COMET FACTSHEET

COMET MODULE

ELF4GREEN – ELECTRO-FERMENTATION AS ADVANCED TOOL FOR TARGETED BIOPRODUCTION OF GREEN FUELS AND CHEMICALS

Main location: Graz (Styria)
Other locations: Vienna (Vienna), Wieselburg (Lower Austria)
Thematic area: Energy & environment
(according to *www.ffg.at/comet/netzwerk)*

Thematic focuses

- **Treatment of biologically recalcitrant materials** (e.g. mixed plastic waste or sewage sludge) through gasification followed by electro-fermentation of synthesis gas. CO_2, CO and H_2 are utilized for the biosynthesis of environmentally friendly products.
- **Fermentation of biologically convertible feedstocks**, such as wastewater from the food industry, to produce medium-chain organic acids or alcohols. Electro-fermentation is used to selectively enhance product specificity and yield.
- **Electro-biomethanation of CO_2** for biogas upgrading and for the treatment of CO_2-rich off-gas streams, with the goal of producing biomethane

Planned realisation and outcomes

The **ELF4GREEN** project investigates an innovative bioconversion concept for the production of green chemicals and fuels. Its objective is to expand the range of renewable products that can be manufactured using biotechnological processes, simplify production pathways, and improve economic viability.

By utilizing a broad spectrum of feedstocks – including biologically recalcitrant substrates and industrial off-gas streams – the project enables their efficient conversion into valuable, sustainable products using advanced microbial fermentation technologies.

At the core of **ELF4GREEN** is **electrobioconversion**, an advanced technology in which fermentation processes are specifically supported by the application of electrical energy. Electroactive microorganisms interact with electrodes to convert substrates such as organic waste or CO_2 into chemicals and biofuels. This approach enhances the efficiency, sustainability, and cost-effectiveness of conventional fermentation processes.

By combining electrochemical and biological catalysis, **ELF4GREEN** opens up new, resource-efficient pathways for the utilization of biomass and CO_2. In addition, electro-biosynthesis enables the storage of surplus renewable electricity in the form of gaseous or liquid energy carriers that are compatible with existing energy infrastructures and supply chains.

ELF4GREEN lays the foundation for application-oriented research aimed at developing novel biotechnological solutions for a sustainable energy supply based on biogenic fuels and for the climate-friendly transformation of the chemical industry..

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Selected company partners (max. 10)**:**

1. Aichernig Engineering GmbH
2. Wien Energie GmbH
3. Rohkraft / Ing. Karl Pfiel GmbH
4. NaKu e.V.
5. Proman Management GmbH
6. ÖVGW – Austrian Association for the Gas and Water

Selected scientific partners (max. 5)**:**

1. BOKU University
2. ISTA - Institute of Science and Technology Austria

Selected international[1] partners (max. 5)**:**

1. Universitat de Girona
2. Free University Bozen
3. Technical University of Denmark

Duration:	01.04.2026 bis 31.03.2030 (4 years)
Staff employment:	7.3 FTE, thereof 5.3 scientists
Management:	Dr. Katharina Ludwig, M.Sc., Project coordinator DI Dr. Bernhard Drosg, Project coordinator ao.Univ.Prof. DI.Dr. Werner Fuchs, scientific project lead
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[1] Partners with headquarters outside Austria