# EIC - $CO_2$ and Nitrogen Portfolio

CONFETI

## ABOUT CONFETI

CONFETI project proposes the development of a lab-scale validated innovative technology that is able to utilise and electrochemically convert $CO_2$ and $N_2$ directly from air or flue gases minimizing the use of critical raw materials and using renewable energy sources.

By the production of urea from N ($N_2$ and/or $NO_3$-) and $CO_2$, the project aims to ensure a circular and renewable carbon and nitrogen economy by recycling and converting the $NO_3$- not consume by the plant into ammonia or urea using photocatalytic technologies based on sunlight.

European Innovation Council
Funded by the European Union

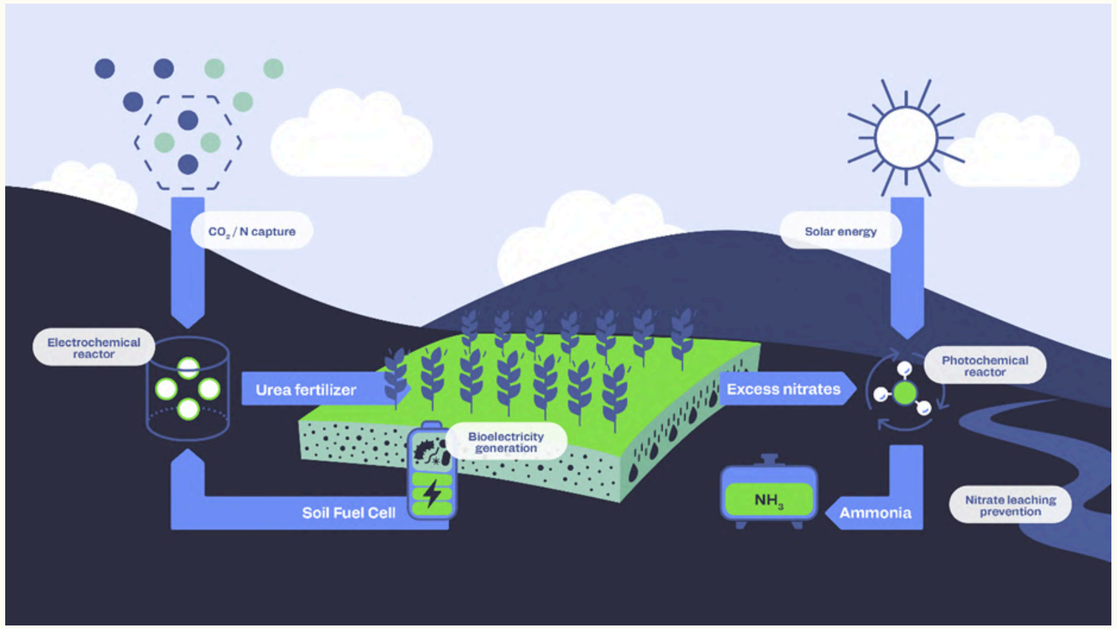


Figure 1. CONFETI approach to lab-scale cycle production of urea from N ($N_2$ and/or $NO_3$-) and $CO_2$.

CONFETI project aims to transform urea fertilizer production and use with a groundbreaking photo-electrochemical process. The scientists behind CONFETI seek to convert $CO_2$ and nitrogen ($N_2$) into urea, reducing both the need for fossil fuels and the environmental impact.

In addition, the project pursues the recovery of nitrogenous by-products generated from fertilization (e.g., nitrates), which are potentially polluting, and transform them back into other fertilizers (e.g., ammonia or urea). Resulting a cycle urea or amonia fertilizer production system (Figure 1).

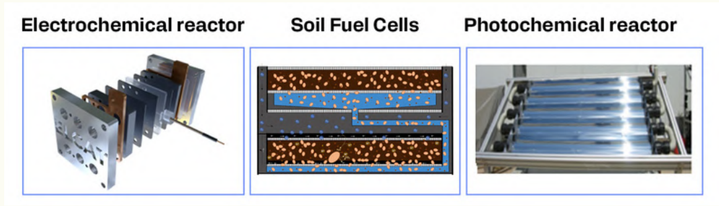


Figure 2. CONFETI research areas to reach technogical objectives.

Specifically, the final proof-of-concept system will combine three pocket-scale reactors:

1) an electrochemical reactor (Figure 2) for capturing, storing and converting $CO_2$ and $N_2$ into urea,

2) a soil microbial fuel cell (SMFC) (Figure 2) that generates energy from soil microorganisms, and

3) a photochemical reactor (Figure 2) for reducing nitrate ($NO_3$-) to ammonia/urea using photocatalytic technology with sunlight.

## IN A NUTSHELL

**CONFETI proposes an innovative, self-sufficient technology that will capture carbon dioxide and nitrogenous compunds convert them into eco-friendly urea or amonia fertilizer.**

## CONFETI PARTNERS

UAB Universitat Autònoma de Barcelona · CNM · CSIC · University of Antwerp · cnrs · Université Toulouse III Paul Sabatier · Università di Pisa · Bioo · Ciemat · Iowa State University

# EIC - $CO_2$ and Nitrogen Portfolio

CONFETI

**START** 01 November 2023

**END** 31 October 2026

**BUDGET** €3.992.976

## PROJECT WEBSITE

https://confetiproject.eu/

## CORDIS LINK

https://cordis.europa.eu/project/id/101115182


European Innovation Council

Funded by the European Union

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# EIC - $CO_2$ and Nitrogen Portfolio

## Double Active Membranes for a Sustainable CO2 Cycle

European Innovation Council

Funded by the European Union

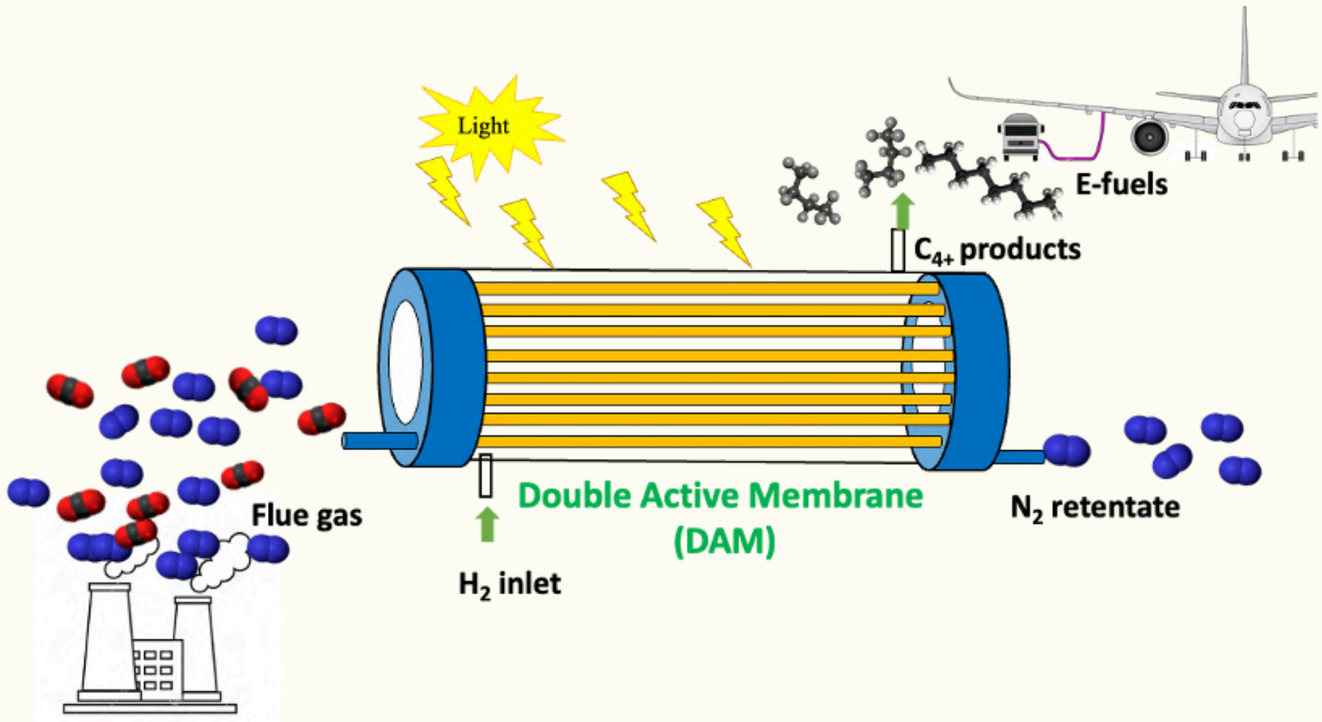
DAM4CO2

## ABOUT DAM4CO2

The **DAM4CO2** project aims at the **simultaneous** carbon dioxide **capture** and **conversion** into added value products such as RFNBO (Renewable Fuel of Not Biologic Origin), also known as e-fuels with application in the production of fuel for aviation.

