

GOODBYO

**MULTI-COMMODITIES MICROBIAL-DRIVEN BIOREFINERY
BASED ON FOOD-PROCESSING INDUSTRY WASTES, BIOGENIC CO₂
AND BIOPROCESS WASTEWATERS**

TRANSFORMING WASTE INTO VALUE FOR A SUSTAINABLE FUTURE

THE GOODBYO PROJECT The manufacturing industry is the leading source of CO₂ emissions in Europe. Disruptive solutions need to be developed to reduce emissions in this sector.

The GoodByO project addresses this challenge by developing a next-generation multi-commodity biorefinery based on food waste, biogenic CO₂, and bioprocess wastewaters to maximize resource efficiency and circularity. By applying the cascading use principle and harnessing the metabolic diversity of microbial catalysts, along with robust process integration and renewable energy utilization, GoodByO aims to enhance the environmental footprint and the cost-effectiveness of both established and innovative bio-based value chains.

GoodByO implements his visionary concept at ChainCraft BV bio-plant by valorizing its gaseous and liquid side-streams as zero-cost feedstocks to produce bio-octanoic acid, bio-hexanol, carotenoids, bio-fertilizers, and microbial proteins. The project ambition relies in the validation of long-term production stability of the developed bioprocesses at TRL5 using real feedstocks, delivering transferable outcomes for further scale-up at higher TRLs.

GoodByO targets to produce bio-based products that meet market requirements at cost-competitive selling price with benchmarks, boosting end-user companies to replace fossil- and palm-oil based products with bio-based alternatives.

GoodByO consortium brings together a Europe-wide multidisciplinary combination of complementary expertise aligned with its objectives. It consists of 10 Partners from 5 different countries, including SMEs, RTOs, academia and association. Fondazione Istituito Italiano di Tecnologia is the project coordinator.



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PROJECT LEADER

Fondazione Istituto Italiano di Tecnologia - IIT - Italy

PARTNER

CHAINCRAFT BV - Netherlands | KRAJETE GMBH - Austria
BRITE HELLAS SA - Greece | MASARYKOVA UNIVERZITA - Czechia
CNR - CONSIGLIO NAZIONALE DELLE RICERCHE - Italy | POLITECNICO DI TORINO - Italy
TECHNISCHE UNIVERSITAET WIEN - Austria
CIB - CONSORZIO ITALIANO BIOGAS E GASSIFICAZIONE - Italy
CENTRE FOR RENEWABLE ENERGY SOURCES AND SAVING FOUNDATION - Greece

OBJECTIVES GoodByO ambitions will be realized by achieving the following specific objectives:

- Creating a microbial chain elongation technology to produce large-scale **bio-octanoic** acid from agri-food waste and gas fermentation effluent, while generating two residue streams as zero-cost feedstock for other GoodByO microbial factories.
- Developing a novel gas fermentation process using acetogenic bacteria for **bio-hexanol** production from the biogenic CO₂ (biogas) and green H₂.
- Establishing a cost-effective **microalgal carotenoid** production process leveraging bioprocess wastewaters and an innovative photo-bioreactor system.
- Developing a novel biological anaerobic **biogas desulfurization** process combined with sulphur-rich microbial biomass recovery.
- Validating the **long-term stability** of developed biocatalysts and continuous bioprocesses using real feedstocks to achieve consistent and scalable production performance.
- Designing a **renewable energy-based power supply** system for the multipurpose biorefinery, using biomethanation as intermediate energy storage.
- Ensuring **environmental benefits** of GoodByO technologies compared to the current commercial processes.
- Developing a **consolidated roadmap** for GoodByO technologies scale-up and commercialisation.

IMPACTS GoodByO is expected to advance the EU global leadership in sustainable biotech-manufacturing industry, while expanding CO₂-utilizing biotechnologies to promote a carbon-negative economy.

In particular:

- Boosting end users companies in substituting fossil- and palm-oil based products with biobased ones.
- Setting an example for existing biorefineries and showing the feasibility and viability of integrating different microbial-based manufacturing processes.
- Promoting the valorisation of biogenic CO₂ streams and biorefinery waste effluents as zero-cost feedstocks.
- Increasing the EU's raw material security, by reducing imports of fossil fuel and palm oil feedstock from outside the European Union.
- Minimising EU's greenhouse gas emissions by offering a greener solution to companies.
- Reducing freshwater consumption by recycling bioprocess water effluents.

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