



Resource-oriented solutions for industrial wastewater treatment: Water2REturn project

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Why Water2REturn?

- **Resources recovery from wastewater effluents** → widely recognised as a valuable and efficient source of nutrients for use in agriculture.
- **Food industry (especially the EU slaughtering sector)** → characterised by high water and energy consumption and production of large amounts of waste and wastewater.
- Current **approach for treating slaughtering wastewater** → in spite of all recognised benefits of adopting a Circular Economy approach, **current practices tend to nutrients removal** instead of recovery and recycling.
- **21st century agriculture faces multiple challenges** → feed a growing population of 9.1 billion people projected in 2050 with a smaller rural labour force and in a context of climate change, land limitation and soil degradation.
- **Chemical fertilisers** → sector experiencing an unstoppable increase in demand, and their extensive use is problematic as they are associated with emissions of greenhouse gases and can cause eutrophication if they leach into water bodies, among other environmental problems.





- Alternative and more sustainable approach → **Water2REturn**.
 - It faces the environmental and economic constraints of the slaughtering industry as a **market opportunity**.
 - It aims to **adopt a Circular Economy approach** to extract the maximum value from slaughterhouse effluents.
 - It makes possible to **recover nutrients** from slaughtering wastewater and **turn them into value added products** for the agricultural sector.

What is Water2REturn?



“Recovery and recycling of nutrients turning wastewater into added-value products for a circular economy in agriculture”

Water2REturn proposes an **integrated solution** for **slaughterhouse wastewater treatment**, as well as for the **recovery of nutrients with high market value** in the agricultural sector. This **Circular Economy** approach turns wastewater treatment facilities into **"bio-refineries"**.

What is Water2REturn?



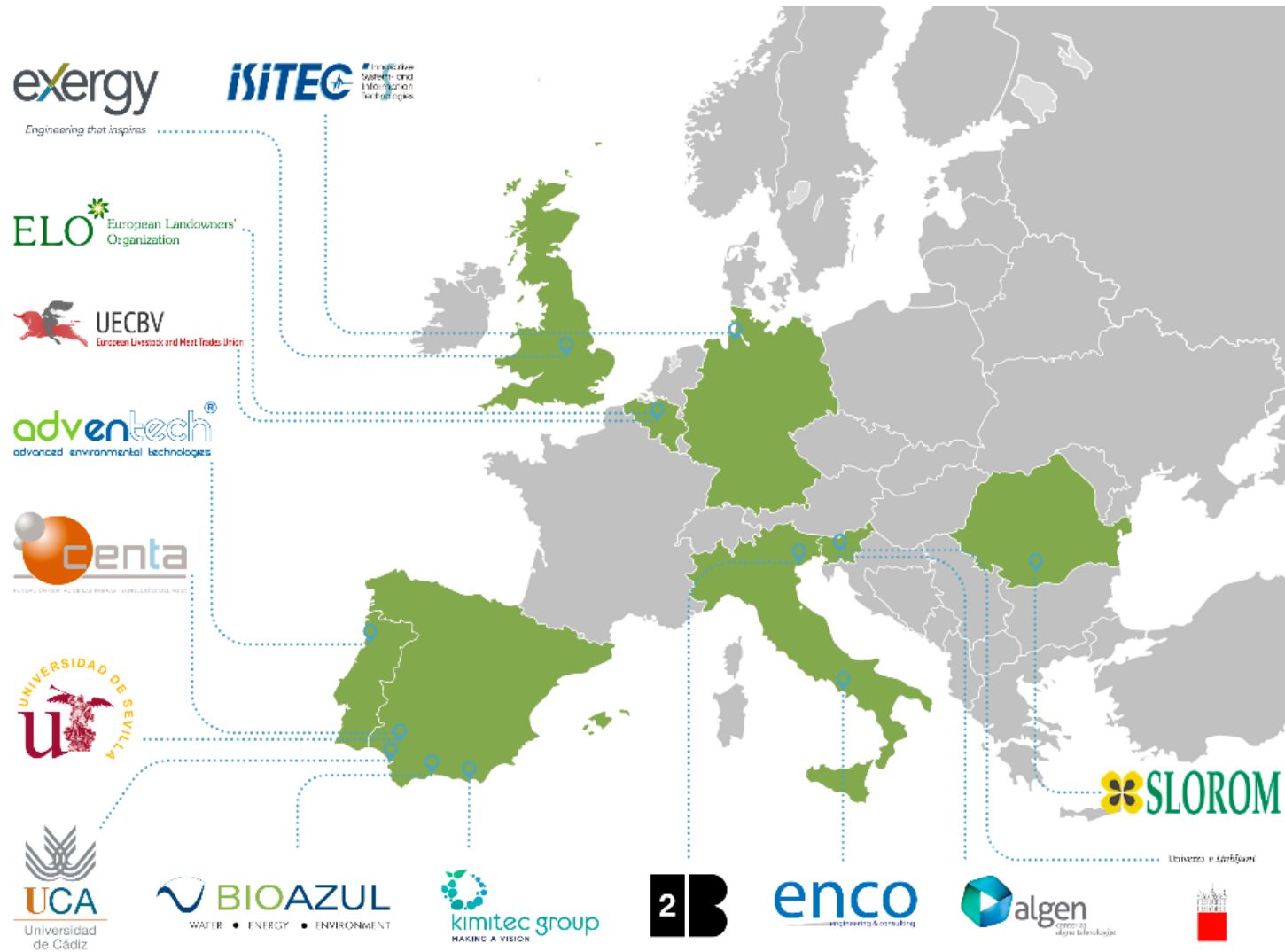
- **Water2REturn project** (contract number 730398) is an **Innovation Action** built on a **bottom-up approach** based on current market demand **co-funded by the European Commission** under its **Horizon 2020** programme:
 - Starting date: 01/07/2017.
 - End date: 31/03/2022 (57 months duration).
 - Budget: 7,075,919,87 € (EC contribution: 5,871,895,76 €).
 - Consortium: 15 partners from 8 countries.



