

CETEC

*Circular Economy For
Thermoset Composites*

Vestas[®]

 **DANISH
TECHNOLOGICAL
INSTITUTE**

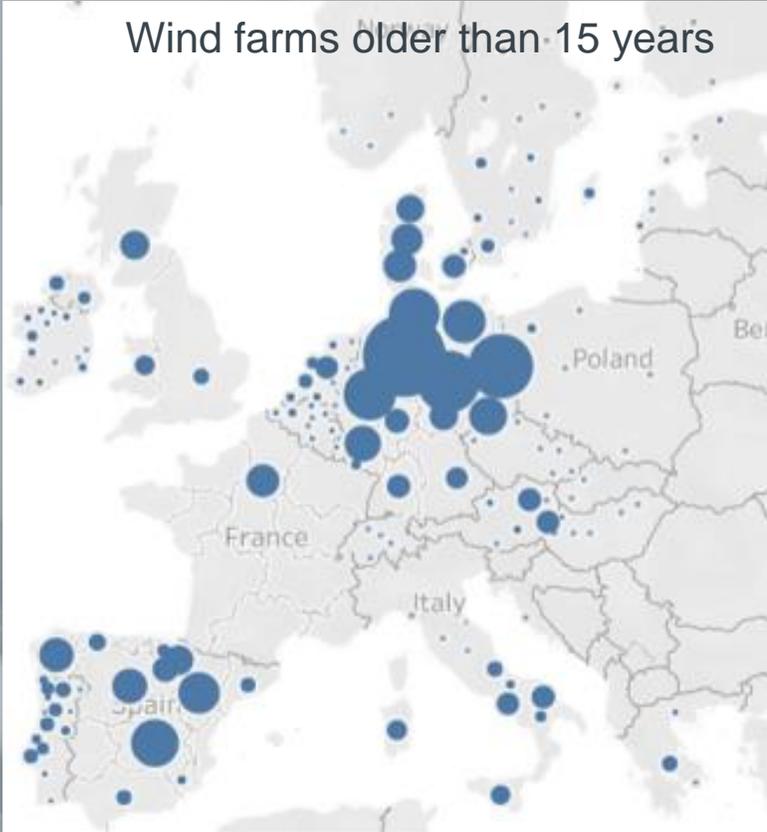
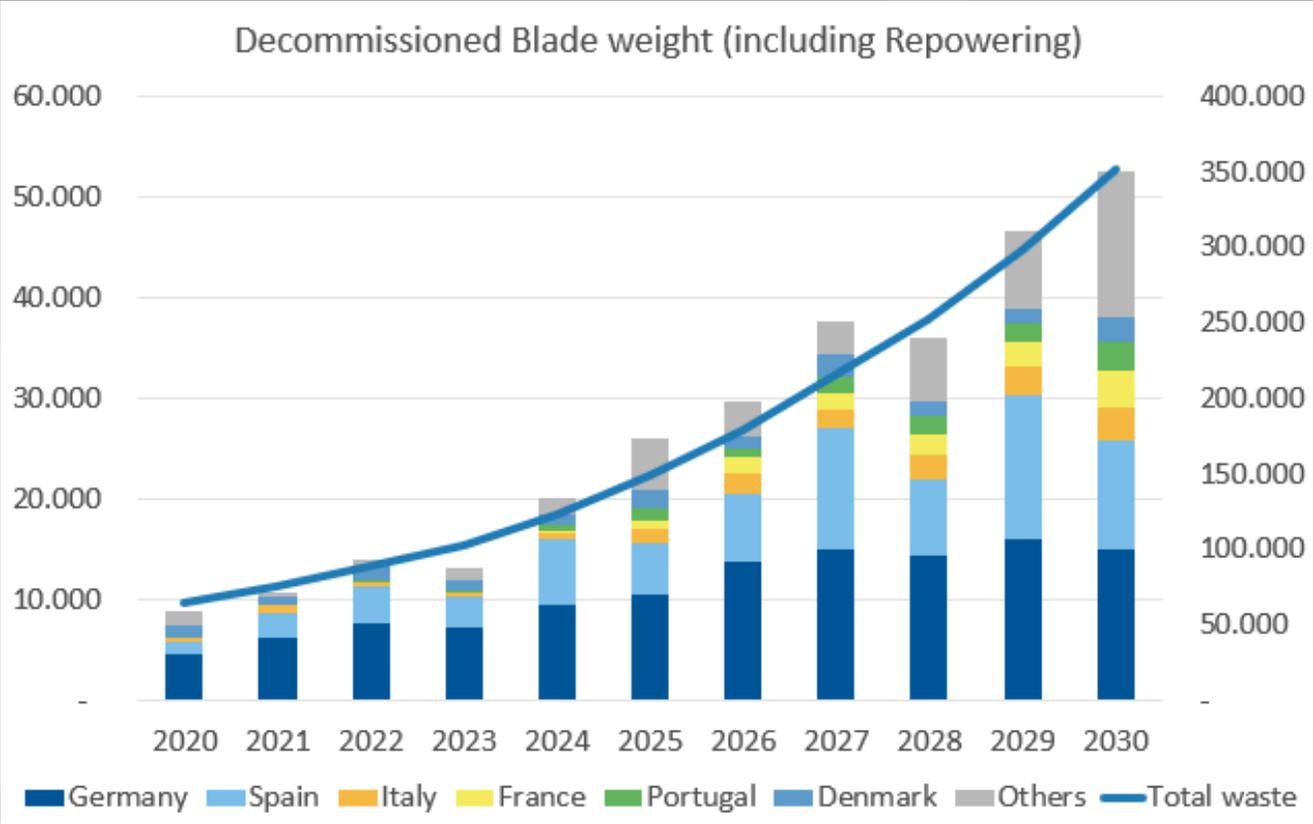
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AARHUS UNIVERSITY

