



PRESS RELEASE

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REFRESH project targets solutions for improved recycling of composite wind turbine blades

The European Union has set ambitious growth targets for wind energy, and in addition to this challenge the wind industry must answer demands for greater sustainability and circularity. The EU-funded REFRESH project aims to develop solutions for recycling the composite materials used to manufacture wind turbine blades and enable the sustainable management of the growing number of end-of-life blades resulting from turbine dismantling or reblading.



Image @ Jason Bickley.

REFRESH (*Smart dismantling, sorting and REcycling of glass Fibre Reinforced composite from wind power Sector through Holistic approach*) aims to develop and demonstrate a novel circular, smart system enabling improved recycling of glass fibre reinforced composite materials derived from turbine blades.

The project team comprises 11 partners active in each step of the circular value chain: project coordinator RINA Consulting SpA (Italy), ACCIONA Construcción SA (Spain), CETMA (Italy), CIRCE (Spain), European Composites Industry Association (Belgium), Enecolab Srl (Italy), GEES Recycling (Italy), Gjenkraft AS (Norway), MTB Manufacturing (France), STD Environnement (France), and TECNALIA (Spain). This network provides access to stakeholders in the composites sector, manufacturers and waste valorisation companies focused on dismantling and remanufacturing, as well as engineering, consulting and research and technology organisations to help guide the redesign of products and processes for enhanced circularity.

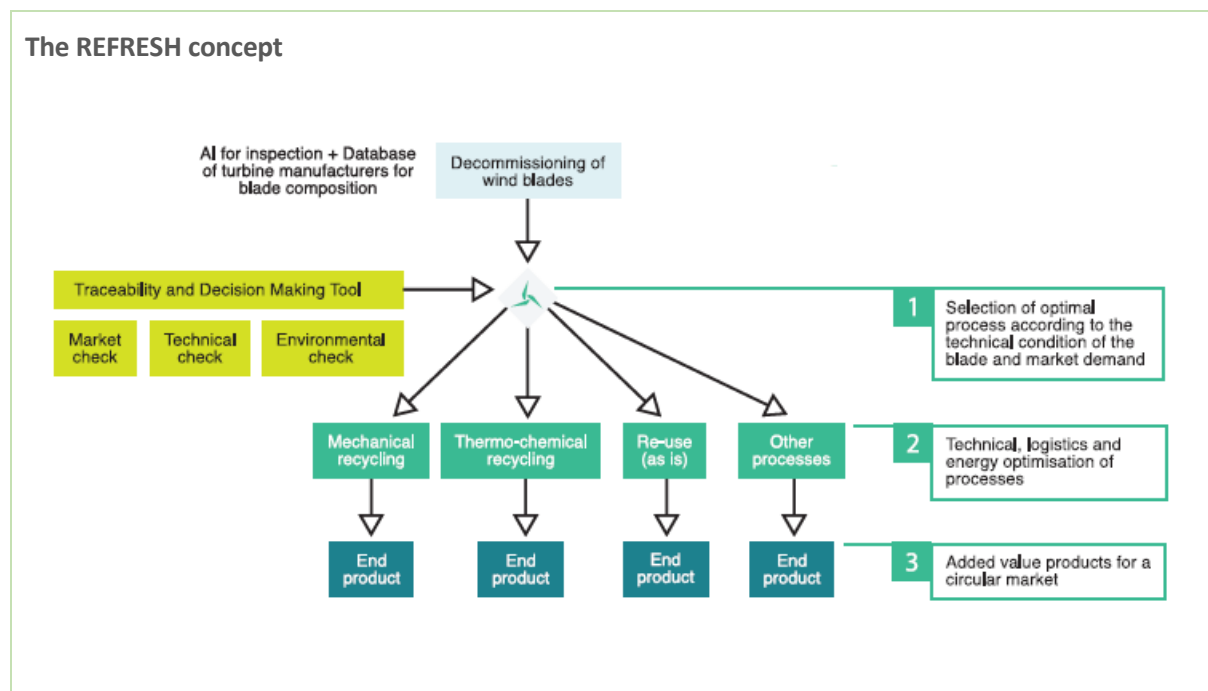
The REFRESH concept

The wind energy industry is committed to promoting a circular economy which reduces environmental impacts throughout a wind turbine’s life cycle, including the end-of-life phase. Most components of a wind turbine have established recycling routes, but the rotor blades, which mainly comprise composite materials, present a complex challenge. Existing recycling solutions for glass fibre reinforced composites are not yet widely available or economically competitive. As wind parks older than 20-25 years are now being decommissioned, wind turbine blade waste is increasing and building a new circular economy strategy for these blades is crucial.

The REFRESH concept for building a circular and self-sustainable value chain foresees three steps. When a wind blade is decommissioned, the optimal recycling process will be selected according to the technical condition of that blade and current market demand. This will be achieved by using a dedicated tracing tool for collecting, protecting and sharing information and an embedded decision-making software for selecting the most sustainable approach to recycling at that time.

The project will focus on the most robust and mature mechanical treatments, where composites are ground into particles which are used in the manufacture of panels for various markets, and thermo-chemical technologies (pyrolysis and solvolysis) which allow the recovery of fibres and synthetic oils. Other process and re-use options will also be investigated. A range of new products resulting from the outputs of the different processes will be designed.

The approach developed within the project will be validated by means of life cycle assessment (LCA) and life cycle costing (LCC) analyses.



Project innovations include:

- Design of portable dismantling, shredding and sorting technologies;
- Development and customisation of recycling processes;
- A new circular business model;
- A novel digital blockchain traceability platform covering the whole supply chain.

Turning waste into resource

New developments elaborated during the project will push technologies to maximise the volume (>90%) and quality (>95% purity) of the materials recovered. REFRESH will seek to re-introduce secondary raw materials into the value chains of the energy sector as well as other markets. The estimated potential savings in virgin raw materials eight years after the project's completion are 52,000,000 tons.

Building a new circular economy strategy for wind turbine blades will have a breakthrough impact in the wind sector. The REFRESH concept has significant potential for replication in other large and high-value markets where the use of composite materials is increasing (aerospace, automotive, and marine, among others).

REFRESH is funded by the European Climate, Infrastructure and Environment Executive Agency (CINEA) under the Horizon Europe programme. The project commenced in January 2023 and will last 48 months.

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