This project is coordinated by **BIOAZUL S.L.**, technology provider company located in Malaga, Spain



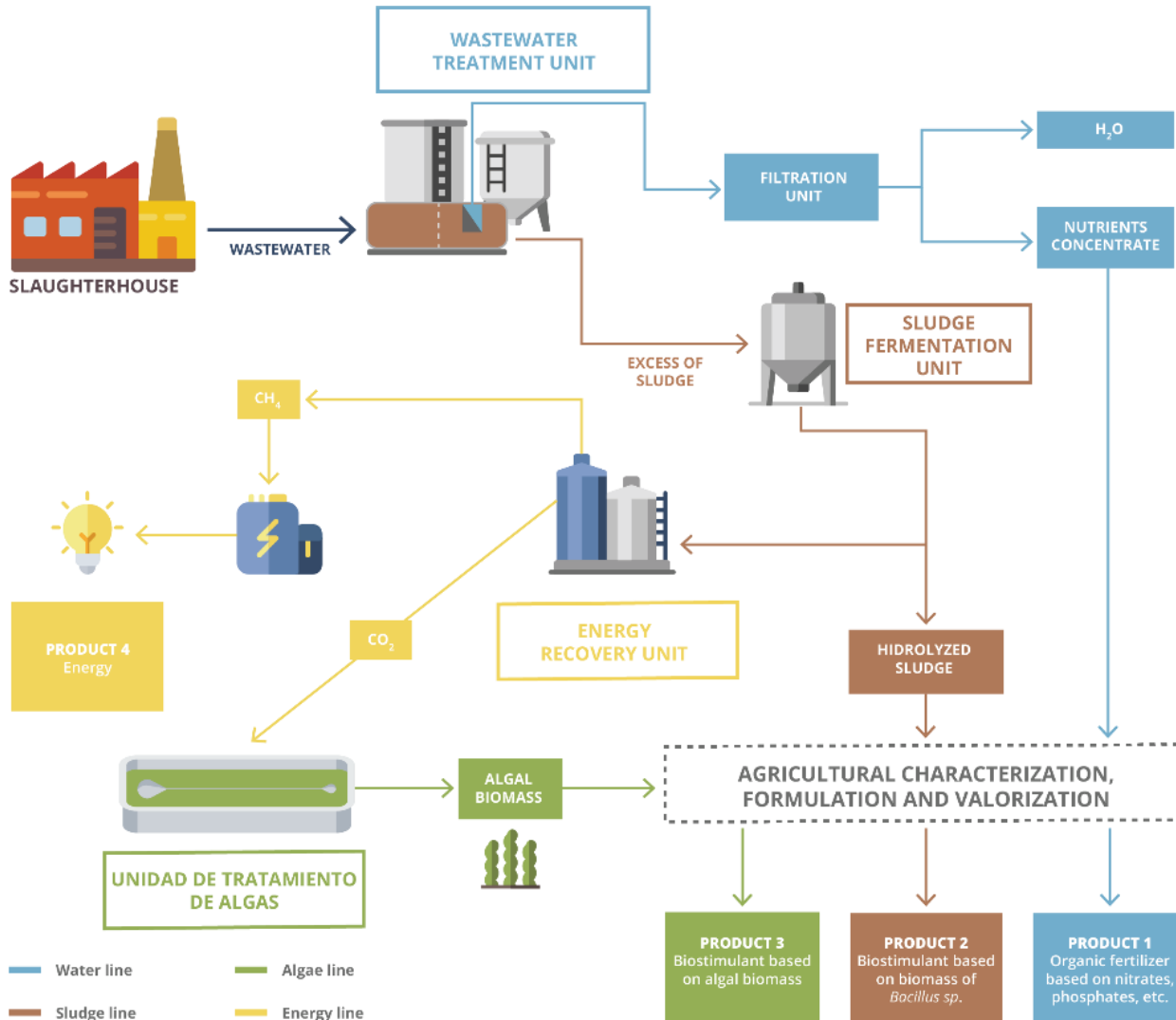
Consortium



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Water2REturn system



WATER LINE
 SRM1: Nitrates concentrate
 AP1: Organic fertiliser based on nitrates

SLUDGE LINE
 SRM2: Hydrolysed sludge
 AP2: Biosimulant based on *Bacillus sp.* biomass

ALGAE LINE
 SRM3: Algal biomass
 AP3: Biosimulant based on algal biomass



ENERGY RECOVERY MODULE
 Biogas + CO₂ released





Line 1: water line

- Wastewater treatment and nutrients recovery (SBR + filtration (microfiltration + ultrafiltration + reverse osmosis) unit).
- Obtention of a nutrients concentrate → Secondary Raw Material 1 (SRM1).
- Manufacturing of Agronomic Product 1 (AP1) → **biofertiliser**.

Line 2: sludge line

- Upgrading of the sludge generated in the water line through a fermentation process with *Bacillus spp.* (sanitisation + fermentation of sludge).
- Obtention of hydrolysed sludge → Secondary Raw Material 2 (SRM2).
- Manufacturing of Agronomic Product 2 (AP2) → **biostimulant**.



Energy recovery module

- Upgrading of the hydrolysed sludge generated in the sludge line through an anaerobic digestion process and further generation of electricity through cogeneration.
- Obtention of biogas (methane) and further electricity.
- Release of CO₂.

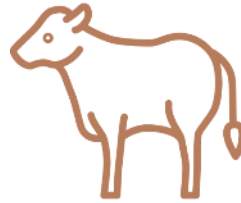
Line 3: algae line

- Capturing of the CO₂ released from the energy recovery module, that fosters micro-algae growth.
- Obtention of micro-algae biomass → Secondary Raw Material 3 (SRM3).
- Manufacturing of Agronomic Product 3 (AP3) → **biostimulant**.