The project implementation will result in a lab-scale membrane reactor for proof-of-concept validation, tested in simulated relevant conditions. Close attention will be paid to:

- the **use of non-critical raw materials** at any stage of the process,
- **carbon-neutrality of the process**, which will be certified with a detailed full life cycle assessment (**LCA**).




### IN A NUTSHELL

**DAM4CO$_2$ will develop a novel membrane technology for the simultaneous $CO_2$ separation and its photocatalytic conversion to C4+ molecules, as renewable fuels to achieve the goals of the European Green Deal.**

### DAM4CO2 PARTNERS

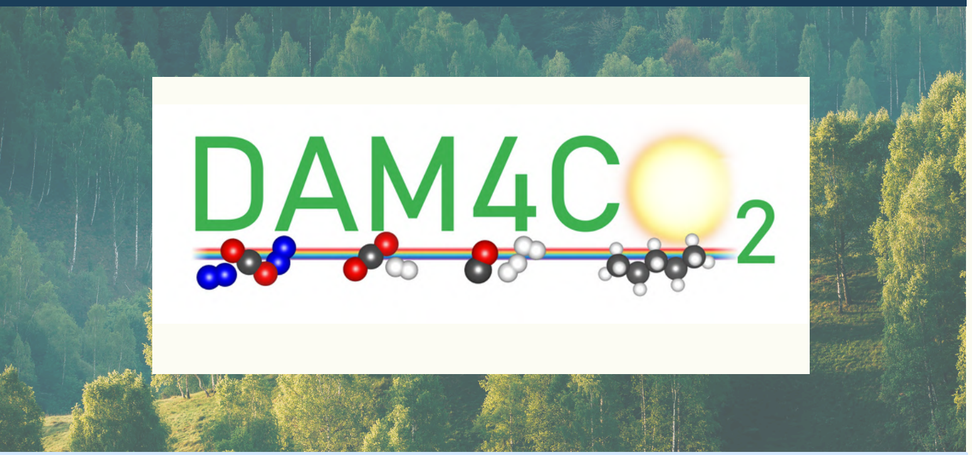
MeSep PRIMALCHIT

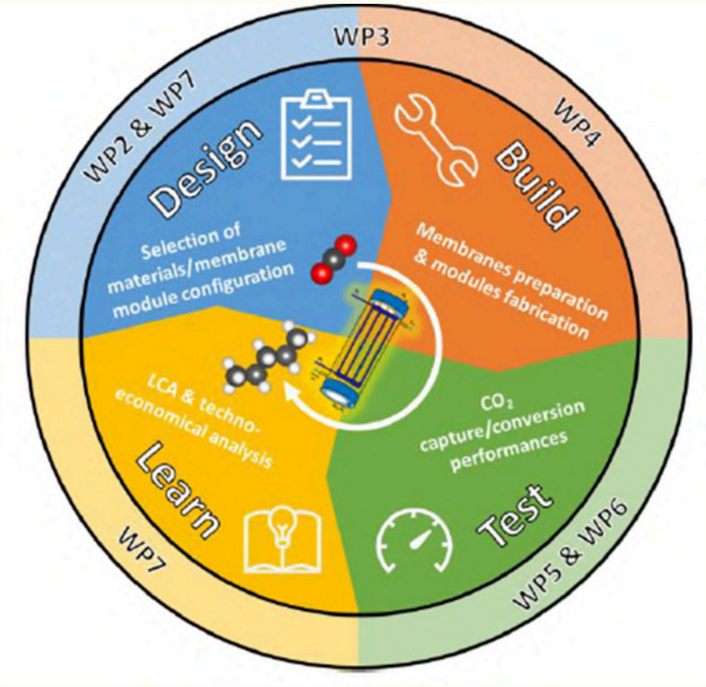
# EIC - $CO_2$ and Nitrogen Portfolio

## Double Active Membranes for Sustainable $CO_2$ Cycle

European Innovation Council

Funded by the European Union




**START** 01 November 2023

**END** 31 October 2026

**BUDGET** €2.975.275 + £ 823.176 UKRI

**PROJECT WEBSITE**

http://www.dam4co2.eu/

**CORDIS LINK**

https://cordis.europa.eu/project/id/101115488

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| The University of Edinburgh | Prof. Maria-Chiara Ferrari | m.ferrari@ed.ac.uk |

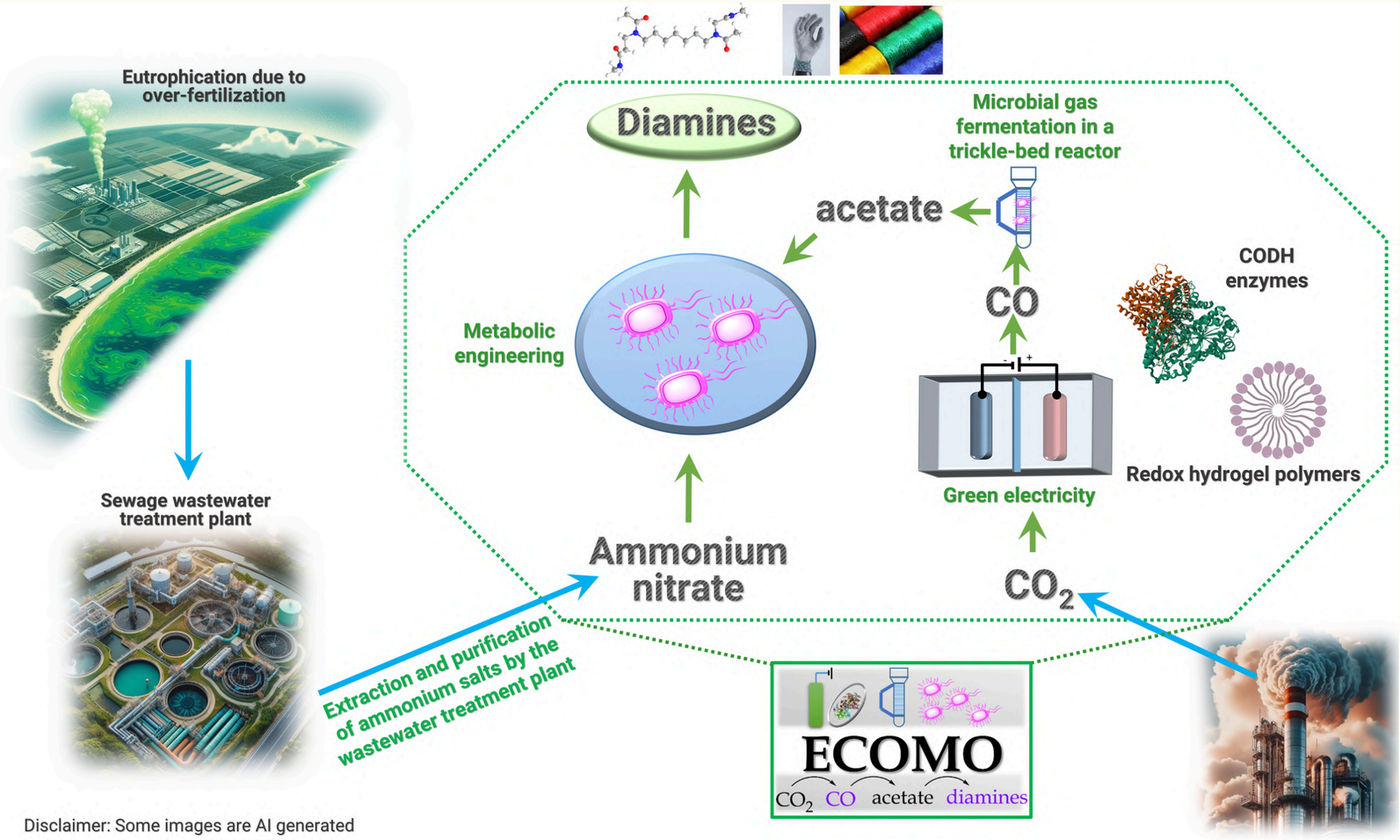
# EIC - $CO_2$ and Nitrogen Portfolio

European Innovation Council
Funded by the European Union


## ABOUT ECOMO

**ECOMO** addresses the chemical industry sector by making it fossil-free, green and sustainable by converting waste carbon dioxide and ammonia (or nitrates) to diamines, making the diamine end-products renewable. The project adopts a hybrid technological approach through three unique innovation gates:

