising the metal concentration in the brines, hence maximising each m^3 of brine processed. The coagulants produced were then tested in jar tests.

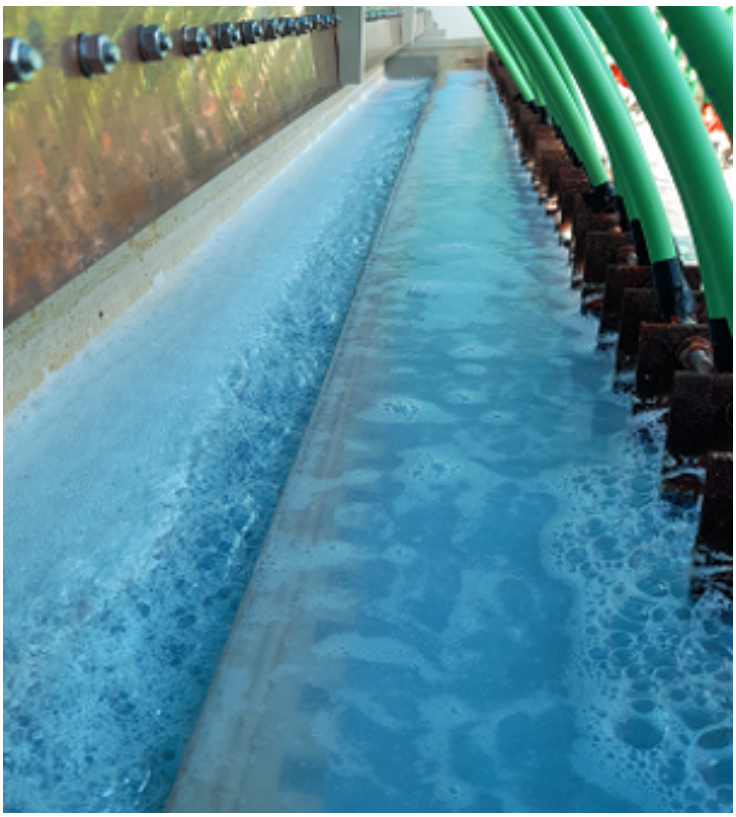
3 **Validation of the ELS technology in operational environments**

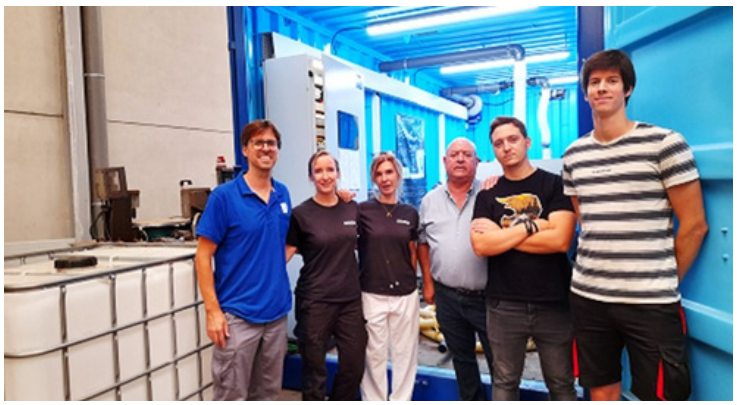
After optimisation, the ELS technology was operated at 3 different WWTPs, 2 urban and 1 industrial, treating different types of brines to produce coagulants. The coagulants were validated at JOVIAR's industrial WWTP and Gandia-La Safor urban WWTP, both located in Spain.

APPLICATIONS

JOVIAR's industrial WWTP (Spain)

