



# BECOOOL

Brazil-EU Cooperation for Development  
of Advanced Lignocellulosic Biofuels

## SUSTAINABLE VALUE CHAINS FOR LIGNOCELLULOSIC ADVANCED BIOFUELS

### Newsletter June 2022

## BECOOOL FINAL RESULTS PACKAGE

BECOOOL project ended last May after five consecutive years of intensive research and demonstration activities which led to significant findings on multiple aspects of lignocellulosic biomass value chain for advanced biofuels and biorefineries. Discover here the latest outputs and the final project results.

### Final Publication: Innovations in Lignocellulosic Biomass Value Chains for Advanced Biofuels

This free publication provides a summary of the main results obtained in the different research components of BECOOL and their relevance for the current context of biofuels deployment.

Topics include:

- Biomass residues potentials
- Efficient harvesting and storage of lignocellulosic biomass
- Integrated cropping systems
- Long-term plantations of perennial energy crops in marginal land
- Gasification of solid biomass and intermediate energy carriers to advanced biofuels
- Biochemical conversion and process efficiency
- Integrated sustainability assessment
- Case study of biomass logistics optimization
- International Scientific Cooperation



#### Innovations in Lignocellulosic Biomass Value Chains for Advanced Biofuels

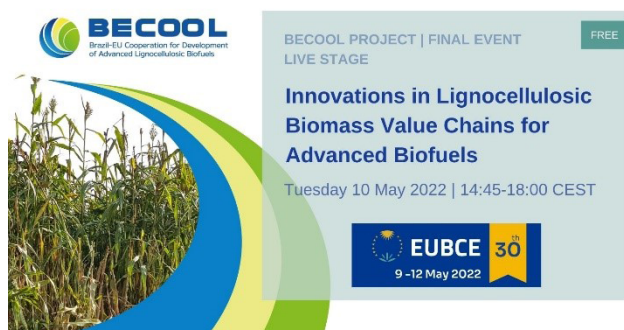


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## Final BECOOL Event at EUBCE 2022

### [Innovations in Lignocellulosic Biomass Value Chains for Advanced Biofuels](#)

This side event of the European Biomass Conference and Exhibition 2022 presented innovations and solutions for the deployment of sustainable lignocellulosic biomass value chains for advanced biofuels, resulting from the scientific cooperation between the BECOOL and the Brazilian project BioValue. Watch the partners presentations about the final results and listen to the experts panel discussion on the role and relevance of lignocellulosic biomass value chains to meet the multiple objectives of the EU Green Deal and in the current global energy context.



[Watch](#)

## Other BECOOL presentations at EUBCE 2022

### [Production Of Bio-Ethanol From Beech Wood Pellets Via Mild Acetone Organosolv Fractionation](#)

**Presenter:** Ana Lopez Contreras, Wageningen Food and Biobased Research, THE NETHERLANDS

**Co-authors:** K. Dussan, De Vrije, R. Van De Vondervoort, A. Bonouvrie, A.T. Smit.

Second generation bio-ethanol represents the most important advanced biofuel from sugar streams, but its production costs are higher than those of other fuels, and innovations are needed to improve efficiency and economics of the process. In this work, beech wood pellets were treated using the FABIOLA<sup>TM</sup> technology, an acetone-based low-temperature organosolv fractionation process. The cellulosic pulp is enzymatically hydrolysed producing a glucose-rich (C6) stream and the hemicellulose sugar solution (C5) is conditioned



for further biochemical conversion. The C6 and C5 streams obtained from beech wood were used for fermentation by the yeasts *Saccharomyces cerevisiae* and *Spathaspora passalidarum*, respectively. While the C6 stream was readily fermentable, the C5 stream required detoxification by activated carbon at different concentrations. Detoxified C5 streams showed higher fermentability and the production of bio-ethanol reached approximately 0.3 g bio-ethanol/gram xylose consumed. Fermentation experiments at 10-L scale confirmed the results obtained at laboratory scale.



[Watch](#)

### [Options for Setting up Advanced Biofuel Chains in Emilia Romagna](#)

**Presenter:** Berien Elbersen, Wageningen Environmental Research, Wageningen Environmental Research -Earth Informatics Dpt.