- Electrochemical conversion of carbon dioxide to carbon monoxide
- Converting carbon monoxide to acetate through gas fermentation
- Transforming acetate to the final product diamine through metabolic engineering




Disclaimer: Some images are AI generated

## IN A NUTSHELL

**ECOMO brings together bioelectrochemistry and microbiology in a circular platform that turns carbon and nitrogen from waste streams into diamines, chemical products of high-value, promoting a greener future.**

## ECOMO PARTNERS

# EIC - $CO_2$ and Nitrogen Portfolio

European Innovation Council

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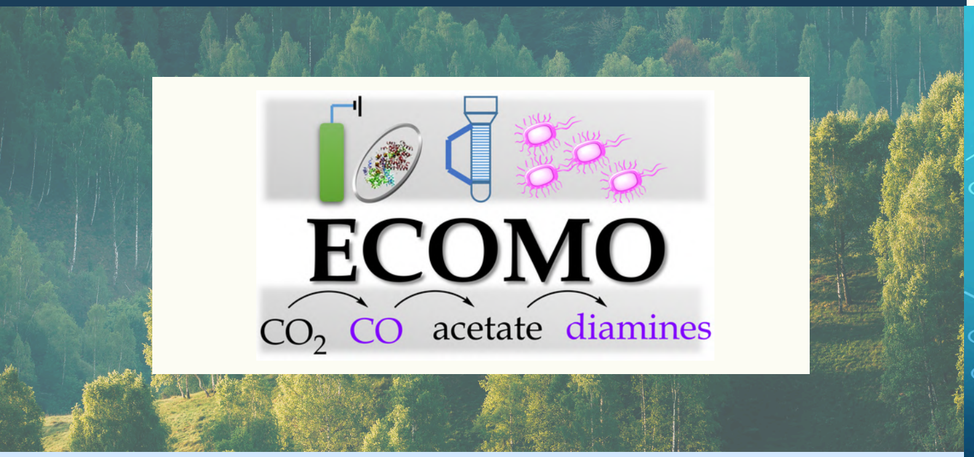


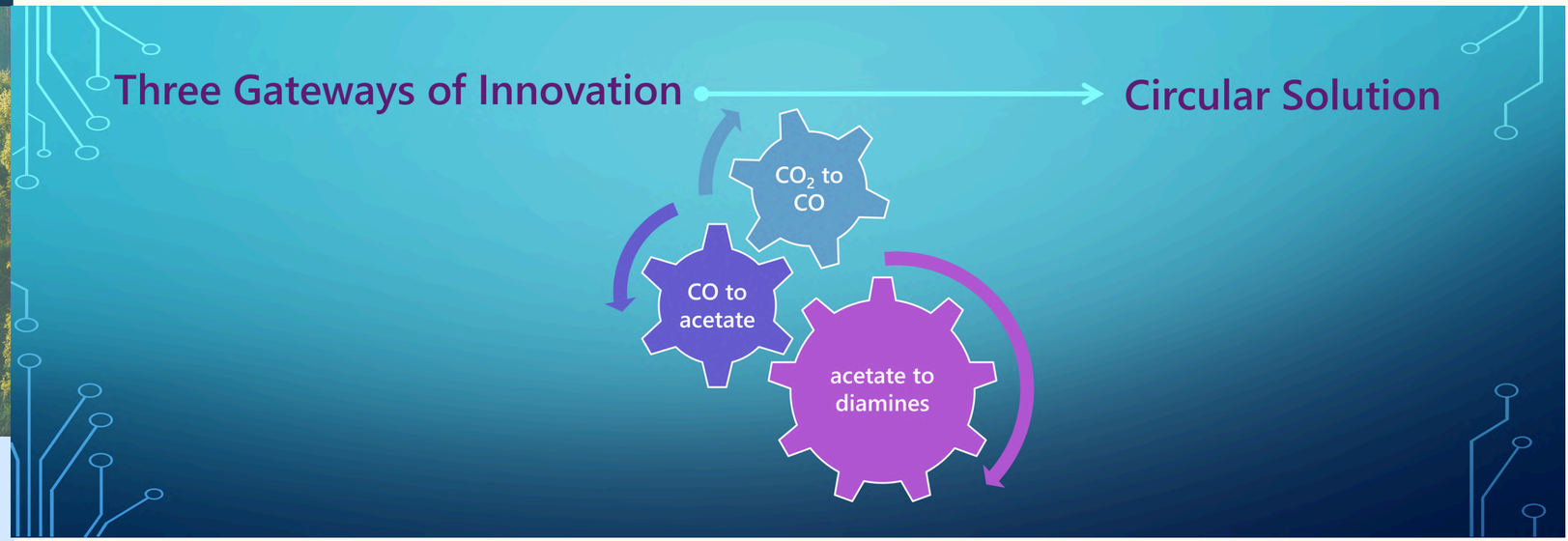


**START** 01 November 2023

**END** 31 October 2026

**BUDGET** €3.784.201

## PROJECT WEBSITE

https://www.ecomo-eic.eu/

## CORDIS LINK

https://cordis.europa.eu/project/id/101115403

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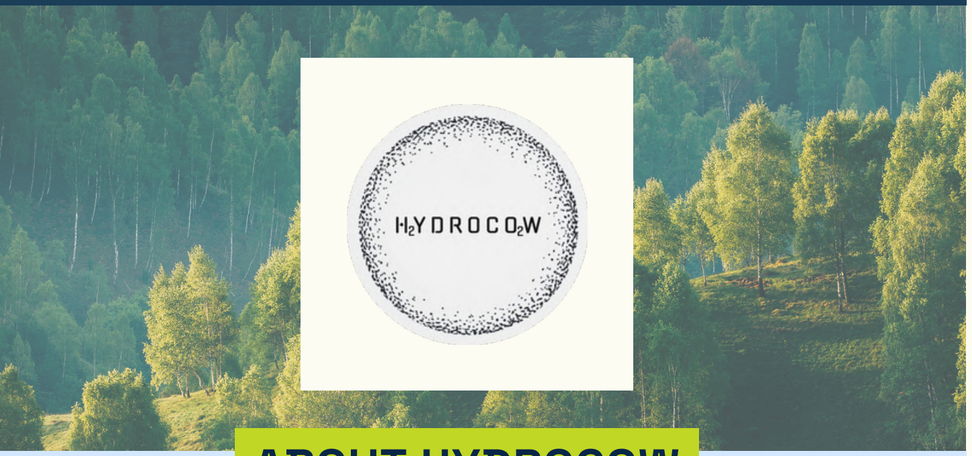
# EIC - $CO_2$ and Nitrogen Portfolio



## ABOUT HYDROCOW

Project HYDROCOW realizes a radically new technology that has the potential not only to address the global challenge of sustainability of food production and the resulting $CO_2$ emissions but also to create a totally new market in the food industry. The main impact of the project is through the **disconnection of food production from agriculture**. This leads to the development of a net-zero carbon, animal-free food product, with an estimated 99% reduction in land and water use in comparison to dairy cows - taking into consideration the land and water use of protein production, such as factory space.