Production and validation of coagulants



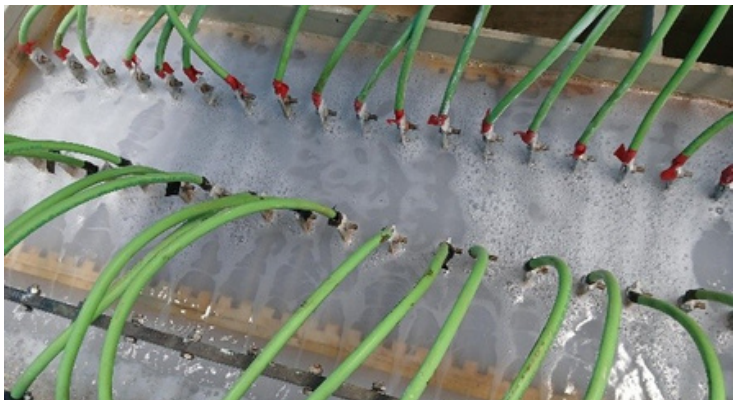


Origin of brines:	Mixtures of brines from demineralisation processes
Brines valorised:	0.86 m^3
Coagulant production:	0.86 m^3
Energy consumption (Al coagulant):	11.3-12.0 kWh/kgAl
Energy consumption (Fe coagulant):	6.2-13.2 kWh/kgFe
Wastewater treated:	16.7 m^3
Heavy metals removal efficiency (Al coagulant):	>92%
Heavy metals removal efficiency (Fe coagulant):	>70%
Partners involved:	AIDIMME, JOVIAR, GOMSL

APPLICATIONS

Gandia-La Safor urban WWTP (Spain)

Production and validation of coagulants



Origin of brines:	Brines from industrial processes and household cleaning products production
Brines valorised:	30 m^3
Coagulant production:	30 m^3
Energy consumption:	14.63 kWh/kgAl
Metal concentration in coagulants:	977 mgAl/L
Wastewater treated:	3,588 m^3
Phosphate (PO_4-P) removal efficiency:	67.4%
Total suspended solids (TSS) removal efficiency:	76.4%
Partners involved:	GOMSL, AIDIMME, JOVIAR

APPLICATIONS

Wulpen urban WWTP (Belgium)

Production of coagulants

Origin of brines:	Drinking water facility (Aquaduin)
Brines valorised:	12.3 m^3
Coagulant production:	12.3 m^3
Energy consumption:	32.9 kWh/kgAl
Metal concentration in coagulants:	910 mgAl/L
Partners involved:	AQUAFIN, AIDIMME, GOMSL

IMPACT

Industrial Application

Metal concentration in produced coagulants

300-900 mgAl/L

800-1,200 mgFe/L

Reduction of climate change impact compared to commercial coagulant production

31% - Al coagulant

Reduction of resource use, minerals and metals impact compared to commercial coagulant production

69% - Al coagulant

47% - Fe coagulant

Removal efficiencies of heavy metals (Cu, Zn, Cr, Ni) using produced coagulants

>92% - Al coagulant

>70% - Fe coagulant

Urban Application

Metal concentration in produced coagulants

977 mgAl/L

Reduction of climate change impact compared to commercial coagulant production

11% - Al coagulant

Reduction of resource use, minerals and metals impact compared to commercial coagulant production

69% - Al coagulant

Removal efficiencies using produced Al-based coagulants

76.1% COD*

67.4% PO_4-P

76.4% TSS

86.1% Turbidity

*Chemical Oxygen Demand

Based on the results obtained from the two validation trials, at JOVIAR's industrial WWTP and Gandia-La Safor urban WWTP, exploitation of the ELS technology after the project, to reach commercialisation, **will be carried out only for the industrial application and will be led by AIDIMME.**