**Co-authors:** B. Elbersen, A. Parenti, I. Staritsky, B. Annevelink, W. Zegada-Lizarazu, K. Oehmichen, B. Gabrielle, S. Njakou-Djomo, D. Chiaramonti, A. Monti.



This study investigated the extent to which a thermochemical biofuel production plant can be sourced entirely from biomass produced in the Emilia Romagna region that complies with the Low ILUC risk definition in the REDII.



[Watch](#)

### [Experiences from Pilot Scale FT Production from Gasification](#)

**Presenter:** BEREND VREUGDENHIL, TNO, Bio Energy & Efficiency Dpt., THE NETHERLANDS

**Co-authors:** B. Vreugdenhil, E. Boymans



Connecting FT with biomass gasification is like trying to have lions as house-pets. The two are not a good match, because FT is developed based on an abundance of coal/gas, resulting in plants that have an economy of scale. Most studies to date show that developing large scale

biomass gasification plants is limited. Connecting these smaller scale technologies to traditional large-scale developments does not make sense. The BECOOL project demonstrated that biomass gasification can be connected to FT synthesis,

however that a different approach is needed to make the fit work.



[Watch](#)

### [Comprehensive LCA of Advanced Lignocellulosic Biofuels](#)

**Presenter:** KATJA OEHMICHEN DBFZ-German Biomass Research Centre, Bioenergy Systems Dpt.  
**Co-authors:** K. Oehmichen, S. Majer, N. Dögnitz, D. Thrän



The BECOOL project aims to develop innovative and sustainable value chains for producing advanced biofuels based on lignocellulosic biomass, integrating the different key research activities of the project into a consistent framework. Based on the

research in BECOOL various potential combinations do exist to form numerous value chain alterations. An integrated sustainability assessment helps to flag opportunities and risks to be addressed by a further optimization of the value chains. At the EUBCE 2022 the results of the comprehensive life cycle assessments of the value chains considered were be presented.



[Watch](#)

### [Advanced Bioethanol Potential of a New Value Chain Based on Innovative Food/energy Cropping System](#)

**Presenter:** Walter Zegada-Lizarazu University of Bologna, Agricultural Science Dpt, ITALY



Maize stover and wheat straw are largely available at EU level. Moreover, dedicated energy crops such as biomass sorghum, industrial hemp and sunn hemp, can add biomass without competing with food crops. This study describes a bioethanol production chain

from crop planting to ethanol barrel via biochemical conversion. In addition, three food and energy cultivation scenarios were built to highlight the potential reduction dependency from fossil fuel of advanced biofuels.



[Read the poster](#)

## BECool deliverables list – Discover all the results in details

- D1.1 [Set up of assessment tools and literature review](#)
- D1.2 [Available agricultural/forest residues and process residues of common interest for EU and Brazil](#)
- D1.3 [Definition of best harvesting logistics for agricultural residues, and for specialist annual and perennial lignocellulosic crops](#)
- D1.4 [Increase of Lignocellulosci Feedstock from Integrated Cropping Systems](#)
- D1.6 [Available agricultural/forest residues and process residues of common interest for EU and Brazil](#)
- D1.7 [Best harvesting logistics for agricultural residues, and for specialist annual and perennial lignocellulosic crops](#)
- D2.1 [Description of Full Biomass Supply Chains](#)
- D2.2 [Tools \(bewhere, locagistics and bioloco\) adapted to be tested in the selected case studies](#)
- D2.3 [Assessment of usability of EU-logistical tools in brazilian situation](#)
- D2.4 [Logistical Concepts for Feedstock Handling](#)
- D2.5 [User manuals for the stand alone tools to be used in further chain design and evaluation](#)
- D3.1.4 [Overall report on gasification experiments and results](#)
- D3.4 [Norms and standards for advanced biofuels](#)
- D3.5 [Gasification of solid fuels/slurry for production of advanced biofuels](#)
- D3.7 [Report on the gasification of liquid intermediates to syngas](#)
- D 3.9 [Gasification of solid fuels for production of advanced biofuels: update](#)
- D 3.13 [Report on the regulatory framework for advanced biofuel](#)
- D 5.1 [Harmonised data and methodological approaches](#)
- D5.2 [Market framework description for liquid biofuels in road transportation and aviation](#)
- D5.3 [Description of plausible value chains](#)
- D5.4 [Impact and strategy for liquid biofuels in road transportation and aviation](#)