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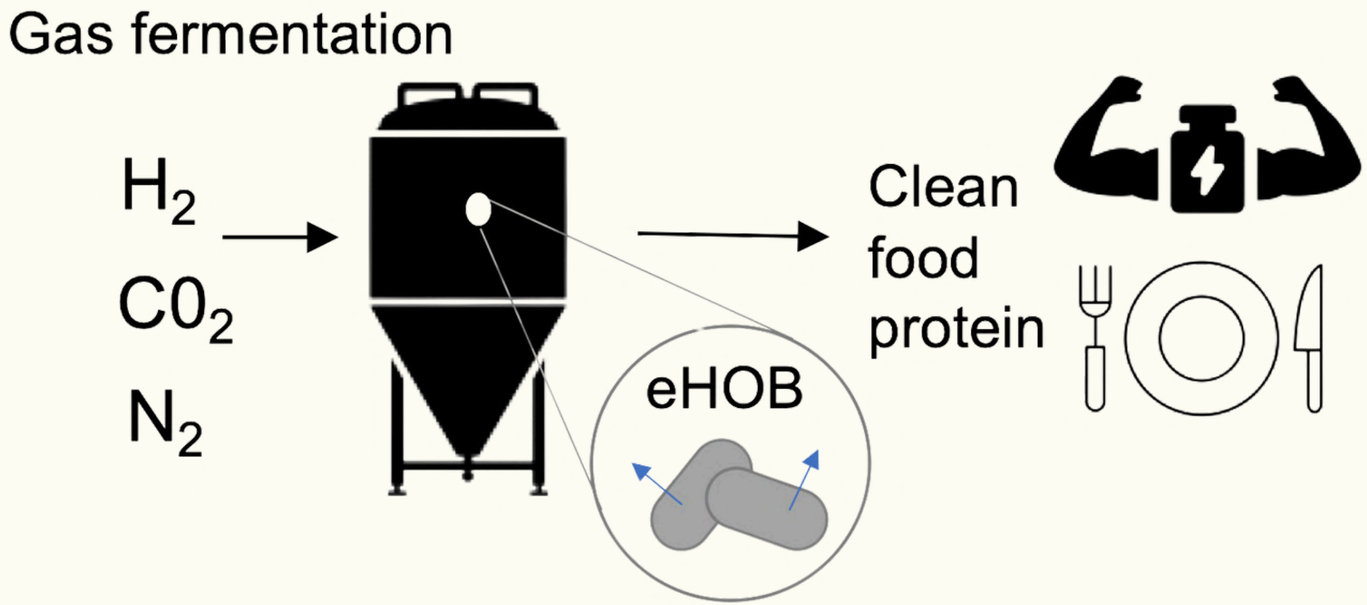



The main objective of the project is to develop and demonstrate **a first-of-a-kind** engineered hydrogen oxidizing bacterium (eHOB) Xanthobacter sp. SoF1-based protein secretion system, where $CO_2$ and soon $N_2$ is valorized into food-grade protein, decoupled from agriculture. In addition, HYDROCOW will generate significant knowledge for a growing research and application community about autotrophic, microbial production systems, their physiology, and sophisticated tools for genetically designing and screening them.

### IN A NUTSHELL

**Our goal is to engineer a microbe that converts carbon dioxide ($CO_2$) and hydrogen, produced from water using electricity, into beta-lactoglobulin, a major constituent of milk. In other words, HYDROCOW aims to produce milk with $CO_2$ and electricity, removing the cow from the process.**

### HYDROCOW PARTNERS

SOLAR FOODS · RWTH AACHEN UNIVERSITY · university of groningen · GINKGO BIOWORKS™ THE ORGANISM COMPANY

# EIC - $CO_2$ and Nitrogen Portfolio


**START** 01 September 2023

**END** 31 August 2027

**BUDGET** €3,963,836

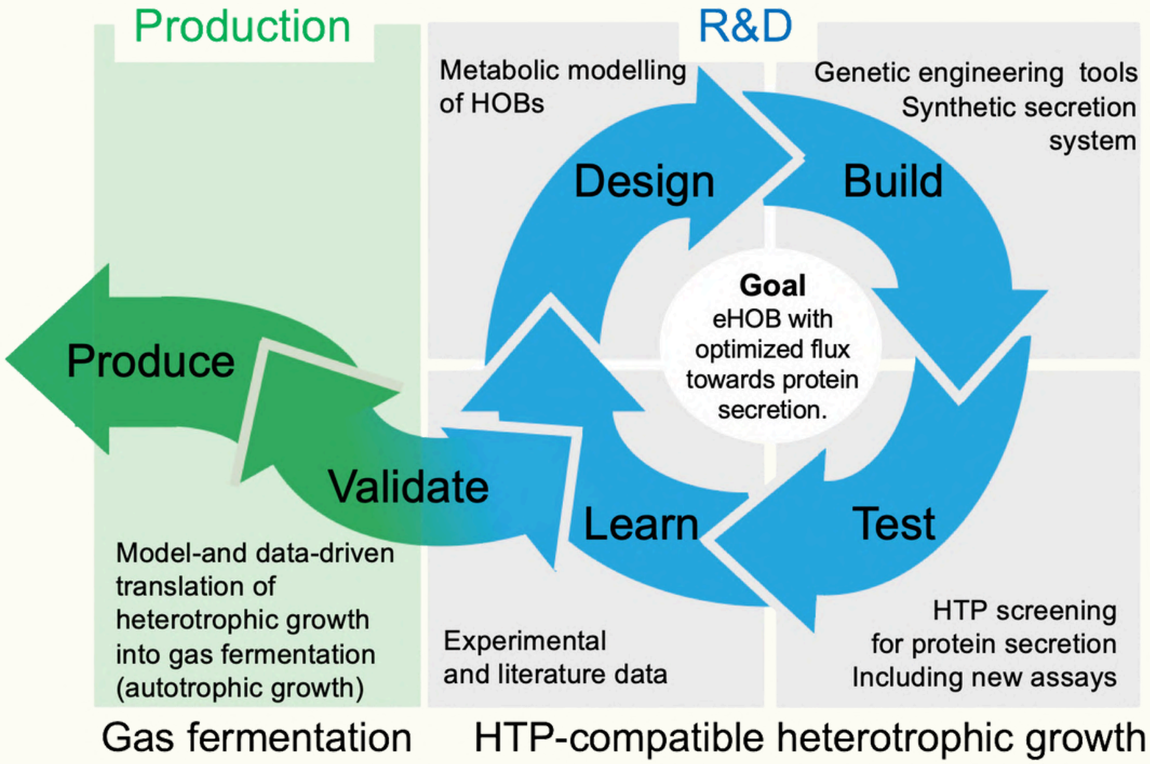
## PROJECT WEBSITE

https://www.hydrocow.eu/

## CORDIS LINK

https://cordis.europa.eu/project/id/101114746

European Innovation Council
Funded by the European Union

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# EIC - $CO_2$ and Nitrogen Portfolio

European Innovation Council
Funded by the European Union

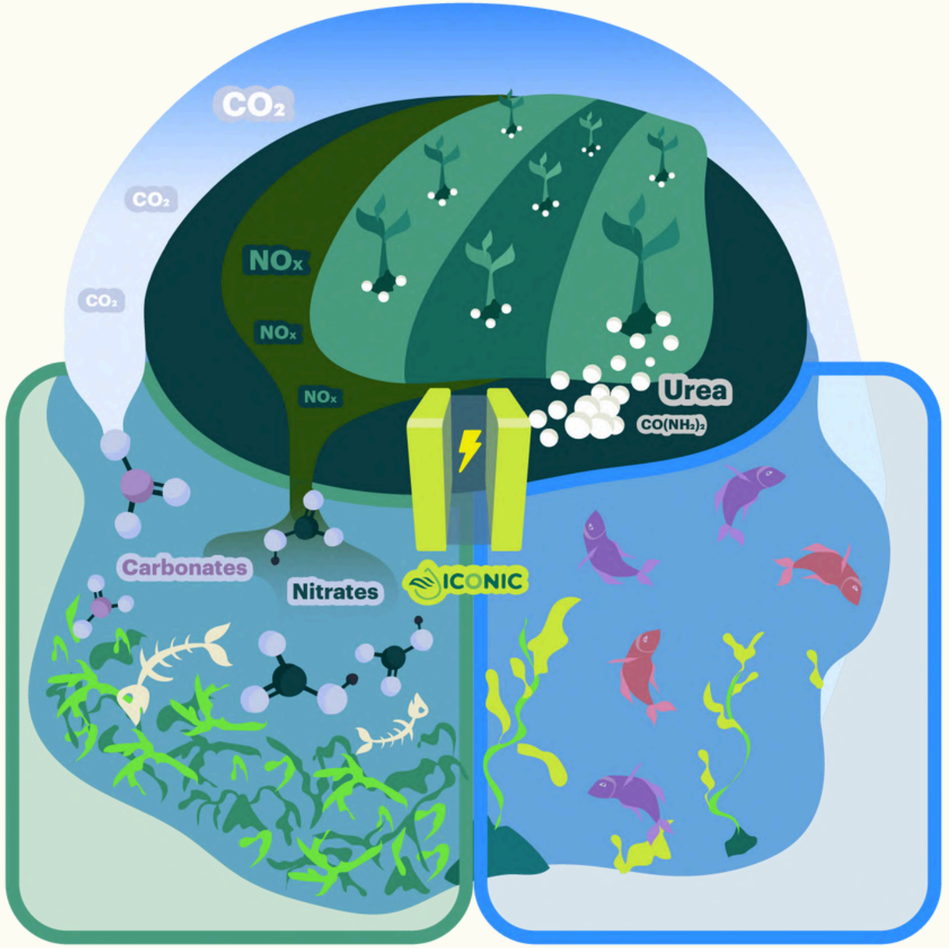
ICONIC
Integrated COnversion of NItrate and Carbonate streams