Wastewater treatment

1 integrated treatment + nutrients & energy recovery system – 3 separated process units (water line, sludge line, algae line) + energy recovery module.



Secondary raw materials

Nutrients concentrate, hydrolysed sludge and algal biomass.



Agronomic products

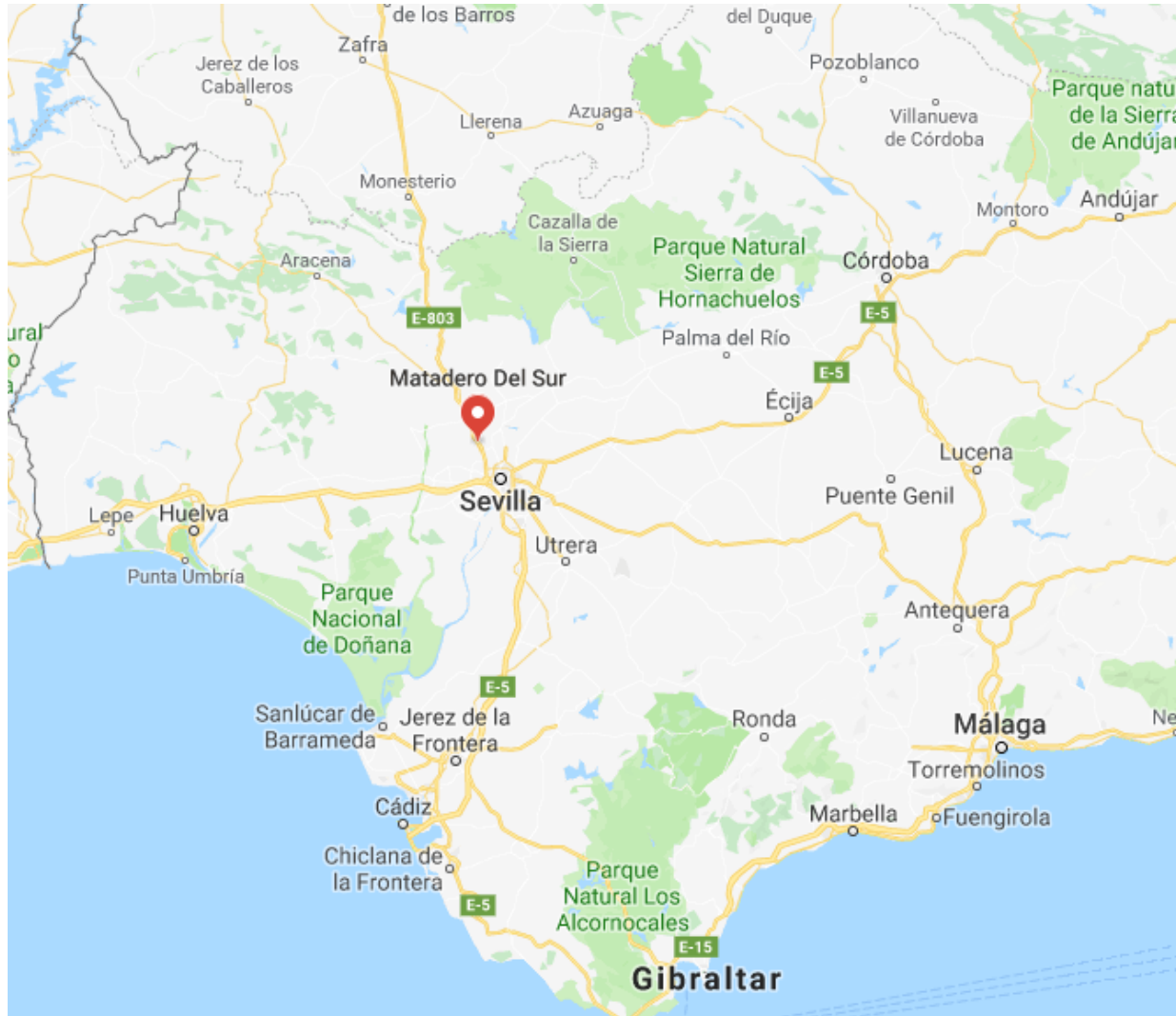
Free of pathogens and pollutants and ready to be commercialised: 1 fertiliser and 2 biostimulants, that will enhance nutrition efficiency, abiotic stress tolerance and/or crop quality traits.

