

ELOXYCHEM moves towards a flexible pilot plant integrating two electrochemical process lines

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ELOXYCHEM project is moving forward with a flexible and industrially relevant electrochemical process for the production of carboxylic acids.

Latest consortium meeting: from technical challenges to a more flexible pilot solution

The latest developments were at the centre of the **sixth ELOXYCHEM consortium meeting**, hosted by project partner **ETA-Florence Renewable Energies**. Partners met to review scientific and technical progress, assess the scalability of the electrochemical approaches and define the next steps towards the project's flexible pilot line.



Figure 1: Sixth ELOXYCHEM Consortium Meeting hosted by ETA-Florence Renewable Energies

A key outcome was the consortium's transition from nitrate-mediated electrochemistry towards a **nickel-based electrochemical route**, selected to improve consistency and robustness as the technology moves towards pilot-scale operation.

This modification enables high throughput and yields to be achieved for **two process lines**, rather than only one, allowing these complementary routes to be combined in **one flexible pilot-scale facility** and their respective value chains to be demonstrated under relevant industrial conditions.

The adapted technical strategy, developed in close coordination with the European Commission in response to limitations identified in the initial pathways, also integrates **digital technologies, renewable energy and flexible operation** into the pilot system.

Ongoing experiments are testing the processes under variable electrical loads to simulate real-world grid conditions and assess how electrochemical production can respond to renewable energy intermittency and demand-response requirements. In parallel, significant progress has been made in the valorisation of cyclic substrates from industrial side streams into different carboxylic acids, while **Tall Oil Fatty Acid (TOFA)**, a waste stream from kraft pulping, is being explored separately as a feedstock for value-added products.

Together, these developments strengthen the scalability, flexibility and industrial relevance of the ELOXYCHEM platform and create a clearer pathway towards pilot-scale demonstration and future exploitation.

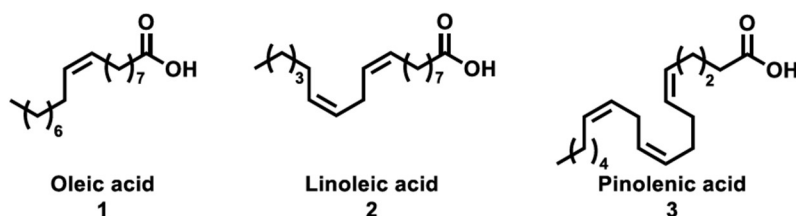


Figure 2: Chemical structure of the three major fatty acids in TOFA

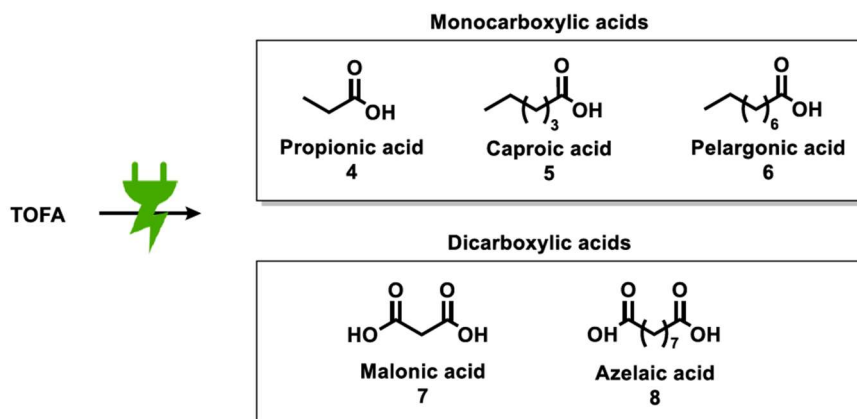


Figure 3: Reaction equation for the EC oxidation of TOFA to dicarboxylic and monocarboxylic acids



Equality, diversity and inclusivity

Innovation goes beyond technology. ELOXYCHEM is committed to promoting equality, diversity and inclusivity across its research and innovation activities.

Sex and gender considerations are integrated into the project's methodology and consortium-wide processes to help ensure that research and innovation outcomes are relevant and beneficial to all. These principles are further detailed in the **Sex and Gender Strategy Report**, prepared by Iconiq Innovation Ltd. The full text is available for download [here](#).

Project overview

ELOXYCHEM started on **1 January 2024** and will run for 54 months, until **1 July 2028**.

The project aims to develop a **commercially viable electrochemical oxidation platform for producing carboxylic acids**, essential building blocks for paints, polymers, catalysts, fine chemicals and dyes. By replacing conventional chemical conversion routes that rely heavily on fossil-based resources and hazardous precursors such as nitric acid, ELOXYCHEM aims to reduce greenhouse gas emissions, energy consumption and chemical waste across the value chain.

By demonstrating this transformational electrochemical conversion platform at pilot scale, producing approx. one ton per year, ELOXYCHEM aims to reach **TRL 5** and provide a potential drop-in alternative to conventional chemical production processes. The platform is designed to operate with conventional, bio-based and biogenic feedstocks.

AI-driven optimisation will support improvements in electrochemical performance, component lifetime and production costs, while the pilot system will demonstrate integration with renewable energy and operation under variable power conditions.

Bringing together a European consortium of chemical producers, manufacturers and research institutions, ELOXYCHEM is working towards a more flexible and sustainable model for chemical production. With the potential to deliver **up to 60% energy savings** compared with existing methods, the project aims to reduce waste, dependence on hazardous precursors and overall energy intensity, supporting Europe's transition towards greener and more digital chemical manufacturing.

ELOXYCHEM

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Links to the project

- **Website:** <https://www.eloxychem-horizon.eu/>
- **LinkedIn:** <https://www.linkedin.com/company/eloxychem-project/>
- **Youtube:** <https://www.youtube.com/@ELOXYCHEM>

Partnership

The project is coordinated by **SINTEF**, with a consortium consisting of several European partners: **Max Planck Institute for Chemical Energy Conversions** (Germany), **Evonik Operations GmbH** (Germany), **Idener** (Spain), **ETA-Florence Renewable Energies** (Italy), **Z Prime** (Germany), **Imperial College London** (UK), **Megara Resins Industry** (Greece), **ESy-Labs GmbH** (Germany), **Iconiq Innovation Ltd** (UK).



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