## ABOUT ICONIC

Using as an inspiration how the natural carbon and nitrogen cycles operate, ICONIC presents itself as an **environmental remediation and a sustainable production technology.** We will help restore the ecosystem by capturing dissolved $CO_2$ and nitrates from seawater and transforming those chemicals into useful industry products, such as urea.

Our **strengths**:

- New catalysts based on non-critical raw materials.
- Direct co-electrolysis of $CO_2$ and nitrates from seawater
- Integrated and scalable prototype powered by renewables for on-site mitigation.




### IN A NUTSHELL

**ICONIC helps to remediate the ocean ecosystem by converting seawater carbonates and nitrates, pollutants responsible for water acidification and eutrophication, into urea and other useful chemicals.**

### ICONIC PARTNERS

ICFO · ICN2 Institut Català de Nanociència i Nanotecnologia · ICMAB · Trinity College Dublin The University of Dublin · TUM · TU Delft

# EIC - $CO_2$ and Nitrogen Portfolio

European Innovation Council

Funded by the European Union

ICONIC

Integrated COnversion of NItrate and Carbonate streams

**START** 01 November 2023

**END** 31 October 2026

**BUDGET** €3.964.666

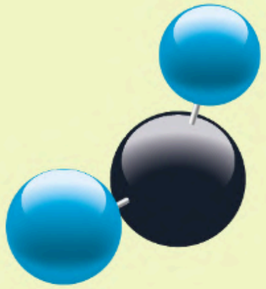
**PROJECT WEBSITE**

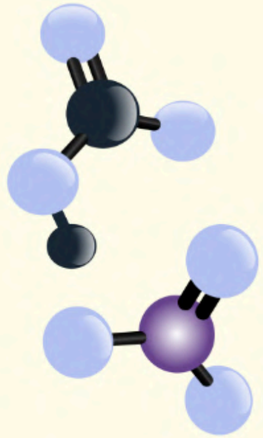
https://iconicproject.eu/

**CORDIS LINK**

https://cordis.europa.eu/project/id/101115204

Ocean restoration and capture & use of CO2





Reduce and recycle the nitrogen losses & C – N integrated management

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| | | |
| | | |

# EIC - $CO_2$ and Nitrogen Portfolio

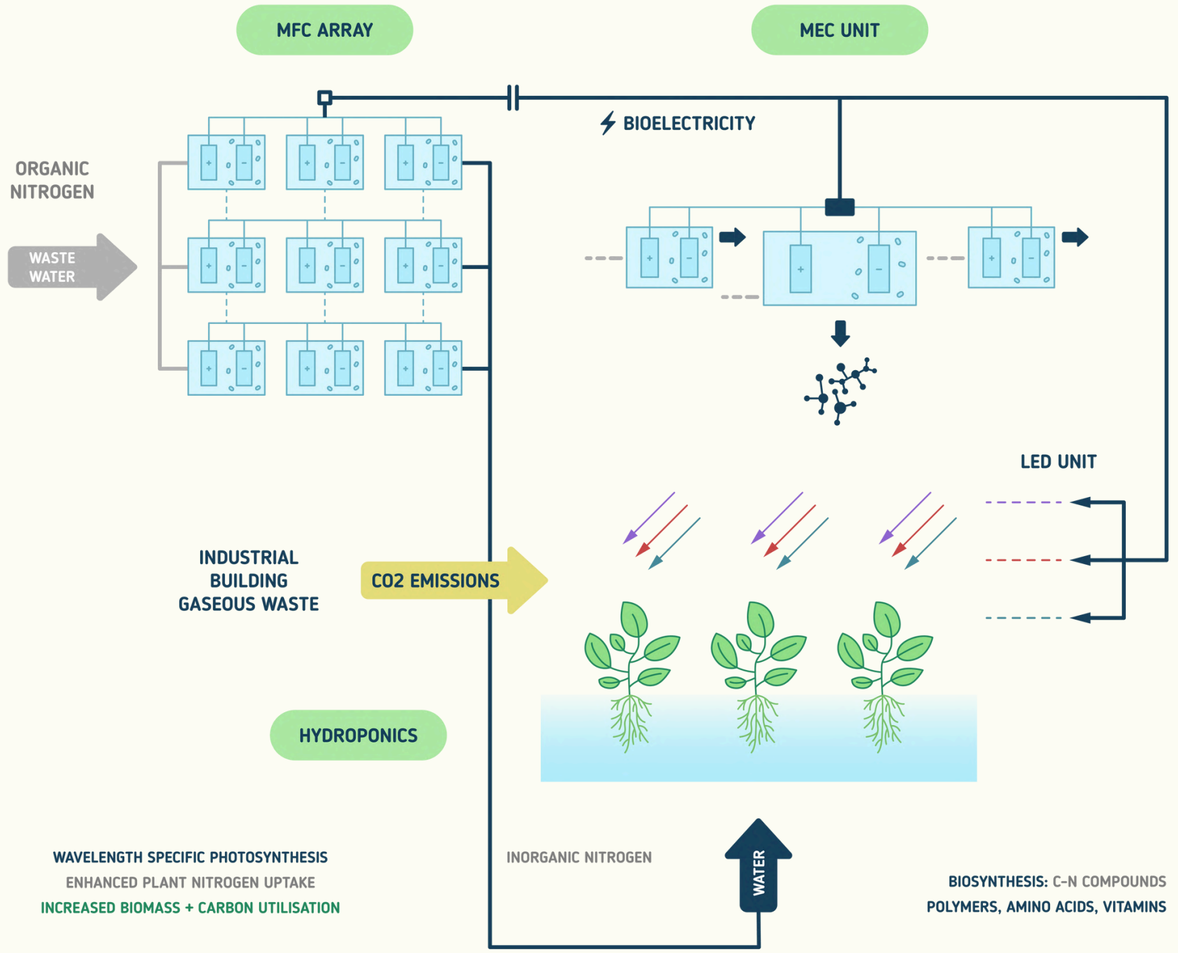
European Innovation Council

Funded by the European Union

## ABOUT MI-HY

Mi-Hy represents an **innovative approach to hydroponics, waste treatment, and energy generation** by integrating processes which historically have been separate into a single ecosystem. This eliminates the need for external (fossil-fuel-based) energy or carbon and nitrogen sources. The novel integrated platform consists of:

- Bioelectricity-generating microbial fuel cells
- Wavelength-specific hydroponics LEDs
- Hydroponics system
- Microbial electrolysis cell (MEC)




## IN A NUTSHELL

**Mi-Hy brings together microbial fuel cell (MFC) technology and hydroponics in a circular platform that turns carbon into biomass and recycles nitrogen from wastewater, promoting a greener future.**

## MI-HY PARTNERS

KU LEUVEN · Sony CSL · Biofaction · CSIC · University of Southampton · UWE Bristol University of the West of England