Wind turbine blades: Large, composite structures, built to last 20+ years



Wind turbine blade recycling: a challenge that must be adressed



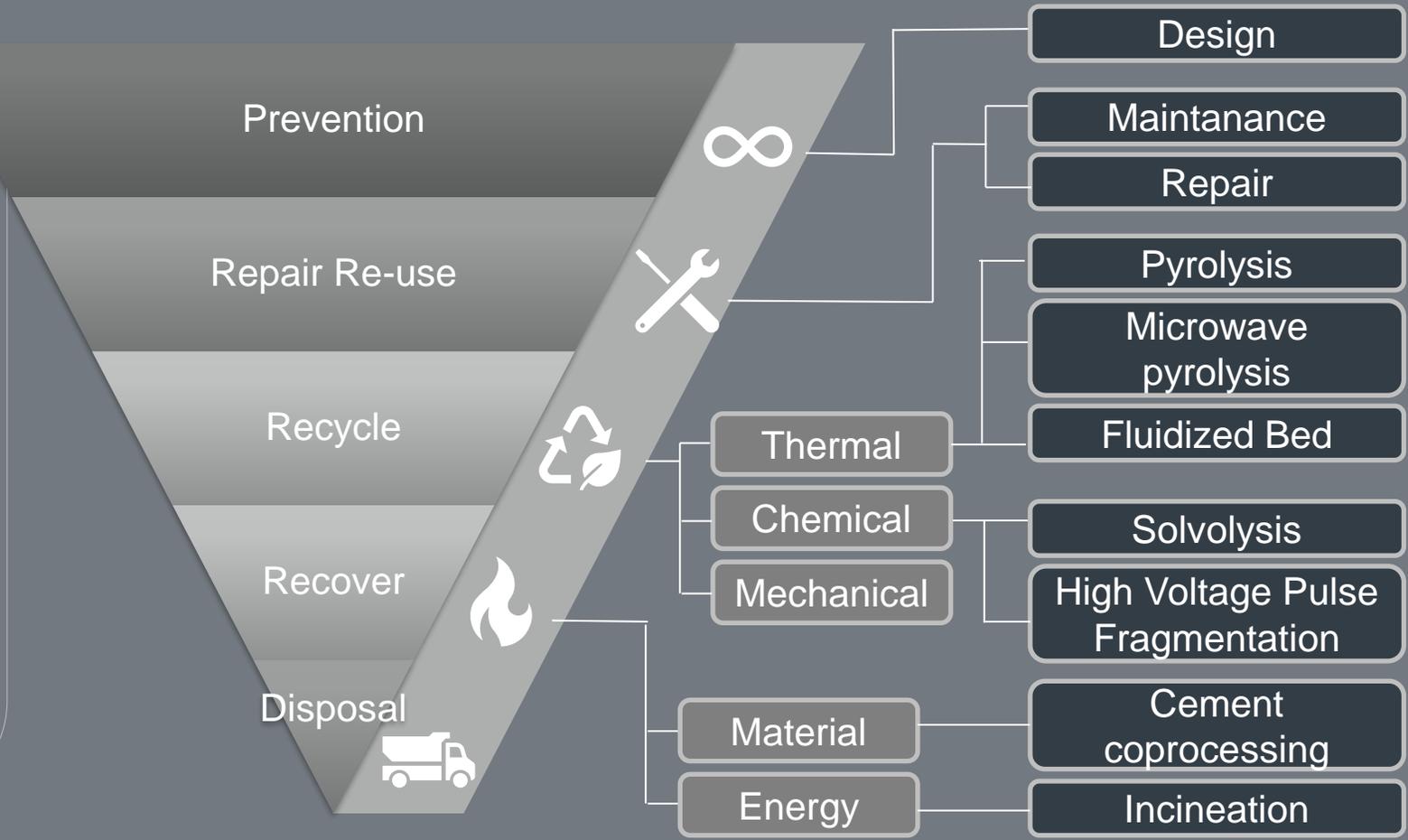
Source: WindEurope

Recycling blades is a key issue for the industry's sustainability performance.

Current end-of-life treatment of blades are far down the waste hierarchy

Main challenge

Wind turbine blades are design to **last decades** in harsh environment and for this reason the material of wind turbine blades is **extremely durable** and thereby are hard reuse in new products. Being able to disassemble the material into base component could give the **valuable raw material new life** and enable a circular materials system



Four partners unite their competences needed to create recyclable blades.

The partners



Vestas is the energy industry's global partner on sustainable energy solutions and with more than 132 GW of wind turbines in 82 countries, we have installed more wind power than anyone else. With our industry-leading ambition to build zero-waste wind turbines by 2040, we will drive the commercialization and implementation of the circular economy technology developed in the CETEC project.



With more than 8,000 employees globally and nearly 130 years in business, Olin is the largest back-integrated Epoxy supplier worldwide. Our Epoxy resins, novolac resins, curing agents, and our AIRSTONETM and LITESTONETM system lines enhance product performance in wind energy and other applications. As the leading producer of Epoxy material for the wind industry, we provide our technological expertise to CETEC in the development of circularity-enabling technologies. These innovations will further increase the efficient use of resources and advance the fundamentals of sustainability.



Danish Technological Institute (DTI) is an independent research and development institute. Based on knowledge and experience from prior work with composite disassembly technologies, DTI will drive the development and scaling of best-fit strategies that enables disassembly and re-use of composite components at end-of-life.



AARHUS UNIVERSITY

Aarhus University is a globally oriented, academically diverse and research-intensive university. With the sustainability of polymer-based materials being a crucial challenge to society, Aarhus University takes part in the CETEC project as developer of a chemcycling process for epoxy materials.

