

# FACT SHEET

## EOLIAN

**Bio-based, repairable and recyclable vitrimer composites and advanced sensors for highly reliable and sustainable wind blades**

*Project coordinator:* Proplast (Italy)

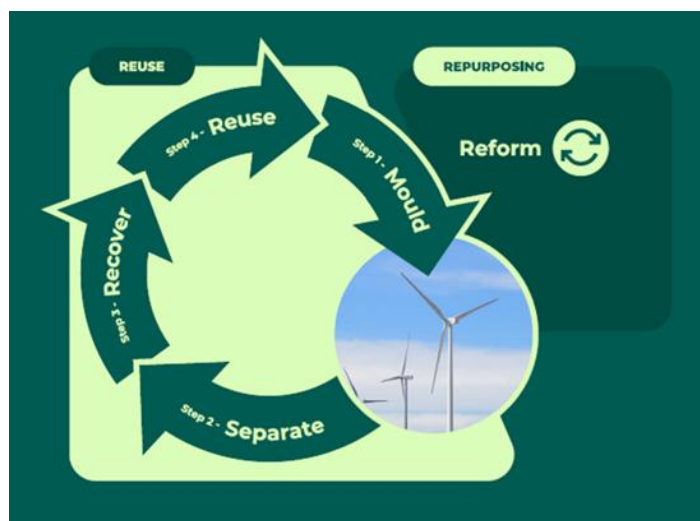
*Partners:* AEP Polymers (Italy), Brunel University London/Brunel Composites Centre (UK), Entelea (UK), EuCIA (Belgium), IRES (Belgium), Norvento (Spain), Politecnico di Milano (Italy), Tekniker (Spain), Zorlu Enerji (Türkiye).

*Duration:* 1 June 2024- 30 November 2027

*Budget:* €3,653,176.25 (EU contribution €3,653,176.25)

*Description:* The EOLIAN project is developing an innovative smart wind turbine blade manufactured from repairable and recyclable composite materials, with an integrated structural health monitoring system that will detect damage before it becomes a major issue.

EOLIAN blades will use vitrimers, a new class of polymer that enables recyclable composite materials. Vitrimers also exhibit 'self-healing' properties, which will make it easier to repair minor blade damage. The project is exploring the use of novel bio-based vitrimers, combined with natural basalt fibre reinforcements to manufacture highly sustainable composites.



Vitrimer composite reuse and recycling options.

Recyclable sensors and a heating system will be integrated into the EOLIAN blade. The sensors will allow structural health monitoring of the blade and enable the detection and fast repair of damage, while the heater can be activated to prevent issues caused by the build-up of ice on the blades. These innovations will contribute to extending the blade's lifespan and ensuring its structural integrity, safety and reliable performance, leading to reduced operation and maintenance costs.

EOLIAN will demonstrate these technologies by manufacturing a sensor-assisted vitrimer composite blade of 14 m in length. All the design phases will be supported by an advanced multiscale modelling to ensure the highest performance level, and by LCA-based environmental analysis to guarantee the most sustainable approach.

#### *Expected outcomes*

The EOLIAN blade will offer longer a lifespan, better maintainability and reliability, together with higher sustainability and recyclability:

- 20% longer lifespan than current blades
- 20% faster to repair
- 75% reduction in ice accretion
- 40% reduction in blade recycling cost
- 15% lower wind turbine life cycle costs

#### *Project coordinator*

Marco Monti  
[marco.monti@proplast.it](mailto:marco.monti@proplast.it)

#### *Communication & dissemination contact*

Amanda Jacob  
[amanda.jacob@eucia.eu](mailto:amanda.jacob@eucia.eu)

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