# EIC - $CO_2$ and Nitrogen Portfolio

European Innovation Council

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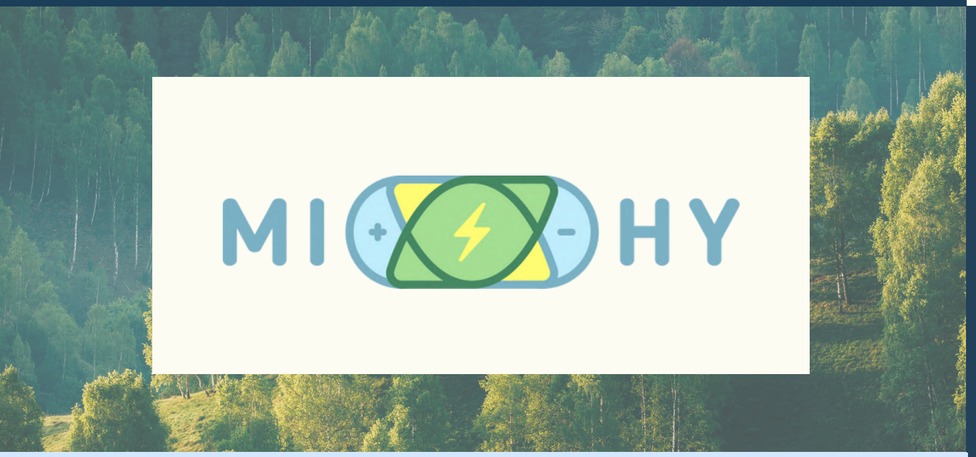


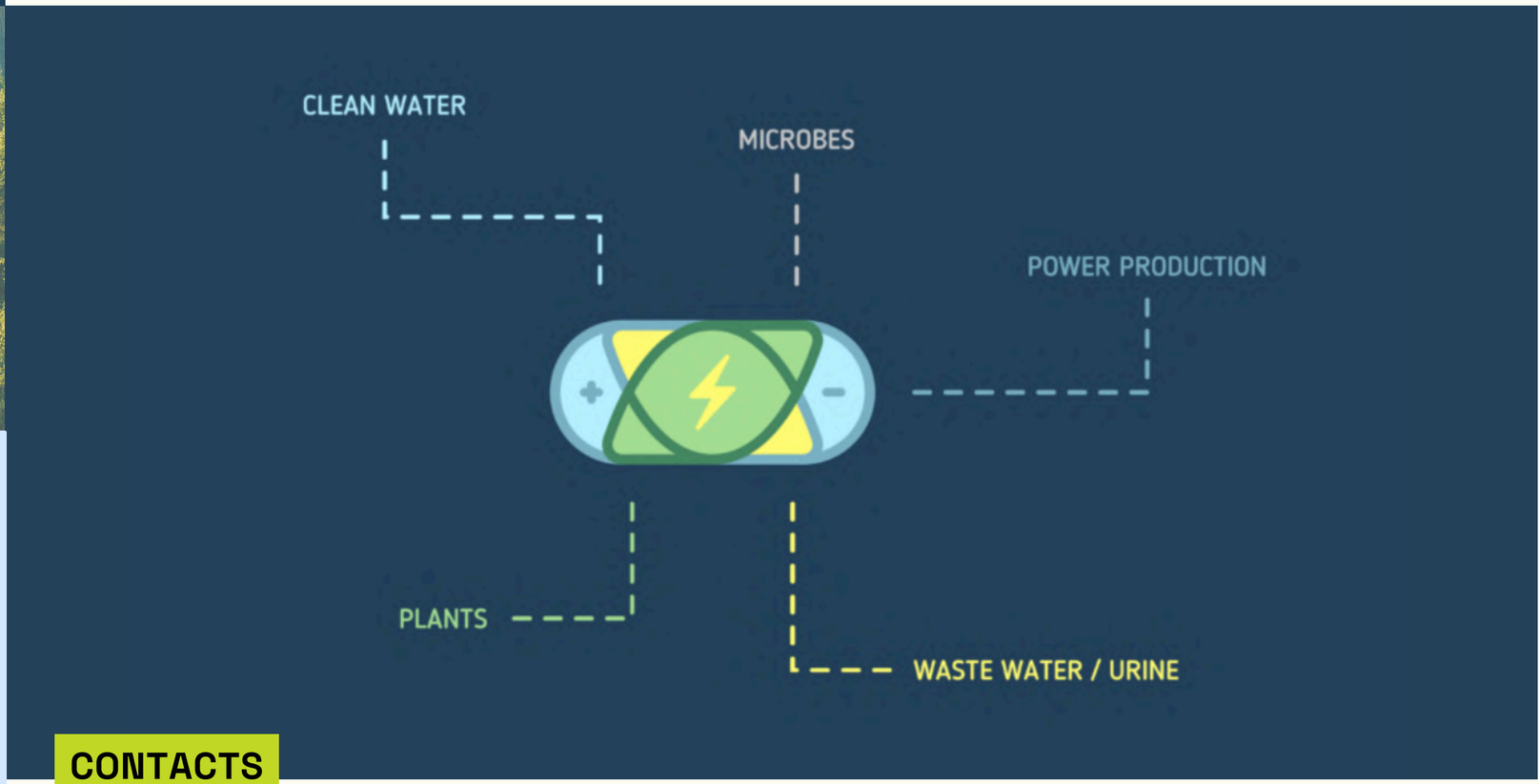


**START** 01 November 2023

**END** 31 October 2027

**BUDGET** €5.968.000

## PROJECT WEBSITE

https://www.mi-hy.eu

## CORDIS LINK

https://cordis.europa.eu/project/id/101114746

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# EIC - $CO_2$ and Nitrogen Portfolio