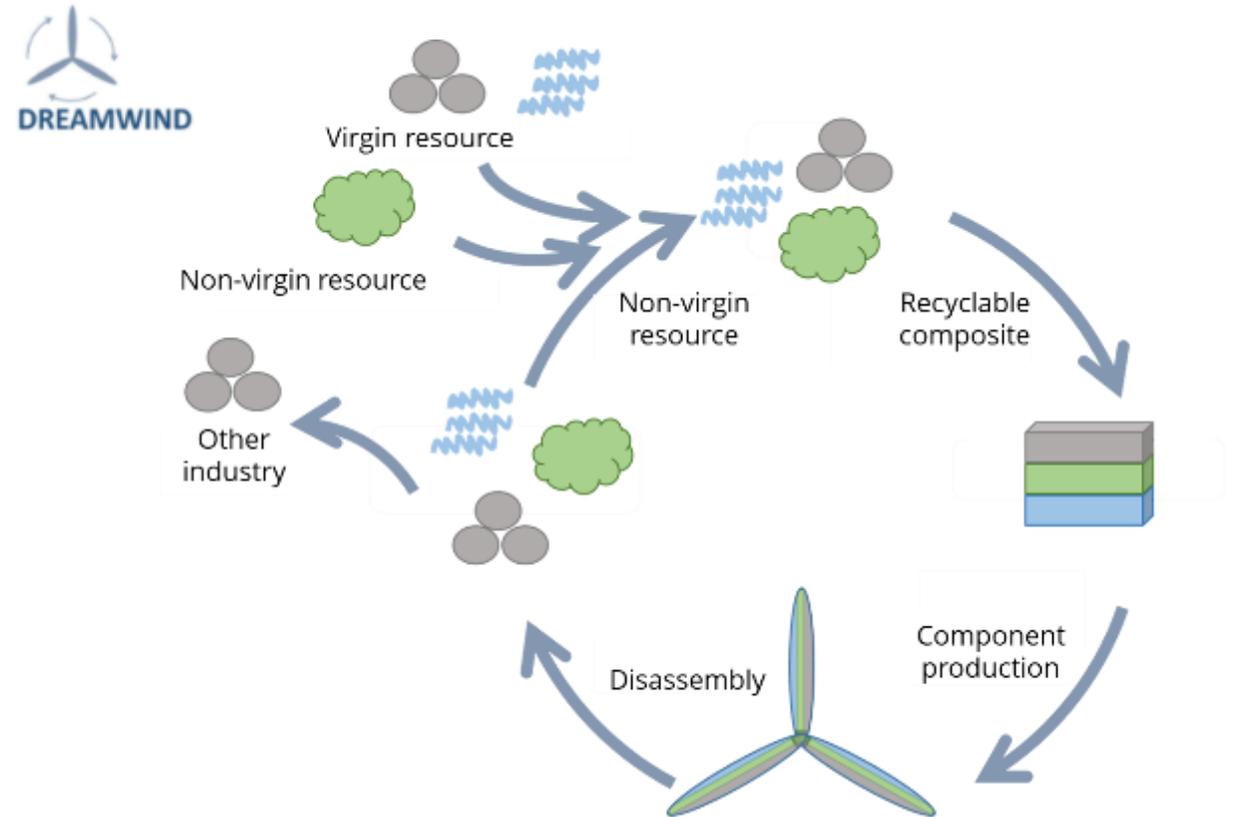


This work is partly funded by the Innovation Fund Denmark (IFD).

CETEC builds on its predecessor DREAMWIND

The CETEC ambitions rests on already demonstrated technology from previous successful project

- In the predecessor DREAMWIND project, the partners have already worked together.
- DREAMWIND: **D**esigning **RE**cyclable **A**dvanced **M**aterials for **W**IND energy
- The technology developed in DREAMWIND enables the partners to disassemble epoxy resin from fiber fractions in old blades.
- That way, each material can be handled and recycled in a separate end-of-life loop.



