



WIND INNOVATION
CLUSTER HUB

EOLIAN PROJECT



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NORVENTO



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CLUSTER HUB

Key strengths

45+

Years of experience

360°

Renewable value chain

TECH

Proprietary technology

ENGINEERING

In-house & industrial capabilities



As of today, Norvento is structured in two main divisions:

norvento enerxía

Energy generation

Generating renewable energy since 1992.

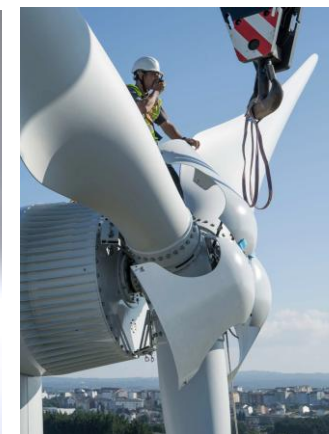


norvento TECHnPower

Technology & Services

Proprietary technology & in-house engineering.

Services across the entire project lifecycle.

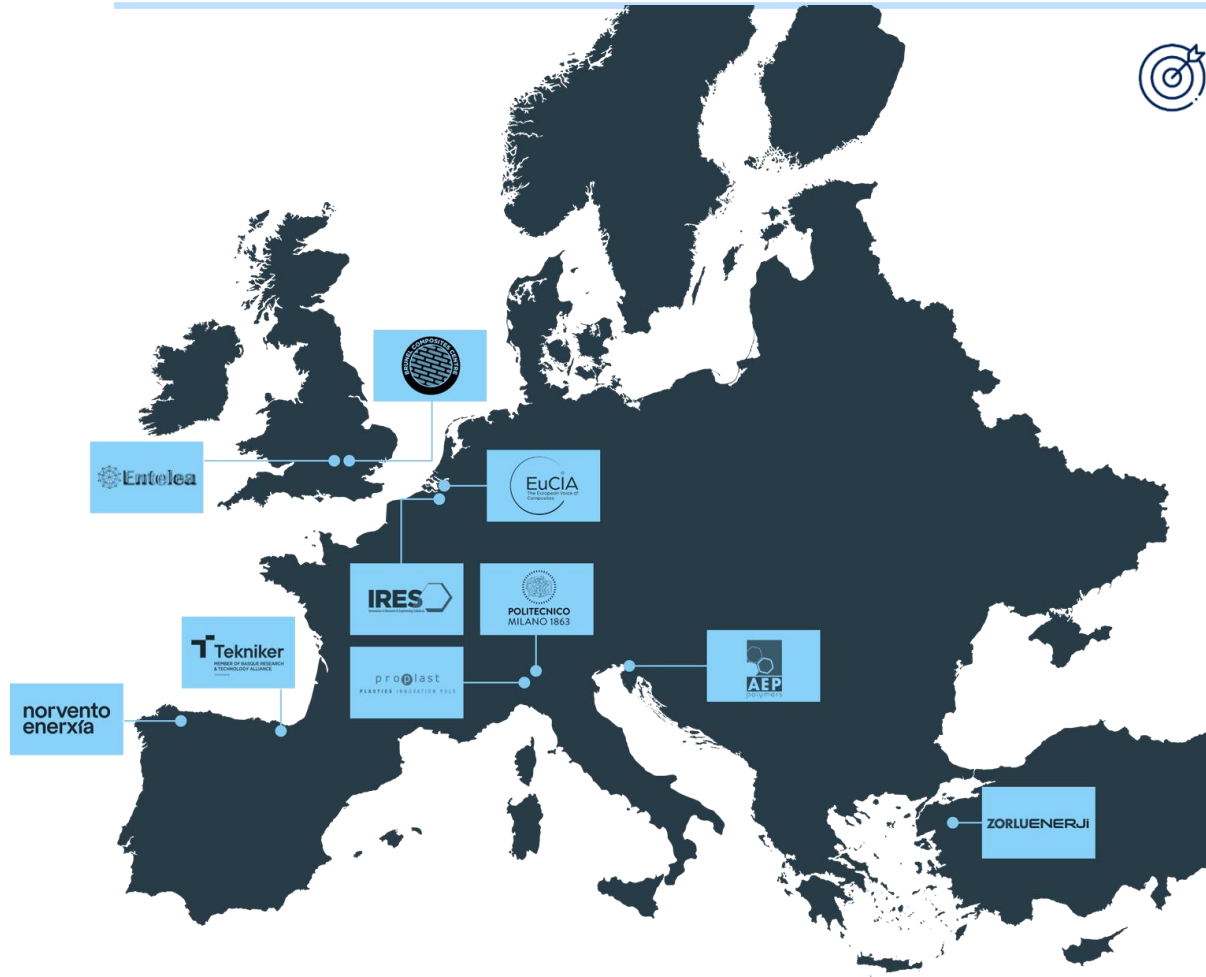


ASSETS >369 M€

OWN FUNDS >214 M€

ENGINEERS & TECHNICIANS >250

CONTEXT OF THE PROJECT



10 Partners

5 Countries

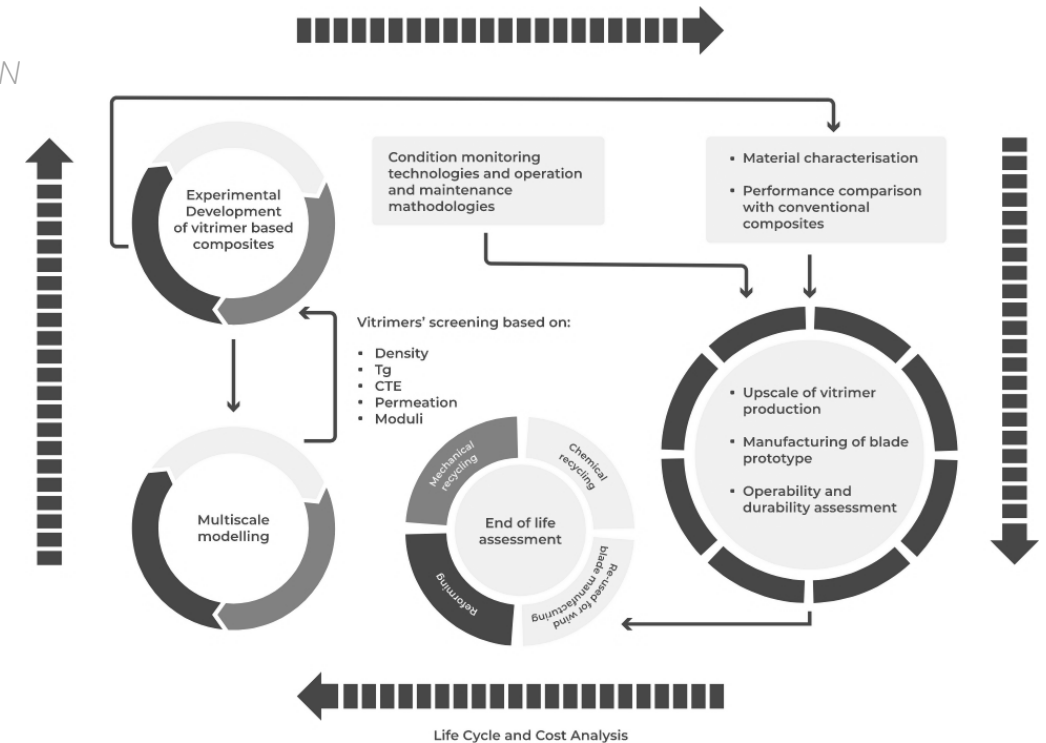
42 Months

€3.6 m Funding

 **EOLIAN general goal:**

-  Sustainable recyclable wind turbine blade.
-  Manufactured from an infinitely circular platform chemistry.
-  In-mould electronics: recyclable sensors and heating actuators.

