Biofuels through Electrochemical transformation of intermediate BIO-liquids

Project Agreement No 101006612

H2020-LC-2020-RES-RIA

Internal Communication Tools

Document type (nature)	*Deliverable*		
Deliverable No and name	*D.5.9 First EBIO workshop at EUBCE*		
Work package number(s)	*WP5 – Dissemination, communication and outreach activities*		
Document ID, Reference or Revision No	*EBIO_D5.9_v0_2021_11_29*		
Date	*25.11.2021*		
Due Date Annex 3	*M12*		
Responsible Beneficiary	*ETA*		
Author(s)	*Emma Fromant*		
Contributors	*ETA*		
Publicity level	*Public*		
Short description	*Summary of EBIO's participation at the 29th edition of the EUBCE.*		
Document approval	*Roman Tschentscher*	*DD.MM.YYYY*	*29.11.2021*

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

Brief Description of the deliverable content and purpose

This report gives and overview of EBIO's presentation at the online EUBCE 29th edition, and also a brief analysis of its impact. The presentation was made by Professor Siegfried Waldvogel, from the University of Mainz, who presented an overview of "Biofuels through electrochemical transformation of intermediate bio-liquids". The technology was briefly explained along with the benefits of using electrochemical transformation and potential issues that may arise during this research project. Given that the start date of the project was 1 December 2020 and the EUBCE was held in April 2021, the presentation was given as part of the speakers corner platform. A full project workshop will be part of the next EUBCE to be held in May 2022.

Content

LIST OF FIGURES

1 Introduction

The European Biomass Conference & Exhibition (EUBCE, www.eubce.com) combines one of the world's leading R&D conferences with an international exhibition, and represents the leading platform for the collection, exchange and dissemination of scientific know-how in the field of biomass.

During the 29th edition of the European Biomass Conference and Exhibition (EUBCE), organised virtually by ETA, EBIO held a virtual stand and gave a short presentation as part of Speaker's corner was conducted to introduce the EBIO project to the international community of bioenergy engineers and researchers, as well as international industry stakeholders.

