



Laboratório Nacional de Energia e Geologia

## Research Areas

Biofuels

Biomass for Industry

Biorefineries

Sustainability for Bioenergy

## Contacts

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Project Co-Funded by:



AMBIENTE E  
AÇÃO CLIMÁTICA

## BIO4PORTUGAL

Demonstration of the technological concept of the techno-economic and environmental viability of a Biorefinery for advanced biofuels exclusively from forest residues



## Motivation

The forest occupies about 35% of the territory of mainland Portugal, providing raw material for various industrial activities, including the production of pulp and paper, contributing to 2% of the national GDP. Thus, it will be crucial to ensure the sustainability of this sector, with the creation of new value chains based on the valorization of forest residues in a context of advanced biorefineries, within the scope of the bioeconomy and circular economy.

In this context, BIO4PORTUGAL project aims to demonstrate the technological concept of ethanol production, as advanced liquid biofuel, from Eucalyptus-based forest/industrial residues.

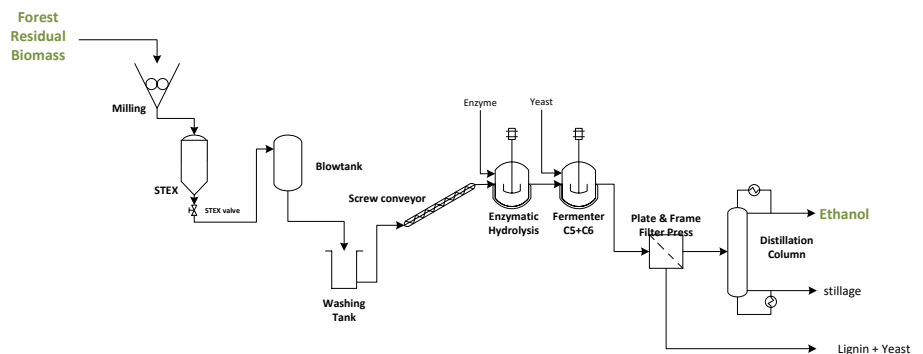
## Objectives

- First complete and integrated Demonstration Unit (TRL 5-6) of advanced liquid biofuels production technology in Portugal

Demonstration Unit of LNEG integrating advanced technology for deconstruction of forest biomass by steam explosion (STEX®) at pilot scale, with the capacity to process 330 ton forest residues/year producing 47,500 liters of bioethanol per year; using an industrially robust yeast, developed by LNEG, capable of efficiently fermenting C5 and C6 sugars in a relevant environment

- Demonstration of the technological concept of exclusive use of Forest Residual Biomass (FRB, based on Eucalyptus) for the sustainable production of advanced biofuels - bioethanol - based on biochemical platform

Demonstration of proprietary technology by applying different alternative configurations – e.g. SSCF with Pre-Hydrolysis/Liquefaction



The proposed technological solution, optimal in terms of cost-effectiveness, should reach the following KPIs (*Key Performance Indicators*):

- Minimum yield of 240 liters bioethanol/ton FRB (oven dried-basis)
- GHG reduction greater than 85%, compared to the use of gasoline
- Economic feasibility with CAPEX<sup>1</sup>/EBITDA<sup>2</sup> maximum 3.5

<sup>1</sup>CAPEX -Capital Expenditure; <sup>2</sup>EBITDA-Earnings Before Interest, Taxes, Depreciation and Amortization

## Partnership

Consortium of three Promoters -  
**LNEG**, **RAIZ** (R&D centre of *The Navigator Company*) and  
**PETROGAL**



## Project Duration

March 2021 - August 2022

## Workplan

Task	Activity Designation	Promoters
1	Forest residues supply plan for the future Production Unit	RAIZ
2	Design and acquisition of instruments and components for the Demonstration Unit	LNEG, RAIZ
3	Commissioning and operation of the Demonstration Unit	RAIZ, LNEG, PETROGAL
4	Development of a robust yeast for the technological process	LNEG
5	Compliance studies with EN 15376 of 2014 for bioethanol produced in the Demonstration Unit	PETROGAL
6	Economic Evaluation, Life Cycle Analysis and Environmental Sustainability Assessment	LNEG, PETROGAL, RAIZ
7	Coordination, Dissemination and Communication	LNEG, RAIZ, PETROGAL