CETEC builds on its predecessor DREAMWIND

Main result in DREAMWIND project was an epoxy system with disassembly potential

Standard epoxy (left) and additive containing epoxy (right)

System enabled **successful dismantling of fibers and resin** and was scaled to +10kg within the Dreamwind project



CETEC could be the future of composite recycling.

CETEC aims to close the loop and develop a truly circular resin-system

CETEC builds on a **visionary idea** for composite recycling set in a **circular economic framework**.

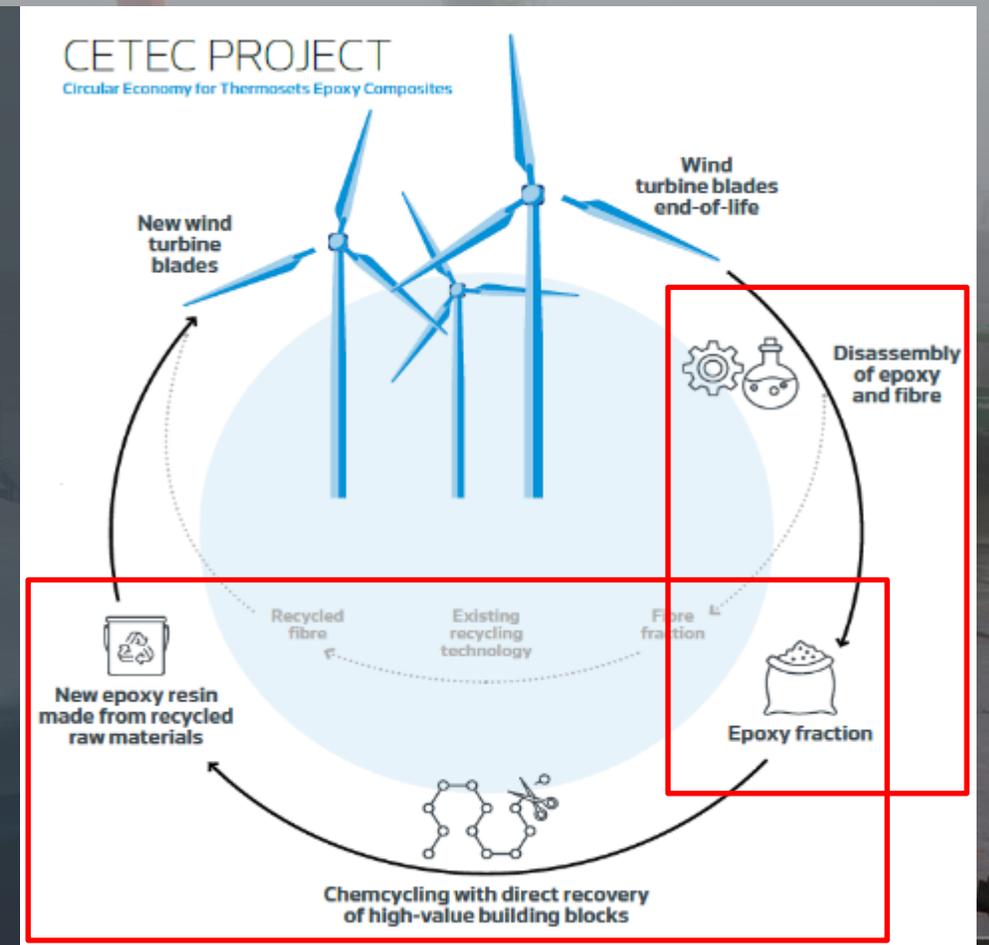
The idea is based on a **two-step process**:

