EBIO Newsletter

Biofuels Through Electrochemical Transformation Of Intermediate Bio-Liquids

Issue 1 / November 2021

EBIO is a four-year project that is part of the European Union's Horizon 2020 Research and Innovation Programme. It is set to be a game changer in the field of biofuel production with the aim to generate energy dense biofuels through electrochemical transformation of intermediate liquified biomass.

The project launched in December 2020 with a budget of around 4 million euros. After some Covid-19 pandemic related start-up challenges, all PhD students have started their research and the project is now and running and in full-swing and has brought together partners from all over Europe all with the same goal: to turn low value crude bio liquids into sustainable road transport fuels.

The consortium is built on strong foundations of research, innovation, and industrial knowledge. It consists of nine beneficiaries from seven different countries, among them some of the world leaders in the field.

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1. Introduction to the project

EBIO will not only help the EU to meet it's 2050 goal for net zero greenhouse gas emissions but also contributes to the achievement of two of the United Nations Sustainable Goals: Number 7 – Affordable Clean Energy, and Number 12 – Responsible Consumption and Production.

EBIO's research objective is to use electrosynthesis to convert two low-valued and readily available bio-liquids - fast pyrolysis and black liquor - into green fuels and biochemicals. Successful implementation of EBIO's technology will lead to a production of at least 60 million tonnes of biofuels per year.

The process of upgrading liquified biomass has the possibility to produce great quantities of environmentally friendly transport fuels. Currently the available feedstocks are pyrolysis liquids and kraft mill black liquor. The further establishment of industrial pyrolysis units combined with the scale up of alternative thermochemical conversion processes, including Hydrothermal Liquefaction, will dramatically increase bio-liquid outputs. Therefore, there is a real potential for EBIO's unique technology to transform the landscape of transport fuels in Europe. Through small scale pilot tests, the new technology will be validated (TRL4), with the vision to scale up activities following the conclusion of this research.

Figure1: Feedstock materials.
Credits: Instituto de Tecnologìa Quimica.

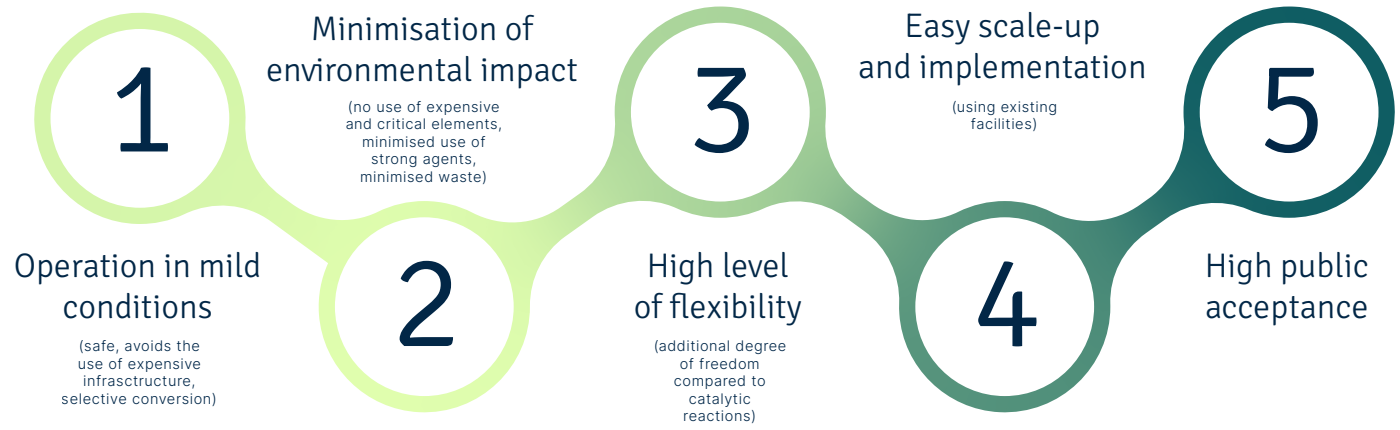


Figure 2: The benefits of EBIO.

2. EBIO Advantages

This pioneering technology has many benefits:

- Electrochemistry technology can operate under mild conditions which avoids the use of expensive equipment, such as compressors, high pressure reactors and heat exchangers, which are currently applied in industrial catalytic hydrogenation processes.
- EBIO's technology can use existing facilities which will make the scale-up process quick and easy.
- No external source of hydrogen will be needed in the first stages of hydro-processing of pyrolysis oil, as protons and electrons are going to be generated in situ from water.

Figure 3: Products.
Credits: Instituto de Tecnologìa Quìmica.

Turning low value crude bio liquids into energy dense biofuels for sustainable road transport

3. EBIO at EUBCE 2021

Speaker's Corner

Professor Siegfried Waldvogel, from the Johannes Gutenberg University Mainz, presented an overview of the EBIO project as part of the Speaker's Corner during EUBCE 2021, which was held online.

The presentation included the goals of the project, an introduction to the consortium, the benefits of electrosynthesis, a short explanation of upgrading biorefineries by electrosynthesis, and a Q&A Session.

