



Industrial scale demonstration biorefinery on lignin-based aviation fuel

Welcome to the fourth BIORREFLY newsletter issue.

BIOREFLY is co-funded by the European Commission under the 7th Framework Programme (Project No. FP7-612747).



The duration of the project is from January 2015 until December 2018.

In this issue we would like to present you relevant news from the partners during the third year of the project. Please do not forget to visit our website www.biorefly.eu.

About BIORREFLY

Aviation is one of the fastest growing transport sectors and this trend will continue in the coming years. According to the International Air Transport Association (IATA), global aviation is expected to grow by 5% annually in the period up to 2030. Currently, petroleum derived liquid fuels are the main energy carrier in the aviation sector. Due to different environmental and economic concerns there is a need for the sustainable supply of aviation fuels.

Bioenergy will play a key role in the EU's long-term energy strategy for all applications, especially in the transport sector. The supply of feedstock and the biofuel conversion technologies which are currently deployed already provide a significant contribution, but diversification of feedstock and advanced technologies will be necessary for further development.

The aviation industry considers aviation biofuels to be one of the primary means to reduce the carbon footprint of the industry. In this context, the BIORREFLY project will develop lignin-to-jet fuel technologies and will also produce such bio fuels.

The combined production of a high annual volume of cellulosic ethanol and lignin-based jet fuel through sustainable and innovative technologies will be the first step towards biofuel commercialisation and market deployment.

The overall goal of the BIORREFLY project is to develop technologies allowing an increased and more economical utilisation of selected renewable lignocellulosic raw materials for the production of second generation biofuel for aviation. The sustainable supply chain will be demonstrated, environmental and socio-economic impacts will be assessed and results gathered from tests in engines will be disseminated to relevant stakeholders.

For further information please contact the project coordinator or visit our website www.biorefly.eu

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Project partners



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Scale-up of the technology

The research and optimisation activities of BIOCHEMTEX continue both at the lab and pilot scale. A focus is the optimisation of the production and separation of second generation (2G) lignin (Figure 1) at demo scale. The aim is to study how to optimise the properties of the 2G lignin to make it suitable for different applications such as dehydro-deoxygenation processes, pyrolysis and gasification that convert lignin into bio fuels. One of the most important physical characteristic is the moisture content of the lignin since many technologies require dry lignin. For this reason, several kinds of drying systems are under evaluation (Figure 1). Another part of experimental activity has been dedicated to the screening of several process parameters that influence the 2G lignin conversion to phenolic oil and the characteristic of such phenolic oil.

On the pilot plant, an activity has been carried out to complete the engineering study of the process. Nevertheless additional research activity is foreseen because the possibility for further improvements always exists. Many useful experimental data are provided to continue the development of the mathematical model of the process.

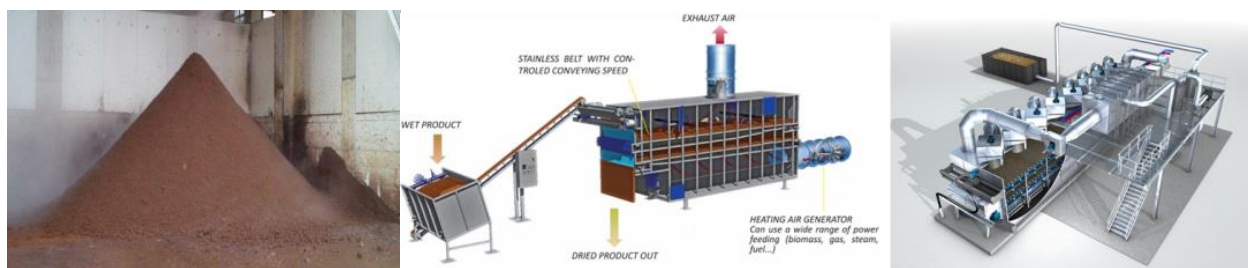


Figure 1: Production, separation and drying of the 2G lignin.

