Main technical objective to be achieved by the consortium in this project is the full-scale demonstration of the most promising EoL methods for biocomposite waste

This project has received funding from the European Union's Horizon 2020 research and innovation programme for the Clean Sky Joint Technology Initiative under grant agreement No 886416.

Consortium

AIMPLAS
PLASTICS TECHNOLOGY CENTRE

València Parc Tecnològic Calle Gustave Eiffel, 4
46980 Paterna Valencia, ESPAÑA
https://www.aimplas.net

TNO innovation for life

Anna Van Buerenplein, 1 Den Haag 2595 DA,
Netherlands
https://www.tno.nl/en/

End of Life for biomaterials

ELIOT

The Problem

High performance composites (FRP: bre-reinforced polymers) are a key technology to ligh-weight design in aviation industry to lower the fuel consumption and with it, the emissions of aviation. Aircraft manufacturers are developing new biomaterials able to match the same light-ness and mechanical properties of current FRP. The new biocomposites use natural fibres (fax, hemp, kenaf, etc.) as reinforcement instead of glass and carbon fibres, and thermosetting resins based on renewable resources (e.g., biobased epoxy). However, sustainable management solu-tions for FRP and biocomposite waste are still far from being a reality, as they have shortcom-ings like heterogeneity, contamination, and thermosetting nature.

The Need

There is an urgent need to develop, test and evaluate different EoL treatment technolo-gies for biocomposites in order to provide innovative and cost-effective solutions that allow these materials to enter the aircraft sector (and others) with full guarantees of life-cycle sustainability.

The Solution

ELIOT project will propose and develop inno-vative solutions for the EoL of the new gener-ation of biocomposites by:

01 Reviewing the current treatment technologies for conventional FRP composite waste

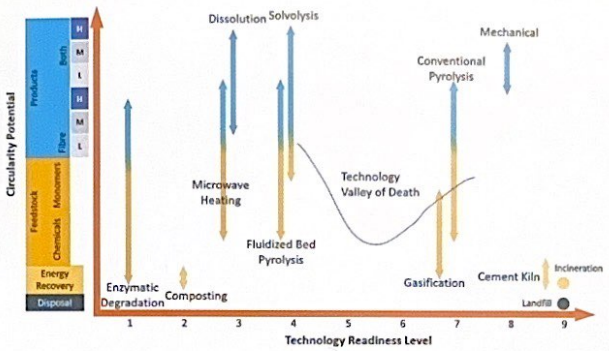
02 Evaluating their potential suitability to be applied to the biocomposite waste and selecting those treatment alternatives that appear as the most feasible

03 Tailoring the selected treatment technologies to the characteristics of biocomposites and testing them at laboratory scale

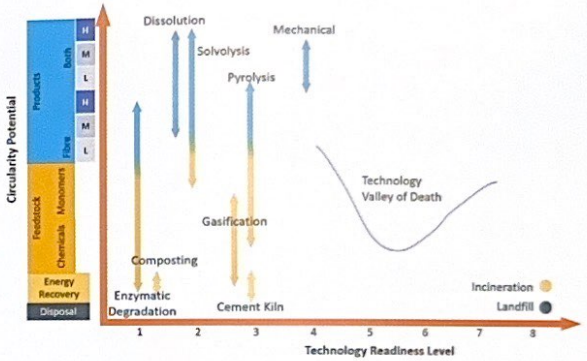
04 Demonstrating their technical feasibility and life-cycle sustainability under pre-industrial scale.

Results

Composites



Biocomposites



Incineration and landfill out from the MCDA analysis as these are waste management options but not recycling technologies

10 end-of-life recycling technologies were assessed for 2 types of composites (basalt fibre and flax fibre combined with a bioepoxy resin.

A comparison of the advantages and disadvantages of each EoL methods have been conducted following a MCDA analysis.

Technology Desirability Matrix

4 technologies ranked better on circularity potential analysis and technology desirability matrix: Dissolution, Solvolysis, Pyrolysis and Mechanical recycling.

These four recycling technologies were selected for further investigation and technology development:

Laboratory testing of 3 biocomposites

- Flax _ber with bioepoxy matrix
- Basalt _ber with PFA matrix
- Carbon _ber with bioepoxy matrix