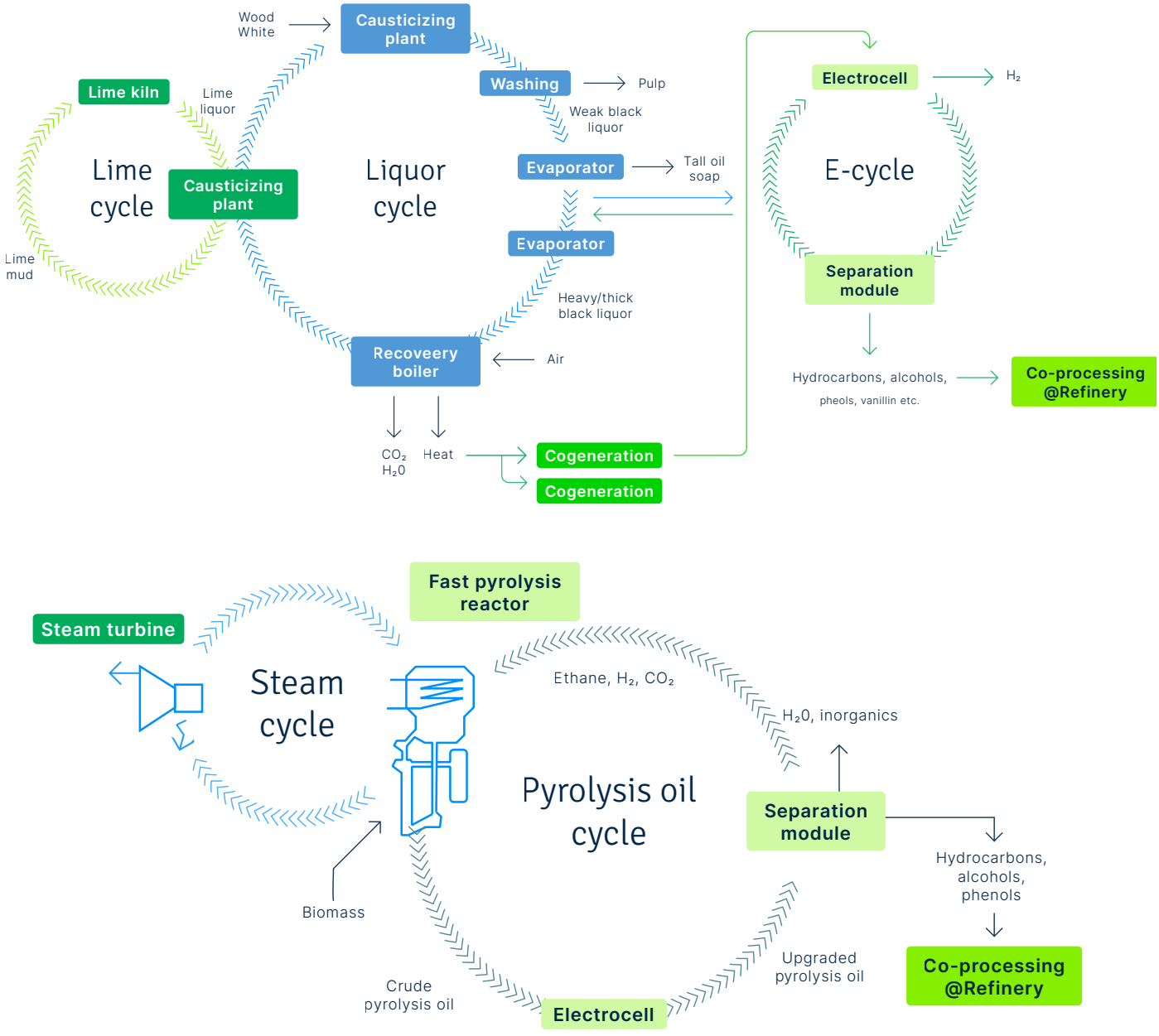
The full recording of the session is available here until April 2022 (for registered participants).

4. 5th H2020 Biofuels workshop

Organized by CINEA. EBIO Presented Online:

This year's H2020 Biofuels Workshop was held on 14th - 15th October 2021 and was organized by CINEA. This fully remote event brought together 33 biofuel projects to discuss ideas for collaborative activities, synergies, and opportunities, that could also be used in the area of project execution, dissemination, and communication.

Project Coordinator, Roman Tschentscher, presented EBIO at the workshop. The presentation consisted of an introduction to the EBIO concept, as well as EBIO's objective to ultimately develop a sustainable process design for the production of energy dense carriers, that can be upscaled to industrial level.



Figures 4-5: EBIO feedstock cycles.

A glimpse of the initial project results were shared which included an optimization of electrode production at industrial scale, and initial ranking of electrode materials and process conditions, as well as the establishment of process design base case for process integration into pyrolysis and pulp mill.

The challenges and obstacles were also briefly touched upon such as the delayed start of three PhD students due to the global pandemic.

In addition, from a technical perspective the complex feedstock and product composition have added to the challenges.

EBIO plans for far reaching impacts that will accelerate and reduce the cost of the next generation of sustainable renewable energy generation, that will contribute towards Europe's innovation base. It also plans to enlarge the feedstock basis for the production of competitive energy dense hydrocarbons.

The consortium is enthusiastic to collaborate with other projects, with these potential ideas to start:

- Electrochemical conversion of biobased components (electrode materials, cell design, conversion kinetics);
- Downstream processing of upgraded bio liquids, including washing, fractionation and purification;
- Blending, co-processing, tuning of fuel properties, hydrogen economy and integration options into refineries;
- Communication activities – joint seminars, workshops and webinars;
- Student exchange – internships, theses, and so on.

PROJECT PARTNERS

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EBIO H2020 Project

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006612.