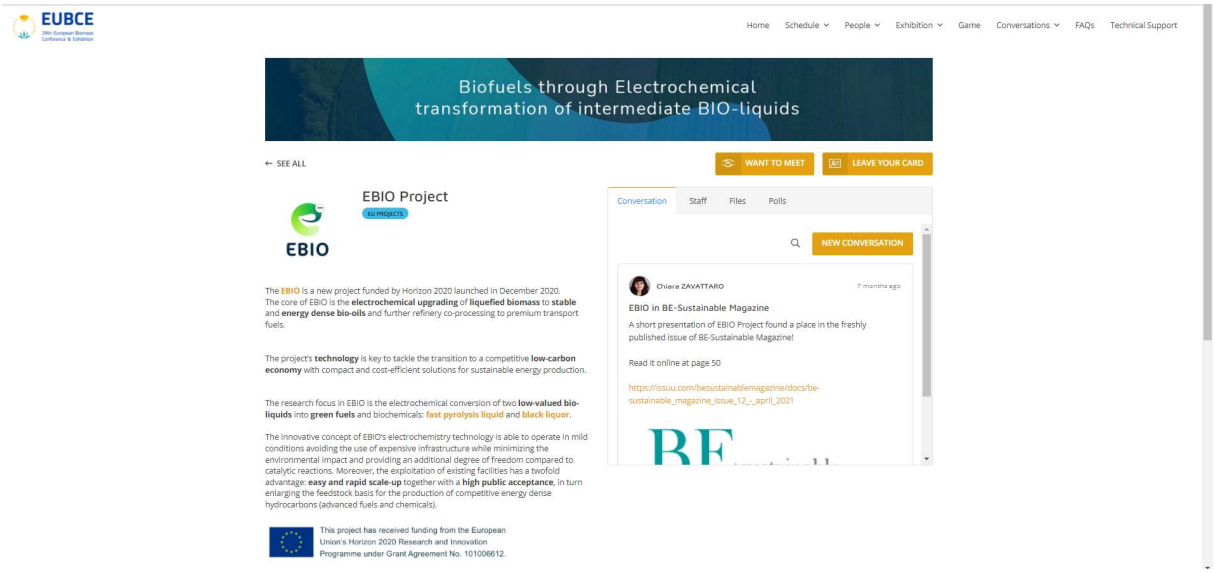

Figure 1 EBIOs virtual stand at the 29th EUBCE online

On 29 April 2021, at 09:00 CEST, Professor Siegfried Waldvogel presented "Biofuels through electrochemical transformation of intermediate bio-liquids" that was listened to by a great number of attendees, some of which also participated in the question-and-answer session at the end of the presentation. This served an introduction to the project, which at the time had started only five months previously on the 1st December 2020, and although it was not a full workshop it should be considered as part of D5.9 (due by M12). As part of the 30th edition of the EUBCE, to be held in May 2022, EBIO will hold its first Workshop (D5.9), and the second workshop (D5.10) should be held before 2024.

2 Speakers corner at EUBCE 2021

Held virtually on 29th April 2021, as part of the EBIO project, Professor Siegfried Waldvogel, from the University of Mainz, presented an overview of "**EBIO – Biofuels through electrochemical transformation of intermediate bio-liquids**" in which the technology was briefly explained along with the benefits of using electrochemical transformation, and potential issues that may arise during this research project.

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

EU PROJECT PRESENTATION - Biofuels through electrochemical transformation of intermediate bio-liquids

Siegfried WALDVOGEL
University Mainz
Prof. Dr.

09:00 - 09:15 CEST on Thursday, 29 April
Add to Calendar

SPEAKER'S CORNER

Figure 2 Speaker's corner streaming preview

2.1 The Presentation Contents

The presentation proceeded as follows:

Prof. Waldvogel started by introducing EBIO as an EU project that deals with creating biofuels through the process of electrochemical transformation of intermediate bio liquids. Feedstock used during this research will include pyrolysis oils and black liquor. The potential benefits of the project are outstanding with an estimated reduction of at least 190 million tons of CO2 emissions every year, not only for the Green Deal, but for our climate. Currently we generate more than 60 million tons of biofuels per year, if we think about only pyrolysis and black liquor as feedstocks, but there could be even more than this considering other feedstock sources.

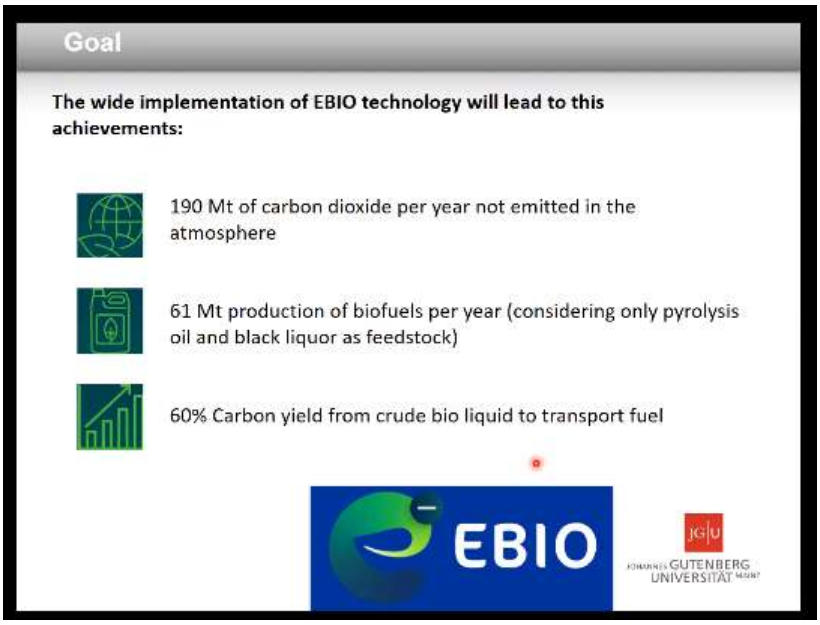

Figure 3 Prof. Waldvogel presentation – project goal

The EBIO research project started 1st December 2020, with a few complications due to the global COVID-19 pandemic. The consortium includes 9 beneficiaries from 7 different countries, among them are some of the world leaders including CONDIAS who is a world leader in diamond coatings, which is very important for electrode materials.