New business model based on circular economy approaches and industrial symbiosis schemes

Business opportunities for the involved sectors:

- Wastewater treatment, energy engineering and consultancy companies.
- Manufacturers of fertilisers, biostimulants.
- Slaughterhouses, meat industry.

Water2REturn demonstrator



- Demonstration site → real working slaughterhouse called “*Matadero del Sur*”, located in Salteras, near Seville (Spain).
- **Treatment capacity** → 50 m³ per day (out of the 150 m³ of the slaughterhouse’s daily flow).
- **TRL 6-7.**

Water2REturn demonstrator



Water2REturn system – water line



Water2REturn system – sludge line

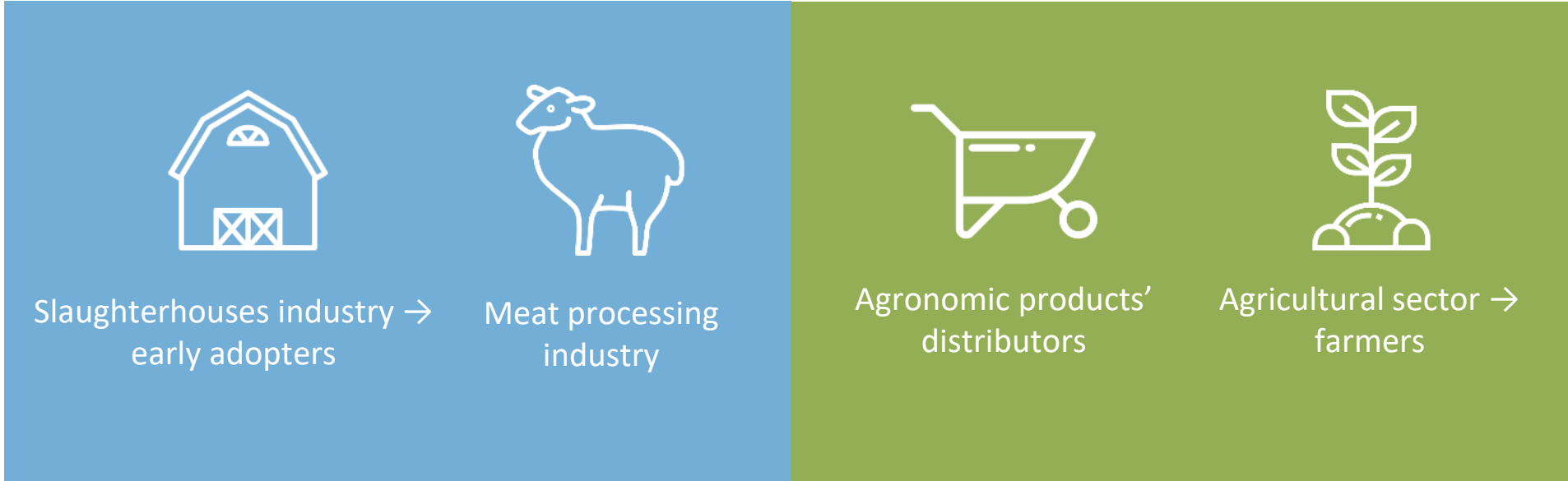


Water2REturn system – energy line



Water2REturn system – algae line





- **Modular system** → to be tailored for future clients according to their needs and expectations.
- **High replicability** → flexible system to be adapted to other food industries.



Thank you

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