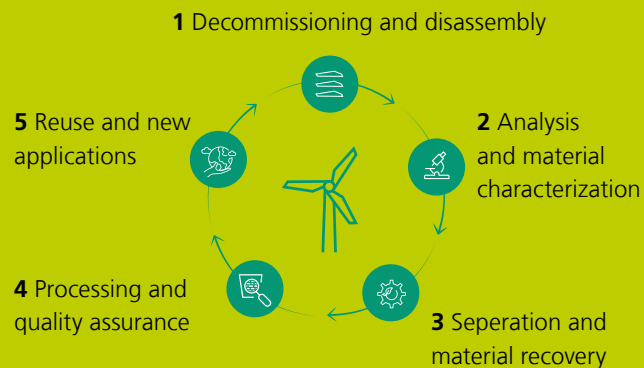


Rotor blade recycling process

The rotor blade recycling can be divided into the following five steps. Fraunhofer IWES conducts research on each of these in various projects.



Fraunhofer IWES

The Fraunhofer Institute for Wind Energy Systems IWES conducts applied research for a sustainable future. The focus topics of the Fraunhofer IWES are offshore, hydrogen, test infrastructure and digitalization. The research work in these cutting-edge technologies plays a central role in transferring results to industry in order to strengthen the business location. More than 400 employees at nine locations are developing innovative methods to accelerate the expansion of the wind energy and hydrogen economy, minimize risks, and increase cost efficiency.

Contact

Niels Ludwig
Deputy Head of Systems and Components
Fraunhofer Institute for Wind Energy Systems IWES
Am Seedeich 45 | 27572 Bremerhaven | Germany



Phone: +49 471 14290-398
niels.ludwig@iwes.fraunhofer.de

www.iwes.fraunhofer.de/en.html

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Rotor blade in slices: The analysis of material composition and disassembly strategies provides important insights into the recycling of rotor blades.

The shredded rotor blade material is separated into the fractions of glass-fiber-reinforced plastic (GFRP), PVC foam, and balsa wood (bottom, from left to right).



From rotor blade to resource

We are researching the fundamentals of recycling solutions in the wind energy sector.

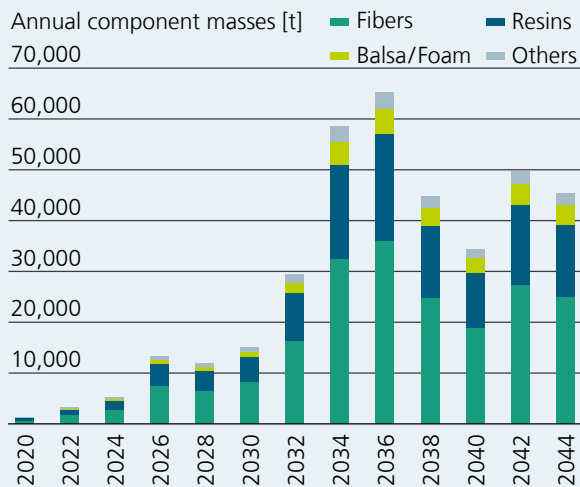
Rotor blades are made of high-performance composite materials whose components are firmly bonded together. This construction makes them particularly durable, but at the same time difficult to recover the individual components at the end of their life span.

As the number of end-of-life rotor blades increases, so does the need for new recycling processes and recovery strategies. The goal is to recover valuable materials at the highest possible quality and make them reusable.

A particular challenge lies in separating the various material fractions – including glass and carbon fibers, resin systems, and core materials such as balsa wood and foams – as purely as possible by type. At the same time, the material properties relevant for reuse must be preserved. This requires new disassembly strategies, recycling processes, and concepts for the reuse of the recovered materials.

At Fraunhofer IWES, we are working together with partners from industry and academia on key research questions related to the recycling of rotor blades. We investigate materials, develop and evaluate recycling processes, and analyze technical and economic conditions.

Forecast of onshore and offshore end-of-life rotor blade volumes in Germany



Research projects at Fraunhofer IWES

Reusing materials

In the ReusaBlade project, Fraunhofer IWES together with partners develops and evaluates recycling processes for rotor blade components with the goal of industrial reuse.

Selective disassembly for high-quality recycling

The ReWert project aims to disassemble rotor blades in such a way that glass fibers, foams, or balsa wood are recovered as pure as possible by type for further use. Concurrently, a life-cycle analysis is being conducted and recycling costs are being determined.

Robot-based disassembly in the field

The RobWind project directly addresses the requirements identified in ReWert. The institutes Fraunhofer IWES and IGP are collaborating with partners to develop a system for material-specific disassembly of rotor blades directly in the field. A mobile measurement platform detects material boundaries, and a waterjet cutting robot then cuts the rotor blade as precisely as possible along these boundaries.

Shaping the circular economy together

In the EoLO-HUBs project, Fraunhofer IWES is working with partners on circular rotor blade concepts that incorporate innovative methods, business models, and knowledge transfer as part of a holistic approach.

More information on the individual projects:



ReusaBlade



ReWert



RobWind



EoLO-HUBs