

# WHAT IS FLEXBY?

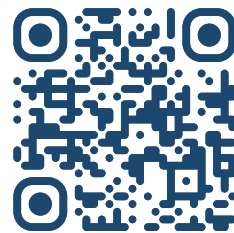
**FLEXBY** is a cutting-edge EU-funded research project dedicated to developing innovative and sustainable biofuel technologies. The project focuses on transforming biogenic residues—such as microalgae cultivated in domestic wastewater and oily industrial sludge—into high-quality biofuels.

What sets **FLEXBY** apart is its **flexible and adaptable process**, capable of producing biofuels tailored to the specific requirements of various **heavy-duty transport sectors**, including **aviation, maritime, and road freight transport**. By leveraging advanced **microwave pyrolysis and hydrogen-free hydrodeoxygenation**, FLEXBY enhances energy efficiency while reducing the environmental footprint of biofuel production.

Through this pioneering approach, FLEXBY aims to contribute to the **decarbonisation of heavy transport**, promote the **circular economy**, and offer a viable alternative to fossil fuels, supporting Europe's transition to a more sustainable and energy-secure future.

## “TRANSFORMING WASTE INTO SUSTAINABLE BIOFUELS FOR HEAVY-DUTY TRANSPORT”

### PARTNERS

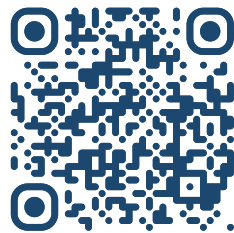


[www.flexby.eu/](http://www.flexby.eu/)

Flexby HorizonEU Project

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CORDIS



ZENODO



*Flexible and advanced biofuel technology through an innovative microwave pyrolysis & hydrogen-free hydrodeoxygenation process*

**Programme:**

HORIZON.2.5 - Climate, Energy and Mobility

**Topic:**

HORIZON-CL5-2023-D3-02-07  
Development of next generation advanced biofuel technologies

**Grant Number:**

101144144

**Project starting date:**

1 May 2024

**Project end date:**

30 April 2028

**Project duration:**

48 months

**Grant amount:**

3,993,682.50



Funded by  
the European Union

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# CORE OBJECTIVES

## Optimised Feedstock Selection

Identify the best oily sludge and microalgae cultivation methods to ensure high-quality biofuel production.

## Low-Carbon, Cost-Efficient Processes

Minimise CO<sub>2</sub> emissions and enhance cost efficiency through optimised system design.

## Technology Validation

Conduct lab-scale experiments to test and validate FLEXBY's innovative biofuel technologies before scaling up.

## Circular & Net-Zero Approach

Maximise resource efficiency by reusing byproducts, integrating renewable energy, and enhancing synergies with renewable hydrogen.

## Process Optimisation & Risk Management

Develop an MDO strategy and HAZOP assessment to improve cost-effectiveness and CO<sub>2</sub> reduction.

## Prototype Development

Design and integrate FLEXBY technologies into a TRL5 prototype at the University of Seville.

## Industrial Validation

Optimise system performance to ensure biofuels meet industrial standards, including electricity generation for transport.

## Sustainability Assessment

Perform Life Cycle Assessments (LCAs) to evaluate environmental, economic, and technical impacts.

## Stakeholder Engagement

Promote results among industry and policymakers, fostering business models and market uptake.

# KEY INNOVATIONS

## Microwave-Assisted Pyrolysis

A high-efficiency process that rapidly converts biomass into solid, liquid, and gas fractions.

## Hydrogen-Free Hydrodeoxygenation (HDO)

Upgrades bio-liquids into jet, diesel, and marine biofuels without high-pressure hydrogen.

## Bio-Hydrogen Production

Converts pyrolysis gas into clean hydrogen for fuel cells using advanced catalytic processes.

## Bio-Char Utilisation

Enhances soil carbon sequestration and serves as activated carbon for catalytic applications.

## Circular Economy & Low-Carbon Emissions

Recycles biomass residues, integrates renewables, and converts CO<sub>2</sub> into syngas.

## Multidisciplinary Design Optimisation (MDO)

A data-driven approach to maximise biofuel yield and minimise emissions.

## Digitalisation & AI

Uses AI-powered data processing for process efficiency and near-zero emissions.

## TRL5 Prototype Development

Integrates FLEXBY technologies into a scalable TRL5 prototype.

## Comprehensive Sustainability Assessment

Ensures carbon negativity through detailed LCAs.