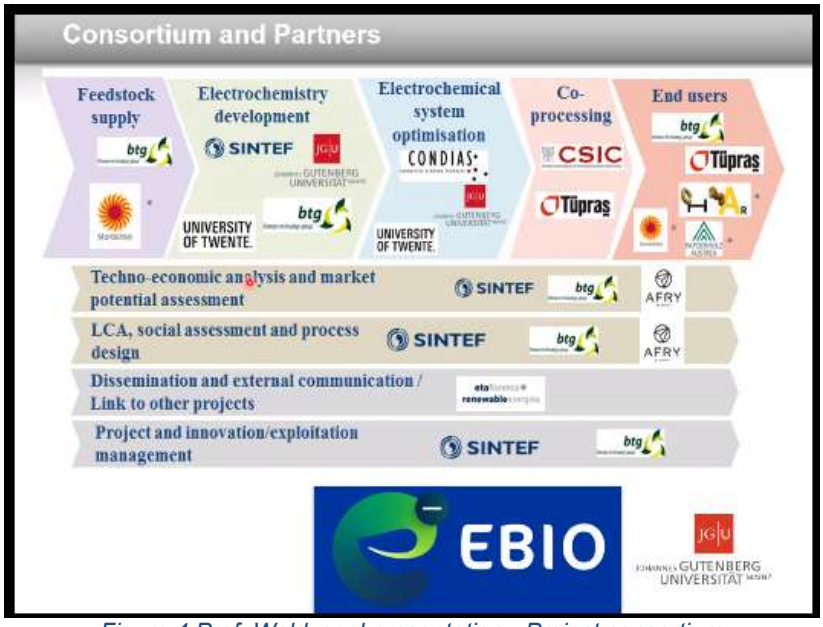

Figure 4 Prof. Waldvogel presentation - Project consortium

The consortium consists of three industry partners (CONDIAS, Tupras, AFRY), four research partners (SINTEF, JGU, UT, CSIC) and two SMEs (ETA, BTG). With the aim of working to together to disseminate useful information.

Prof. Waldvogel continued to present the benefits of electrochemistry and why it should be used. To start with it is required to find an alternative to electricity produced by coal, oil and gas, therefore renewal solutions are being explored. Up until now energy produced by biomass has not produced enough to fit the demand, especially because a lot of energy and money is required to convert synthetic fuels in the traditional method of bio-fuel production.

EBIO will be different from traditional methods as the electrochemical method does not use as much electricity and sits within the fine chemical area. This means that the downstream process will be more affordable compared to other methods.

The pros for using electrosynthesis in bio-fuel production are summarized in the slide below:

Figure 5 Prof. Waldvogel presentation - Pros of electrosynthesis

The new approach of EBIO will short-cut many steps of traditional methods and is explained by Prof. Waldvogel as a disruptive technology that will change the landscape of bio-fuel production.

The following slide the process in which the black liquor in a biorefinery is taken out to be upgraded. In the upgrading process some hydrogen is produced, that can be used as a fuel, and also hydrocarbons and alcohols are an outcome of the upgrading.

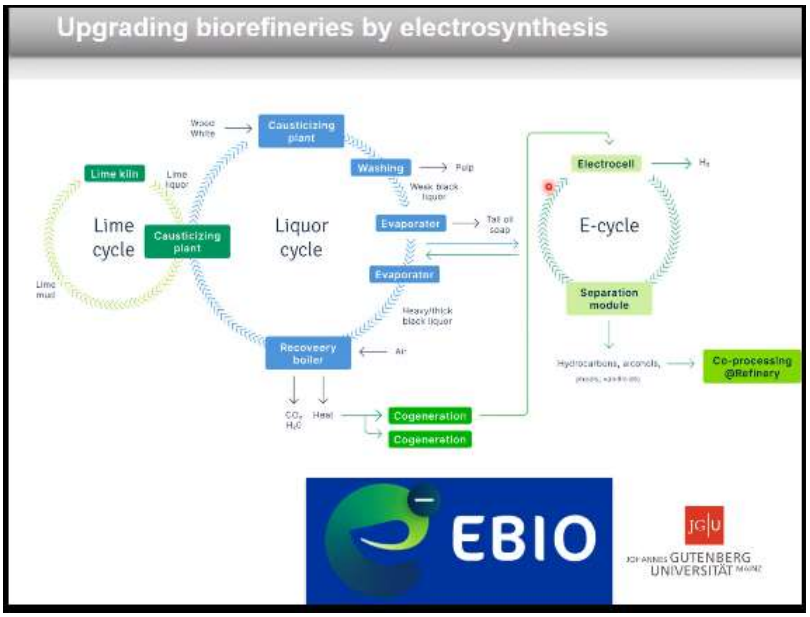

Figure 6 Prof. Waldvogel presentation - the upgrading process using electrosynthesis

The research will start will small scale Start with screening of batch cells from screening 1-4ml then slowly upscaling the process up to a flow cell 15L vessel, in order to get enough output to test an engine.