STAKEHOLDER ENGAGEMENT

Tools & Materials

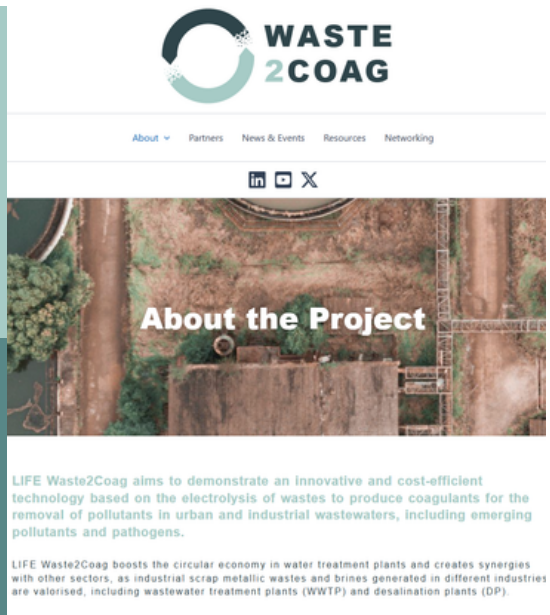
4
Social media channels

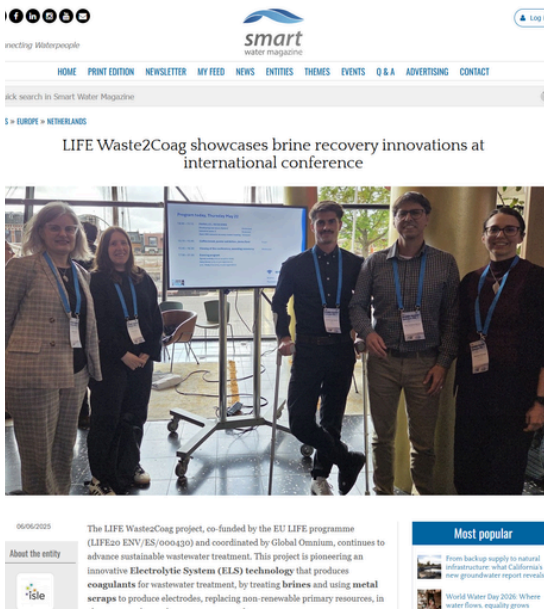
15,000+
Website visits

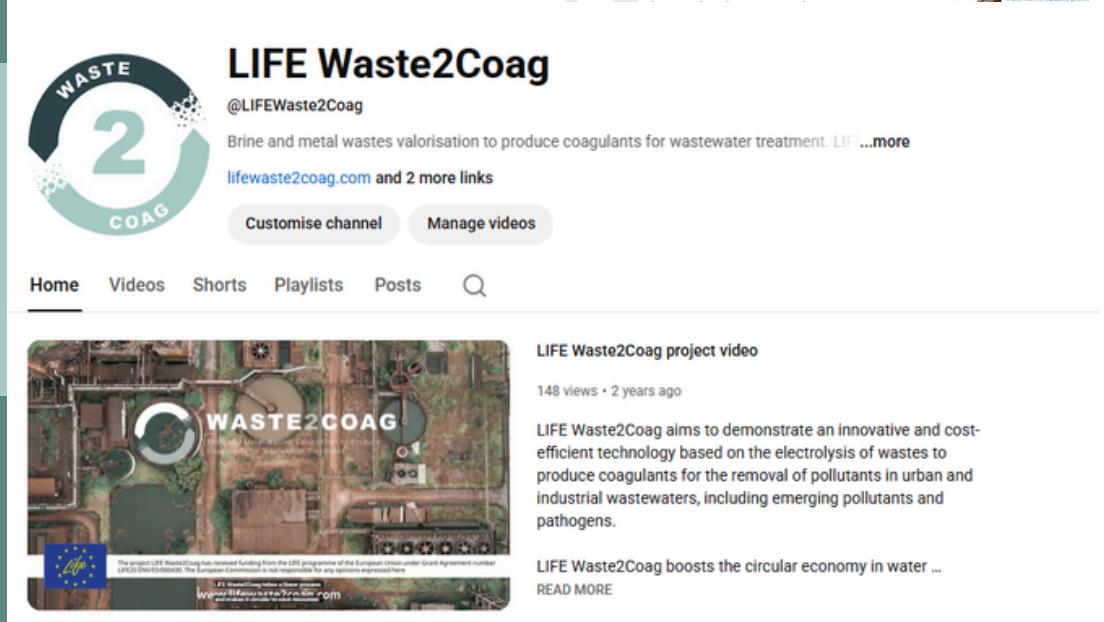
900+
Combined followers

15
Videos

10
Press Releases & Newsletters







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STAKEHOLDER ENGAGEMENT

Activities

22
Targeted stakeholder events attended

5
Industry events attended

10
Networking with EU projects

4
Market-focused initiatives organised

40,000+
Individuals reached through activities

The LIFE Waste2Coag consortium attended a range of targeted dissemination and engagement activities, including **5 industry events, 5 international initiatives**, and **3 national platforms**.

Additionally, project partners delivered **3 market-focused webinars** and **1 Innovation Workshop**, focused on the application of the ELS technology in an industrial setting.