Test rigs ready for tests

RE-CORD commissioned two test rigs for the characterisation of renewable jet fuel produced in the framework of the project. Both, the atomisation test rig and the small-scale gas turbine rig (based on an APU-derived engine) were tested with conventional jet-fuel and set up for the experimental trials with renewable jet fuel. Moreover, RE-CORD recently published research work about the combustion of hydrotreated renewable jet fuel in Applied Energy Journal, investigating emission profiles and flame heat release in a combustor test rig of the University of Cardiff. The acquired knowledge about renewable aviation fuel and the results of the upcoming tests will follow the R&D lines of BIOREFLY, which aims at evaluating the fit-for-purpose properties of this bio-jet fuel and its blends in view of future ASTM D4054 certification.

Currently the atomisation rig was set up to study the spray characteristics of the selected fuel by using optical measurement systems: PIV at selected sections of interests, to evaluate cone and spray penetration; P/DPA, if deemed necessary for more detailed studies on droplets size and velocity. Conventional and renewable jet fuels are injected in an atmospheric insulated chamber, maintaining same injection conditions as aviation engines.

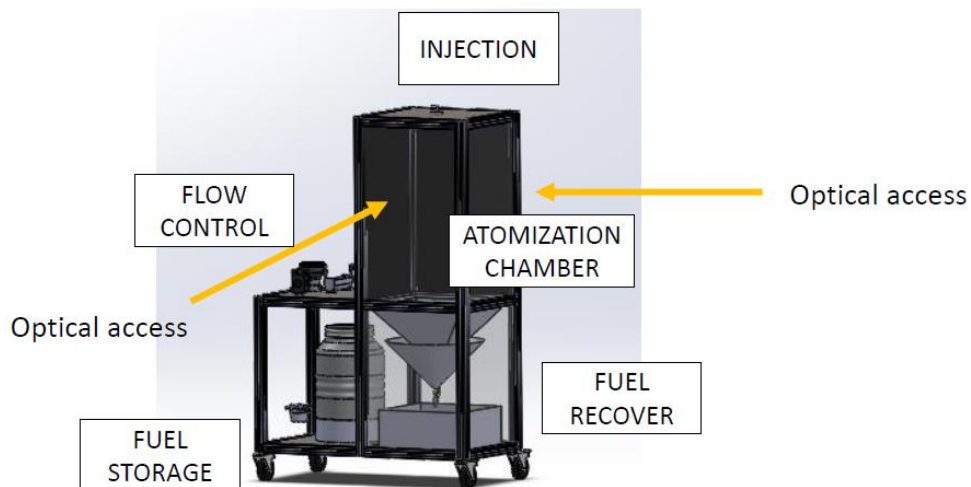


Figure 2: 3D model of the pump and nozzle test bench, used to set up the rig for optical measurement systems.

The small-scale turbine rig is based on a Garrett GTP 30-67 engine, which is a 25 kW APU-derived power unit with a single reverse flow silo combustion chamber and a pressure swirl nozzle. The upcoming tests will focus on the investigation of emission index and engine performance with varying fuel composition, power output and test duration. Test results will be useful also to characterise a blend of n-, iso- and cyclo-paraffins at different share and to assess the fuel properties towards ASTM certification.



Figure 3: Pump and nozzle test bench at RE-CORD.

ASTM committee D02

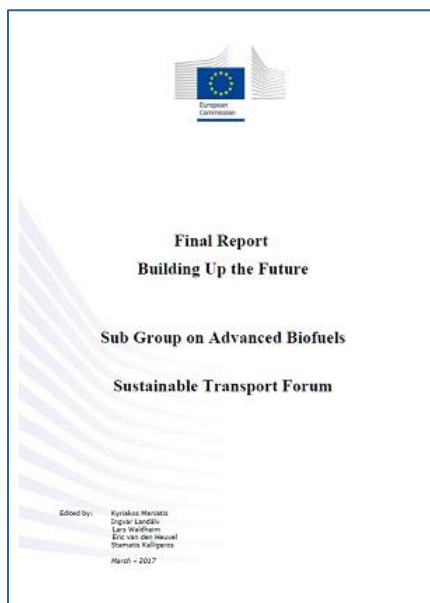
The ASTM committee D02 on Petroleum Products, Liquid Fuels and Lubricants organises twice a year a meeting for all members and subcommittees. The committee informs the latest developments, discusses changes to existing standards, and reviews any negative votes on recent ballots.