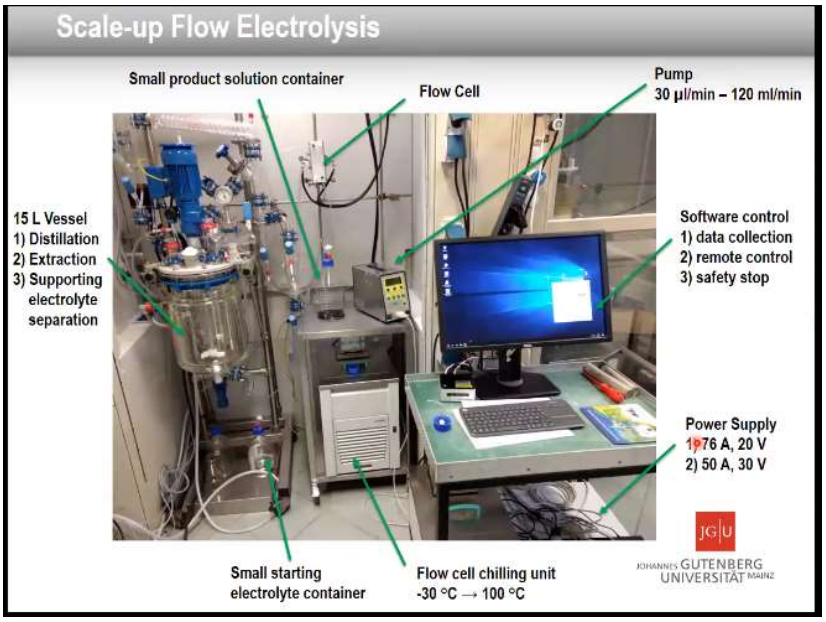

Figure 7 Prof Waldvogel presentation - up-scaled lab equipment

Q & A Session

The presentation was watched by twenty people of which several asked the following questions:

How mature is the electrosynthesis process?

It has been known for 170 years. In the 1970s, the technology was used for making hydrocarbons out of fatty acids. This is on TRL 7 or 8 already. An American company, Wolverine, that was bought by Shell, that made high performance lubricants out of this process.

Any literature available?

On the homepage of Prof. Waldvogel's lab there is a link to lots of old literature that has been rediscovered recently. It can be found here.

Have longer chain versions been considered to make jet fuel?

It has been considered. For this the kerosene version at least C10 or a little more is required. Fatty acid and medium type acid are by-products of black-liquor that is good for this, with a cross electrolysis it should be in a correct range for jet fuel.

3 Conclusion and Remarks

EBIO's first presentation served an introduction to the project, which at the time had started only five months previously on 1 December 2020, and although it was not a full workshop it should be considered as part of D5.9 (due by M12). As part of the 30th edition of the EUBCE, to be held in May 2022, EBIO will hold its first Workshop (D5.9), and the second workshop (D5.10) should be held before 2024.

EBIO's first presentation was considered as a successful event, although viewer numbers and participation were relatively low, 18 in total. This could be attributed to the fact that the project had not long started, and due to the global COVID-19 pandemic the project kick-off experienced several setbacks. The speaker was able to give an overview of the project and present the objectives of the research, but in this first presentation was unable to present any findings or results.

Going forward to the next workshop at EUBCE's 30th edition the consortium will prepare a full agenda for a presentation and Q&A session that will last between 1 – 2 hours. It is suggested that appropriate

publicity is carried out for EBIO's next workshop, and to focus the presentation at the selected audience to encourage full engagement.

At EUBCE 29th edition Professor Siegfried Waldvogel presented a project overview on behalf of EBIO. The presentation consisted of an introduction to the project goals, the project consortium, the benefits of electrochemical technology in upgrading bio-fuels, a brief overview of the process and a Q&A session. The presentation was successful, but the next workshop should aim to attract more viewers and participants, with thematic presentations to be scheduled into the full EUBCE agenda, which will include interactive sessions and presentations conducted by the project partners.