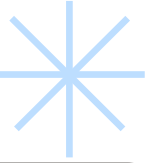
EOLIAN plan



RESULTS SO FAR AND STATUS



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Accommodate vitrimer composite to wind industry requirements:



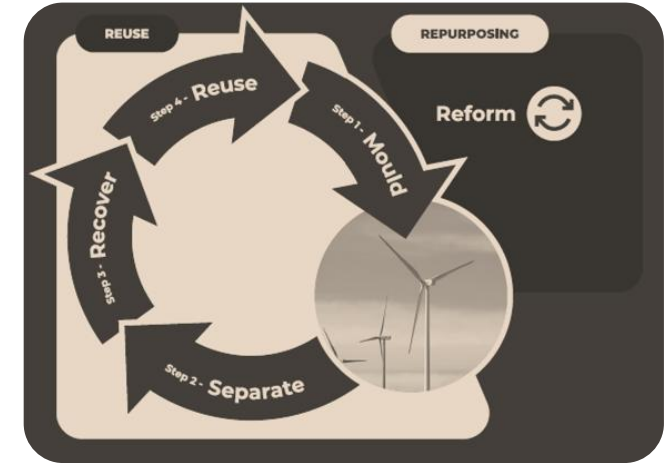
Vitrimer composite chemistry:

- High biobased content at high scale.
- Competitive price.
- Mechanical properties.
- Reshaping and repair capabilities.
- Composite durability (20–25 years in service).
- Modelling approach.



Blade manufacturing:

- Resin workability (viscosity, T_g, pot life, ...).
- Maximum mould temperature.
- Compatibility of materials. (sensors/actuators and resins).
- Impregnation of natural fibres.

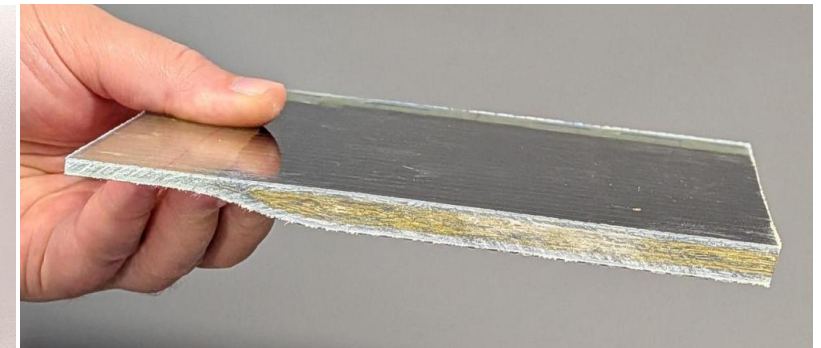


Circular recycling and re-use enabled through EOLIAN

Status of the project:

Finalists selection: two vitrimer resins. On-going: infusion tests, properties tests, resin scale-up.

Production of the mould blade demonstrator completed, with manufacturing of the blade set to follow.



Manufacturing process of a hybrid laminate with vitrimer resin (VSB prepegs) (Norvento)

THE EOLIAN BLADE

Norvento's general goal within EOLIAN project?

🎯 Design and manufacture a recyclable wind turbine blade.

Validation from two perspectives:



Design validation.



Manufacturing validation.



Norvento wind turbine blades manufacturing facilities

How?

Through a technical comparison regarding the overall performance of:

Traditional blade:

- Epoxy resin-based composite.
- Glass fibres.

Recyclable blade:

- Biobased and vitrimer-based composite.
- Natural (basalt) fibres.

Both of them with same external / aerodynamic geometry

THE EOLIAN IMPACT

Competitive advantage:



Sustainability:

- The **main issues** to overcome through EOLIAN project (aligned too with Norvento vision):
 - Non-repairable blades.
 - Lack of repurposing.
 - Zero circular recycling.
- Conscious use of resources and push circular economy: produce/reuse/recycle traditional materials and look for alternative ones.
- EOLIAN project **study and validate sustainable and viable solutions** that will need to be implemented in the near future.



An innovative and distinctive product:

- Market driven: Norvento considers the **EOLIAN blade a potential product for wind turbine sector, and for its costumers.**
- Norvento works with small – mid size wind turbines, where it is **committed to the quality and innovation in its products** to differentiate itself from its competitors.
- The **EOLIAN blade** will allow the market, and particularly Norvento, to be at the **forefront of the latest developments and distinguish itself** and stand out among other companies in the sector.



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THANK YOU

Any question?

