



Waste biorefinery technologies for accelerating sustainable energy processes

WIRE COST Action's 3rd Workshop, Thessaloniki 29-30th March 2023

BIOFLEXPOR Technology towards 2G Bioethanol Biorefineries

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Abstract:

By 2030, decarbonizing the transport sector will become mandatory requiring the introduction of advanced biofuels into the market, with minimum targets of 1% in 2025 and 3.5% in 2030 in accordance with the RED II Directive. To avoid future biofuels imports, it is essential that an industrial cluster emerges in Portugal with the capacity to produce advanced biofuels, such as 2G Bioethanol.

In this context, the team from Bioenergy and Biorefineries Unit (UBB) of LNEG (*Laboratório Nacional de Energia e Geologia*) has been actively working on the development of an innovative and fully integrated technological strategy to produce advanced bioethanol using agricultural and forestry residual biomass as sustainable feedstock. The target is the demonstration, at relevant environment, all stages of the production technology, enabling the direct obtention of a biofuel that complies with EN standards, allowing its immediate blending with other fuels, such as gasoline. The prototype is based on a proprietary non-catalyzed steam explosion technology, i.e., without the addition of acids and using only high-pressure steam, called FLEXBIO™, initially developed by the company Stex and since 2019 in partnership with LNEG. The LNEG team has also been conducting R&D aiming at the development of new yeasts and enzymes that enhance the conversion of both cellulosic and hemicellulosic fractions of biomass. All technology will be environmentally sustainable, in terms of GHG emissions and waste production, promoting the circular bioeconomy. This innovative technology for a 2G bioethanol biorefinery, enabling to obtain a biofuel with high energy quality and sustainable origin from different types of biomasses, has been demonstrated in a relevant environment (TRL 5) in a prototype simulating (at scale 1:15) the commercial installation, under the BIOFLEXPOR project. The consortium is led by the company Prio Bio, S.A., the largest producer of biofuels in Portugal, and includes, in addition to LNEG, I.P., teams from CBE (Centro de Biomassa para a Energia) and Florecha – Forest Solutions, S.A. (*Forest Solutions*).

The technology - under optimization but already demonstrated for the conversion of corn stover, olive tree pruning and eucalyptus-based forest residual biomass, yielding close to 150 L Ethanol /ton biomass (oven-dried weight) - will respond to a lack of economically viable technical solutions for small-scale biorefineries that process 200-700 tons/day of biomass, corresponding to a nominal bioethanol production capacity of 10,000-30,000 ton/year. It may therefore be close to a commercial application, which will be of strategic importance for the BIOFLEXPOR consortium, and for the LNEG team.

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