

Smart dismantling,
sorting and REcycling
of glass Fibre
REinforced composite
from wind power
Sector through
Holistic approach



Improving the sustainability of wind energy

Wind power will be key to achieving the EU's renewable energy targets and making the EU carbon-neutral by 2050. The size of wind turbines continues to increase in response to the ever-increasing demand for renewable energy. Today, rotor blades of more than 100 m in length are being developed for offshore installations. Composite materials enable the design of longer, lighter blades with optimised aerodynamic shapes.

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 composite blades 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, building a new circular economy strategy for turbine blades is crucial.



Turning waste into resource

The REFRESH concept for building a circular and self-sustainable value chain foresees three steps.

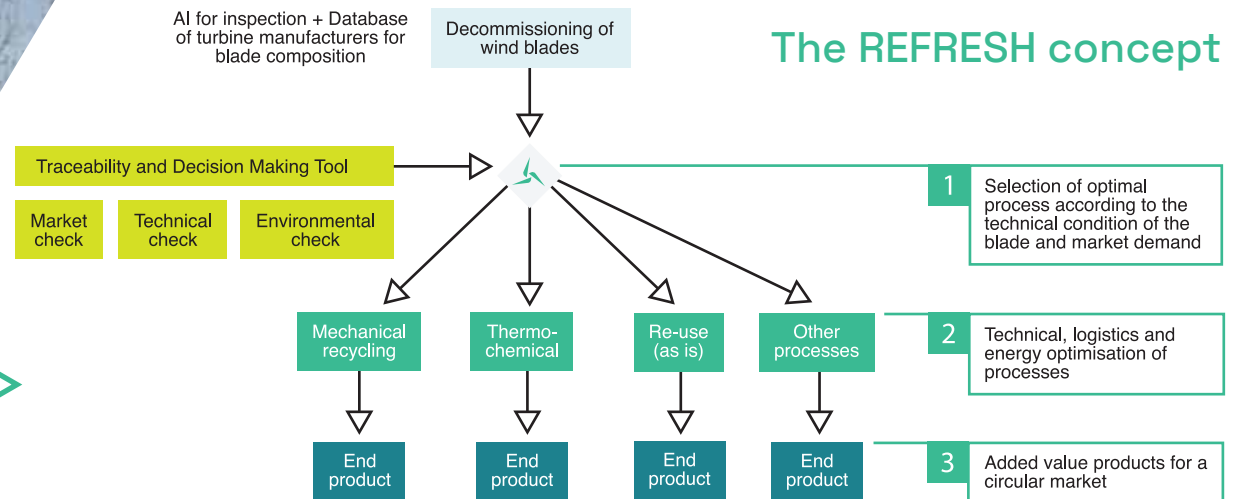
When a wind blade is decommissioned, the optimal recycling process will be selected according to the technical condition of that blade and current market demand (1). This will be achieved by using a dedicated tracing tool for collecting, protecting and sharing information and an embedded decision-making software for selecting the most sustainable approach to recycling at that time.

The project will focus on the mechanical and thermo-chemical treatment of waste but will also explore further processing and re-use options (2). A range of new products resulting from the outputs of the different processes will be designed (3).

The approach developed within the project will be validated by means of LCA and LCC analyses.

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 reintroduce secondary raw materials into the value chains of the energy sector as well as other markets.

Building a new circular economy strategy for wind turbine blades will have a breakthrough impact in the wind sector. The REFRESH concept also has significant potential for replication in other large markets where use of composite materials is increasing.



The REFRESH concept

The REFRESH consortium



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