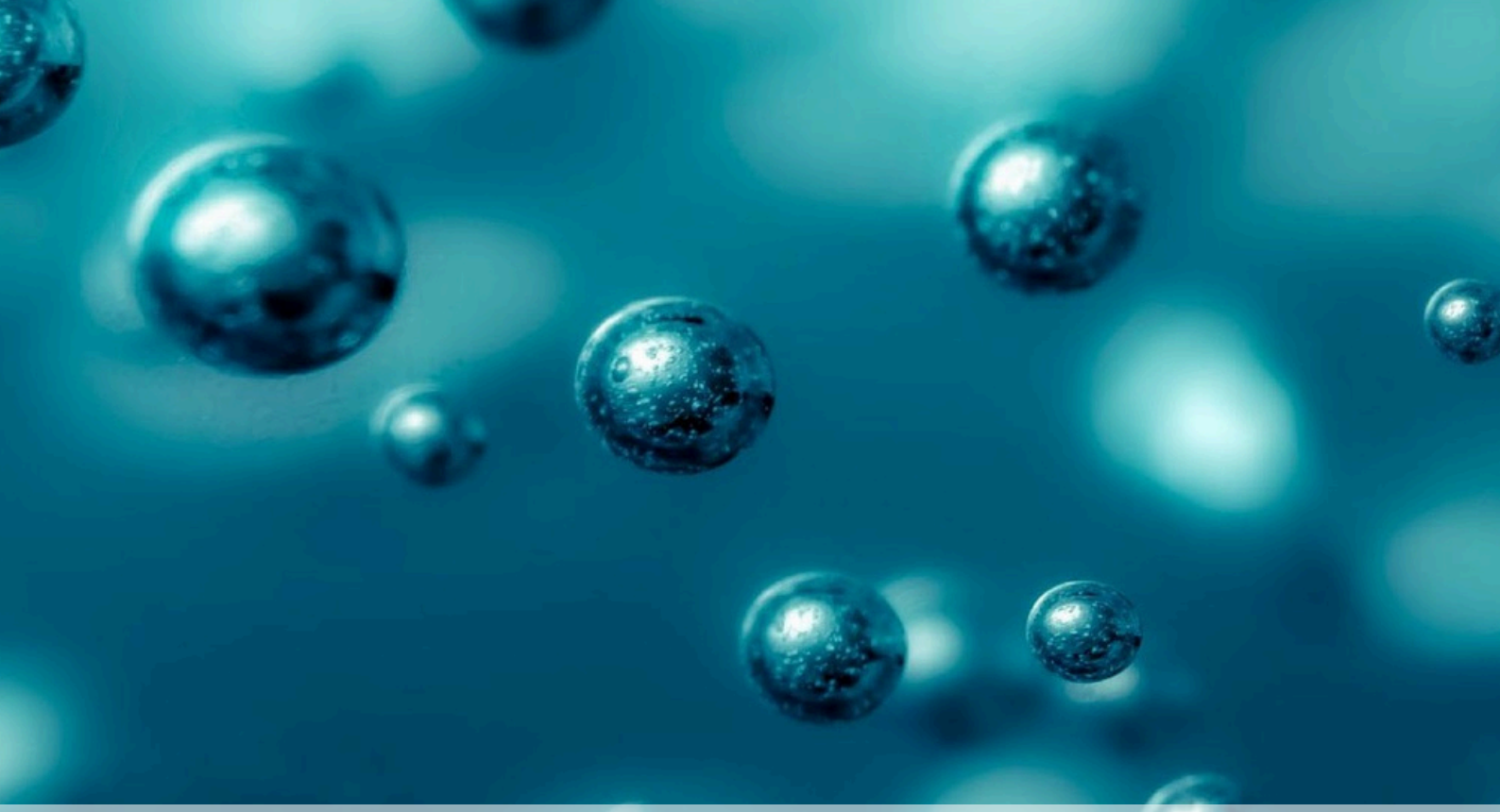
PROJECT LEGACY

"As coordinators, we are proud of the strong cooperation achieved among all partners in LIFE Waste2Coag, which enabled the successful validation of an innovative approach to waste-derived coagulants, from waste selection to its transformation into coagulants. The results and lessons generated by the project represent a solid foundation for continued progress and knowledge transfer in this field."

Feliu Sempere, Innovation Engineer, GOMSL

"Our participation in the LIFE Waste2Coag project has allowed us to validate the ELS technology as a pioneering and robust solution for transforming industrial waste—brines and scrap metal—into valuable resources, demonstrating that it is possible to achieve real industrial symbiosis that reduces the environmental impact of water treatment. Looking ahead, AIDIMME's commitment is focused on scaling this system for industrial applications and consolidating a technical support service, taking on new challenges and bringing its benefits to a wider range of companies and sectors, to facilitate the adoption of this circular technology by the global market."

Silvia Oyonarte, Chemical Technology Technical Lead, AIDIMME



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Prepared by ISLE