1

Disassembly to recover fiber and epoxy resin

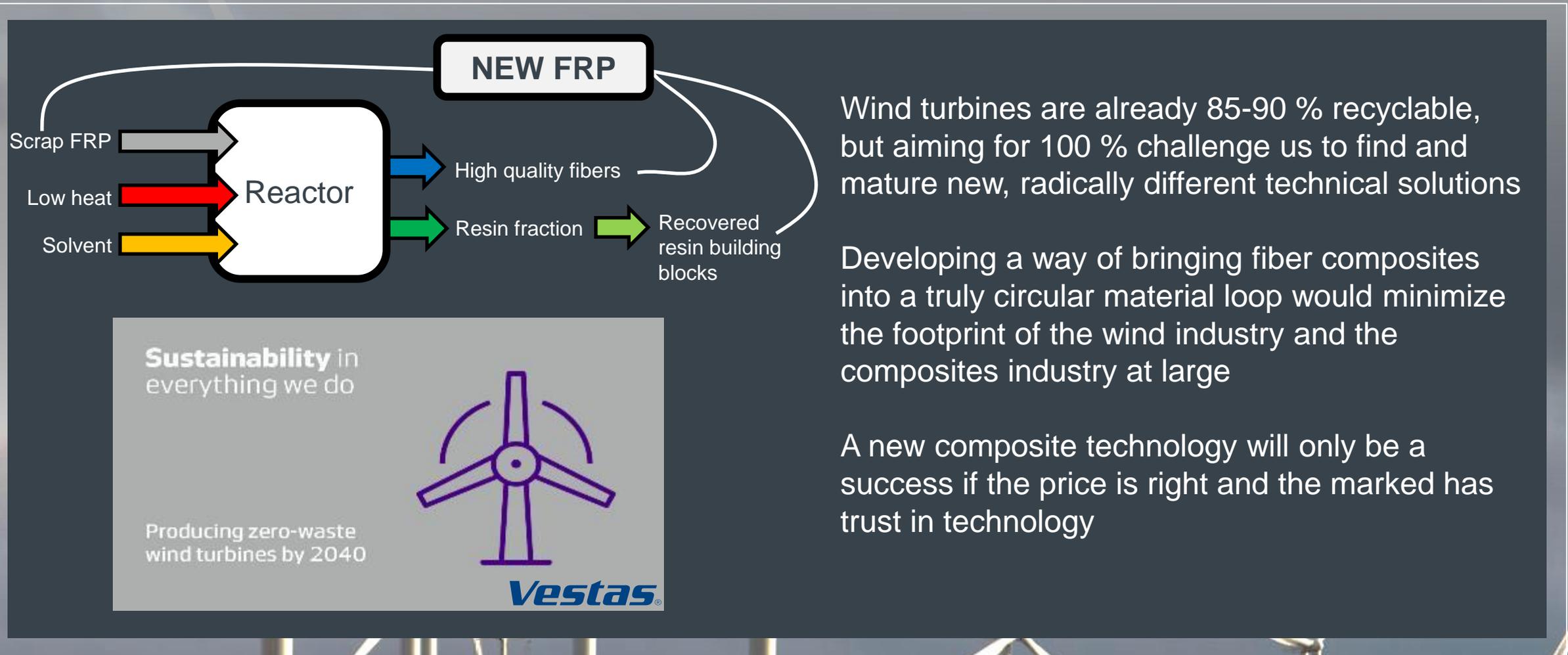
2

Chemcycling with direct recovery of high-value building blocks



CETEC can help solving the wind industry's biggest sustainability challenge.

Sustainability benefits



Vestas®

Wind. It means the world to us.™