## BECOOOL Publications

[Advanced Bioethanol Potential of a New Value Chain Based on Innovative Food/Energy Cropping System](#)

(Walter Zegada Lizarazu, Andrea Parenti, Andrea Monti)

[Agricultural/forest residues for advanced biofuels. Final results from the BECOOL project](#)

(Myrsini Christou, Paloma Perez, Carlos Martin, Pilar Ciria, João Carvalho, Thayse Hernandes)

[Spatio-temporal assessment of integrating intermittent electricity in the EU and Western Balkans power sector under ambitious CO2 emission policies](#)

(Mesfun, S., Leduc, S., Patrizio, P., Wetterlund, E., Mendoza-Poncea, A., Lammensc, T., Staritsky, I., Elbersen, B., Lundgren, J., Kraxner, F.)

[Biomass Production and Feedstock Diversification for Advanced Biofuels: the BECOOL Project](#)

(Christou, M., Alexopoulou, E., Monti, A., Zegada-Lizarazu, W., Parenti, A., Carrasco, J., Ciria, C.S., Pari, L., Suardi, A.)

[Perennial Grasses as feedstock for Bioenergy and Bio-Products](#)

(Alexopoulou, E., Christou, M., Zegada-Lizarazu, W., Monti, A., Parenti, A., Carrasco, J., Ciria, C.S.)

[Evaluation of Sunn Hemp Productivity after Wheat under No Tillage Conditions](#)

(Parenti, A., Zegada-Lizarazu, W., Monti, A.)

[Sunn Hemp, a Promising Leguminous Energy Crop as Inter-Cropping System: Preliminary Results for Spain](#)

(Sastre, C.M., Royano, L., Ciria, C.S., Parralejo, A.I., González, J., Ciria, P., Carrasco, J.)

[Sowing Dates Effect on Camelina Growth in Different EU Climatic Zones](#)

(Christou, M., Alexopoulou, E., Zanetti, F., Krzyżaniak, M., Stolarski, M.J., Righini, D., Monti, A.)

[Maize Cob Harvesting: first assessment of an innovative system](#)

(Pari, L., Bergonzoli, S., Suardi, A., Alfano, V., Scarfone, A., Lazar, S.)

[Intercropping Dedicated Grass and Legume Crops for Advanced Biofuel Production](#)

(A.Parenti, W. Zegada-Lizarazu, A. Monti)

[Building Value Chains for Large Scale Ft Production](#)

(B.J. Vreugdenhil, E.H. Boymans, P.M.R. Abelha, M. Buffi, D. Chiamonti)

[Sustainable Biomass Feedstock Options for Advanced Biofuels](#)

(M. Christou, E. Alexopoulou, A. Monti, W. Zegada-Lizarazu, A. Parenti, J. Carrasco, C.M. Sastre)

[Comparable studies on four annual herbaceous lignocellulosic crops as feedstock for advanced biofuels](#)

(E. Alexopoulou, W.Zegada-Lizarazu, M.Christou, A.Monti)

[Innovative Lignocellulosic Crop Rotation Systems as a Source of Feedstock for Biofuels Production](#)

(W. Zegada-Lizarazu, A. Parenti, C. Martin-Sastre, J. Carrasco, M. Cristou, E. Alexopoulou, A. Monti)

[Fractional Condensation of Slow Oxidative and Intermediate Pyrolysis Vapors from Lignocellulosic Biomass: Pilot Unit Design and Testing](#)

(M. Buffi, S. Dell'Orco, A. M. Rizzo, D. Chiamonti)

[Investigation of Slurries Made of Char-In-Pyrolysis Oil in Terms of Formulations, Stability, and Rheological Properties](#)

(Buffi, M.)

[A Value Chain for Large Scale FT Production: the Case of Pyrolysis Oil-char Slurry Gasification](#)

(Boymans, E., Vreugdenhil, B., Abelha, P., Buffi, M., Chiamonti, D.)





## Partners



ALMA MATER STUDIORUM  
UNIVERSITA DI BOLOGNA  
COORDINATOR



[becoolproject.eu](http://becoolproject.eu)



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