As part of BIOREFLY's activities, SkyNRG joined the most recent meeting held on 25-29 June 2017 in Boston, Massachusetts, USA, to get the latest news from the subcommittees D02.J0.D01 (Jet Fuel Specifications) and D02.J0.06 (Emerging Turbine Fuels), and to understand better the certification process of new alternative jet fuel pathways.

SkyNRG also discussed the D4054 Clearing House concept with the US Federal Aviation Administration (FAA). The Clearing House is a new platform that helps alternative jet fuel producers getting their pathway certified under D7566. The Clearing House is funded by ASCENT (Aviation Sustainability Centre of Excellence for Alternative Jet Fuels and Environment) and is managed by the University of Dayton Research Institute (UDRI). It supports fuel producer candidates by: testing the jet fuel with Tier 1 and 2 (performed in-house); writing research reports; establishing a dialogue with OEMs; and accordingly performing a test with Tier 3 and 4. Generally, the testing costs for Tier 1 and 2 are covered by the Clearing House, while any further tests need additional funds.

The next ASTM committee D02 meeting will be held in Houston, Texas, USA on 3-7 December 2017, SkyNRG will be attending the meeting.

Sub Group on Advanced Biofuels



In March 2017, the Sub Group on Advanced Biofuels (SGAB) presented its Final Report titled "Building-Up the Future". The report introduces positions, recommendations and key messages from the renewable and advanced biofuels industry, seeking to support the European Commission in the elaboration of a methodology for the development of advanced biofuels in Europe.

In this SGAB report the biofuels industry underlines its commitment to ensure the deployment of sustainable fuels for decarbonising the transport sector and to thus contribute to the EU 2030 energy and climate change targets.

For download of the SGAB report, please click [here](#).

Figure 4: Cover of the Final Report

BIOREFLY at the EUBCE 2017

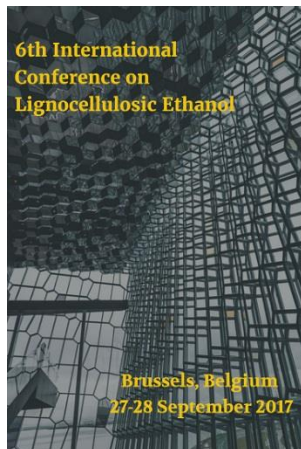


Figure 5: BIOREFLY at EUBCE 2017

The 25th European Biomass Conference & Exhibition (EUBCE 2017) took place in Stockholm, Sweden on 12 to 15 June 2017. As one of the world's leading R&D conference combined with an international exhibition, EUBCE represents the leading platform for the collection, exchange and dissemination of scientific know-how in the field of biomass.

Information on activities and results of the BIOREFLY project was disseminated to EUBCE participants via flyers, posters, and handbooks available at the exhibition stand of project partner WIP Renewable Energies. Furthermore, the annual BIOREFLY project meeting took place at EUBCE on 15 June 2017.

Events



The 6th International Conference on Lignocellulosic Ethanol (ICLE) will take place in Brussels on 27-28 September 2017. The conference is organised jointly by the European Commission and advanced biofuels industry stakeholders.

The conference is a two-day event aiming to bring together all key stakeholders of lignocellulosic ethanol and engage them into a dialogue on the state of the art of conversion technologies, market development strategies and policy in the EU. The following topics will be intensively discussed: *REDII, implementation of ILUC mandate at national level; legislation on transport decarbonisation impacting cellulosic ethanol deployment; progress and learning in cellulosic ethanol plants; needs for investment and strategies among other topics.*

BIOREFLY Communication and Dissemination

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