European Innovation Council

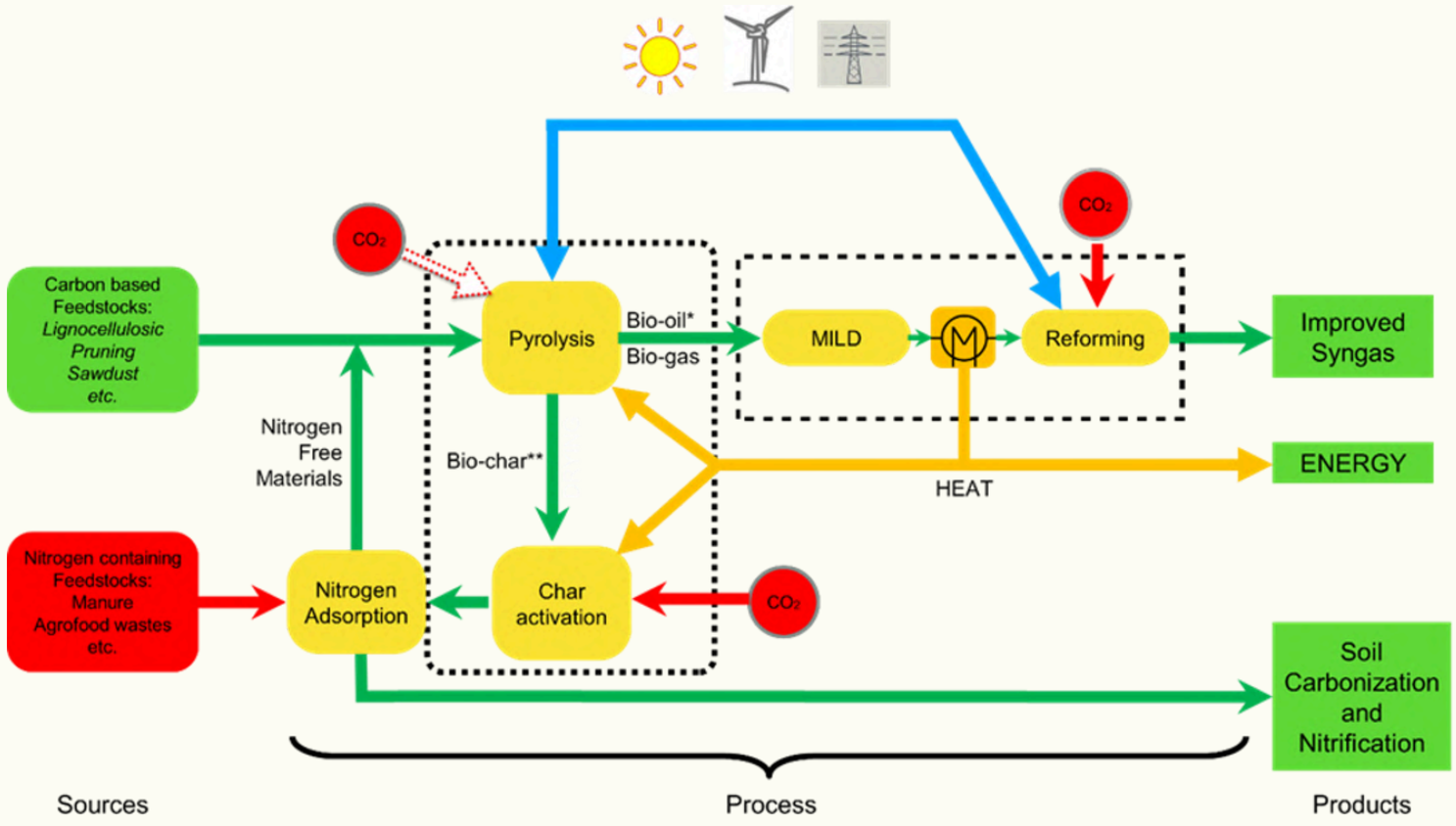
Funded by the European Union

MINICOR

## ABOUT MINICOR

MINICOR aims to develop a versatile process for management and valorisation of $CO_2$ and nitrogen with efficient renewable resource deployment. The concept integrates pyrolysis, MILD-combustion and dry reforming with biomass residues as feedstock for production of syngas and biochar.

The concept adopts a circular approach as it employs biomass residues as raw material and combines the production of syngas with that of porous biochar materials for several possible applications such as soil amendment.




**IN A NUTSHELL**

**MINICOR introduces circular biomass conversion for production of syngas from $CO_2$ via reforming, and biochar material for soil amendment. Thus adopting a circular approach for C- and N-compounds with efficient us of renewable resources.**

**MINICOR PARTNERS**

Lund University · Consiglio Nazionale delle Ricerche STEMS · DTU · RI.SE

# EIC - $CO_2$ and Nitrogen Portfolio

European Innovation Council

Funded by the European Union

**START** 01 November 2023

**END** 31 October 2028

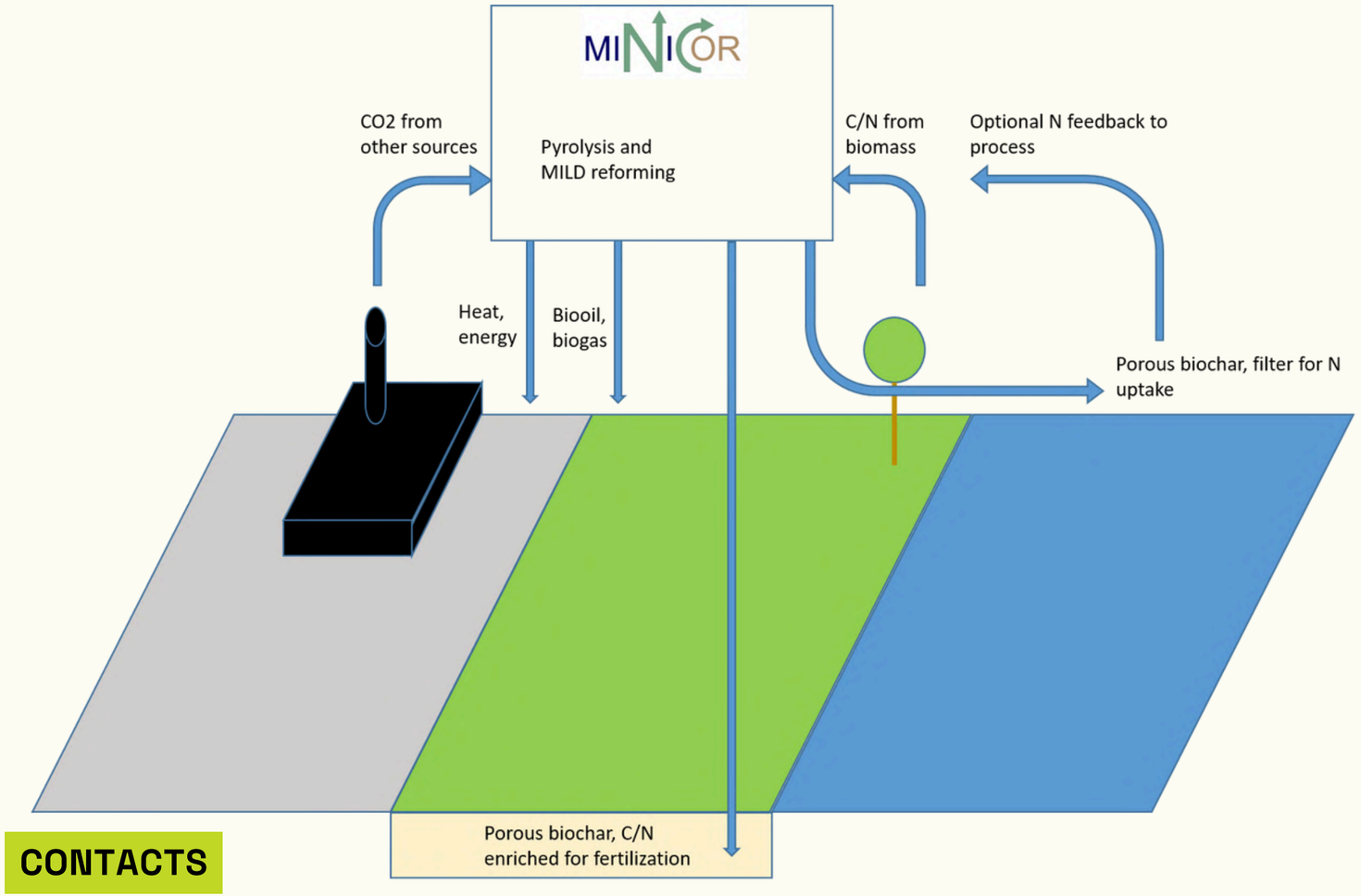
**BUDGET** €3.697.437

## PROJECT WEBSITE

https://www.minicor-project.eu

## CORDIS LINK

https://cordis.europa.eu/project/id/101115506




## CONTACTS

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| Technical University of Denmark | Prof. Peter Glarborg | pgl@kt.dtu.dk |
| Research Institutes of Sweden AB (RISE) | Dr. Waqar Butt | waqar.butt@ri.se |

# EIC - $CO_2$ and Nitrogen Portfolio

superval
sustainable photoelectrochemical valorization of flue gases

## ABOUT SUPERVAL

Limiting postcombustion emissions is one of the most urgent environmental actions.

SUPERVAL overarching objective is to develop a breakthrough modular technology, built with non critical raw materials, able to capture and valorise the $CO_2$ and nitrogen components (NOx and $N_2$) of flue gas streams respectively to formate and ammonia, using sunlight as primary energy source, and water as source of hydrogen (protons and electrons).

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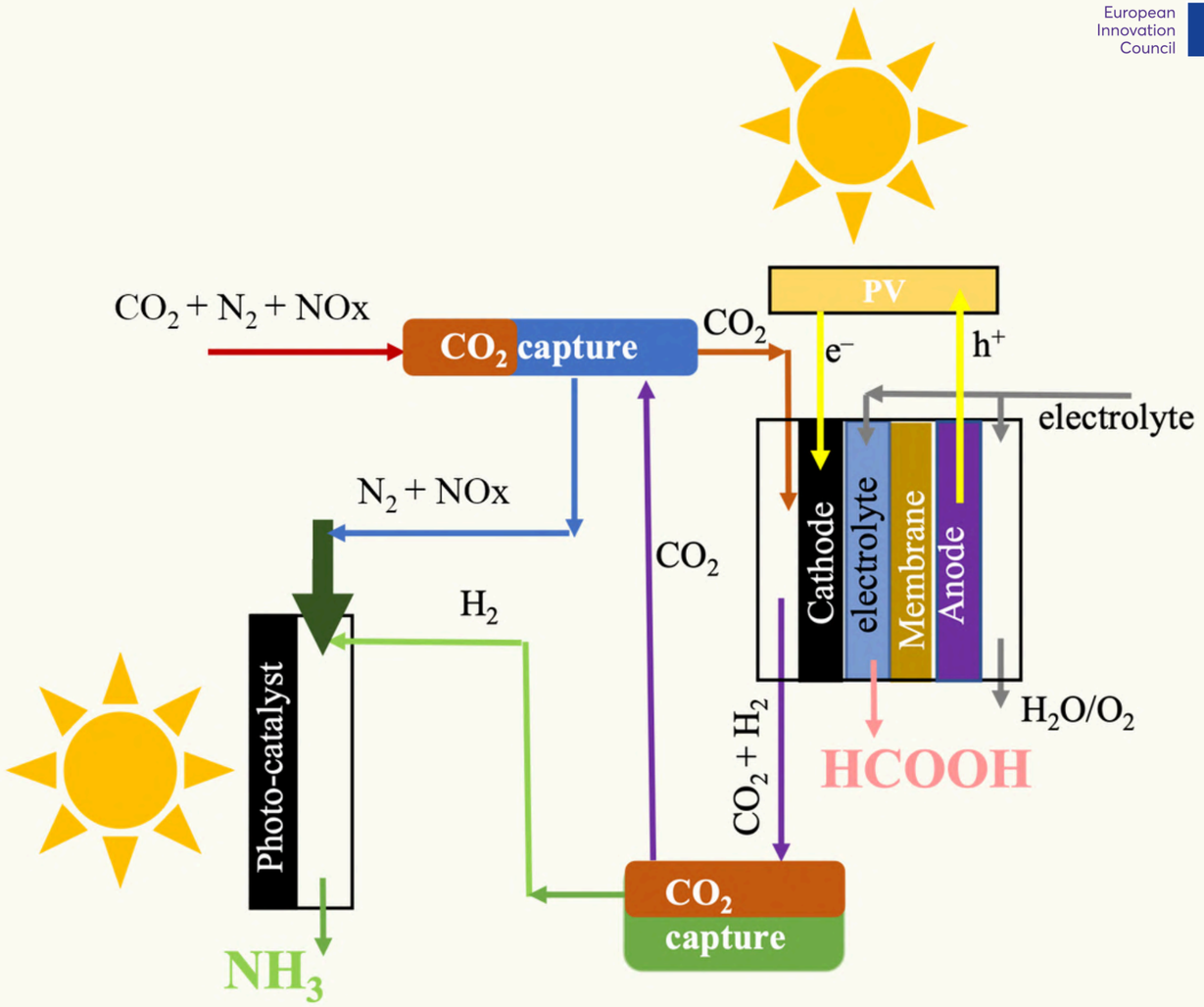


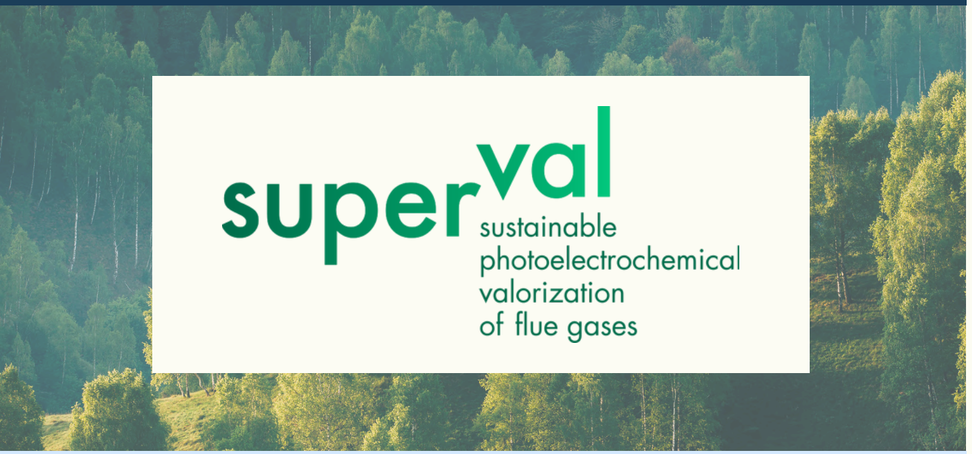

**IN A NUTSHELL**

**SUPERVAL aims to turn $CO_2$ and Nitrogen from pollution and waste into useful products (like ammonia and formate) in a sustainable way**

**SUPERVAL PARTNERS**

ICIQ Institut Català d'Investigació Química · Orchestra Sci. · Universitat Politècnica de València · Jülich Forschungszentrum · Università degli Studi di Messina · INSTM · TU/e Eindhoven University of Technology · vareser · 2i0 LCA consultants

# EIC - $CO_2$ and Nitrogen Portfolio



superval
sustainable photoelectrochemical valorization of flue gases

**START** 01 November 2023

**END** 31 October 2027

**BUDGET** €3.571.708

## PROJECT WEBSITE

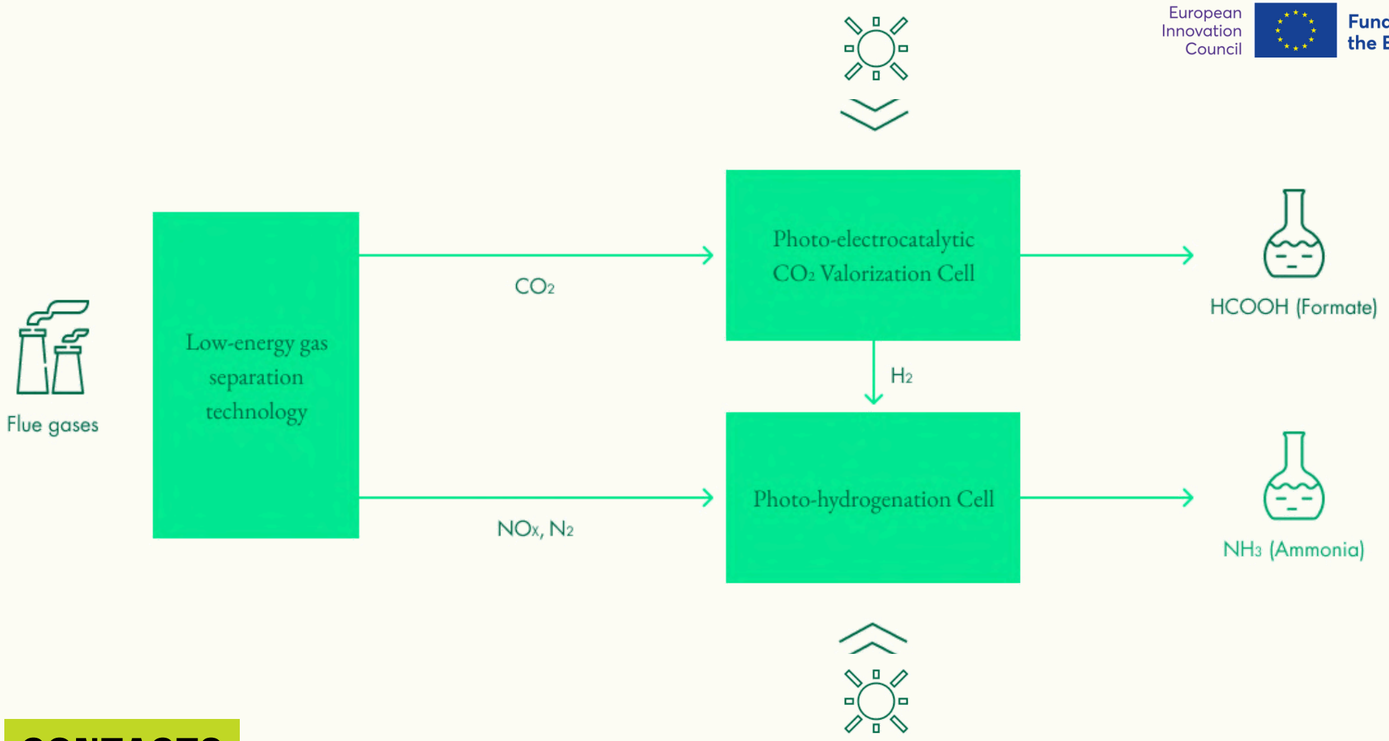
https://superval.eu/

## CORDIS LINK

https://cordis.europa.eu/project/id/101115456

European Innovation Council

Funded by the European Union




## CONTACTS

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