

ENABLING CIRCULAR COMPOSITES STARTS WITH WASTE CODES¹

May 27th, 2024

Composites are a valuable resource even at their end-of-life. Several technologies to reuse or recycle these materials are technologically mature.² Our industries believe there is potential to develop a business case for sustainable end-of-life solutions for composites, starting with the wind energy and boating sectors.

These sectors have used composites for decades in large components that can be comparatively easily located, collected, dismantled, and sorted and can provide reasonably reliable and predictable waste streams to waste treatment providers. In addition, they have set industry-wide commitments on the reuse, recovery, or recycling of their composites-based components.

They are the obvious candidates to start building up a regulatory framework enabling sustainable end-of-life solutions for composite materials. This could create a knock-on effect for composites waste streams from other sectors in the future.

But the current EU regulatory frameworks on waste are not sufficient to enable the deployment and commercialisation of the sustainable waste treatment solutions for end-of-life composite materials that are available now and in the future. Our associations are looking forward to engaging with the legislator to define the right regulatory framework, starting with the introduction of waste codes for end-of-life composite materials.

The introduction of specific identifiers for this waste is a prerequisite to develop a business case for treating end-of-life composite materials. It is essential for both public and private actors to conduct the preliminary assessment of the required infrastructure for their collection, sorting and sustainable treatment. With the absence of such an identifier for end-of-life composite materials, these streams cannot be identified and quantified, and potential treatment options cannot be properly assessed. Specific Waste-Codes, under the Waste Directive, for end-of-life composite materials would be the ideal identifier for this purpose.

We call on the EU institutions to amend Europe's waste policy in six ways so that we can achieve greater circularity in composite materials from decommissioned wind turbine blades and nacelles, and decommissioned boats. The cornerstone of these changes is to create dedicated waste codes for end-of-life composite material waste from decommissioned wind turbine rotor blades and nacelles, and boats (see Annex I). Based on those waste codes subsequent additions to the Waste Framework Directive, Landfill Directive and Waste Shipment Regulation should be made to foster circularity in end-of-life composite materials.

¹ 'Composites' refers here to fibre reinforced polymer composites.

² Joint Research Centre, 2023, *Towards a better definition and calculation of recycling*, JRC131531.



We acknowledge that setting up the regulatory framework suited for circular composites will take time. In the meantime, we would appreciate if the European Commission could provide guidance to national authorities and waste management industry on which waste codes and waste shipment codes should be used for transportation and intra-European shipments of end-of-life composite materials from decommissioned wind turbine rotor blades and boats.

STATE OF PLAY ON END-OF-LIFE COMPOSITE MATERIALS

Composite materials or composites are made by combining two (or more) different materials, usually a polymer matrix and reinforcement fibres such as glass, natural, or carbon fibres. Composites are desired and increasingly used in many sectors because they are lightweight, durable and have excellent properties (high mechanical strength and resistance to heat, water, and chemicals).

Each year around 440 kt of thermosetting composite materials reach end-of-life and enter Europe's waste streams.³ But as Europe is consuming and producing more composites – in 2022 Europe produced 2,800 kt of new composite materials⁴ – the volume of end-of-life composite material will only increase.

Most of the composite material waste today is made up of small fractions of larger waste streams such as consumer goods and construction waste that are hard to sort and collect. As a result, most end-of-life composite materials are not yet recycled and end up in incinerators, landfills, or backfilling operations across Europe.

Two significant composite material waste streams stand out: boat hulls and wind turbine rotor blades and nacelles. These are two types of large units that are largely made of composites. And they are comparatively easily located, collected, and sorted. Their large mass per unit and relatively pure material composition makes them also very well suited to more sustainable end-of-life treatment.

For this reason, the wind energy and boating industries have set clear commitments to re-use, recover, or recycle their decommissioned composite-based components by 2025 and 2030 respectively. In 2022 these sectors are estimated to have generated" up to 36 kt of composite material waste. By 2025 this is estimated to be 49 kt and by 2030 close to 84 kt.

³EuCIA, 2022, Background document on circular economy; November 2022

⁴AVK, 2023, *The European Market for Fibre-Reinforced Plastics and Composites 2022*, April.

Estimated annual composite waste from decommissioned boats and wind turbines in Europe (kt)

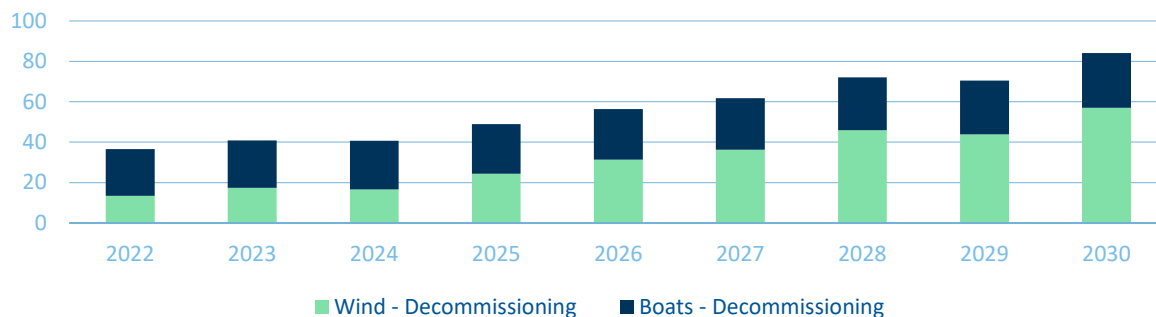


Figure 1: Estimated annual composite material waste from decommissioned wind turbine blades and nacelles, and boats. Sources: EBI, WindEurope.

Building the business case for large-scale deployment

Several technologies to deliver on these commitments are mature and available.⁵ And our industries are actively involved in many projects to roll out these and other technical solutions for managing end-of-life composite materials at large scale. But the commercialisation of these solutions and projects faces significant barriers, including regulatory ones.

The current regulatory framework is simply not supporting large-scale deployment of sustainable treatment solutions for end-of-life composite materials. Decommissioned wind turbine blades and nacelles for example far too often end up being labelled as ‘construction and demolition waste’. The latter accounts for more than 1/3 of Europe’s waste and 94% of it ends up in landfills.⁶ Our industries believe landfilling end-of-life composite materials is a waste of valuable resources and space in Europe.

End-of-life composite materials still retain value if we can feed them into the circular economy. This value can also be extracted by using end-of-life composite materials as input into cement co-processing.⁷ In these cases, the end-of-life composite materials reduce the EU needs for raw material extraction and imports of materials with limited or no supply in Europe. And as such they help reach the EU’s decarbonisation targets by avoiding the emissions related to those materials’ extraction and production.

⁵ Joint Research Centre, 2023, *Towards a better definition and calculation of recycling*, JRC131531.

⁶ Joint Research Centre, 2021, *Waste disposal: Main report*, JRC125415.

⁷ CEMBUREAU et al., 2023, *Cement co-processing is a sustainable solution for recycling end-of-life composite materials*

To establish a successful business case, waste solution providers such as recyclers, waste management companies, and cement plants need reliable forecasting data, easy access to waste volumes and quality assurance. Without these three elements they are unable to unlock and secure the necessary investments in treatment facilities nor would they be able to deliver end products that are consistently reliable and marketable.

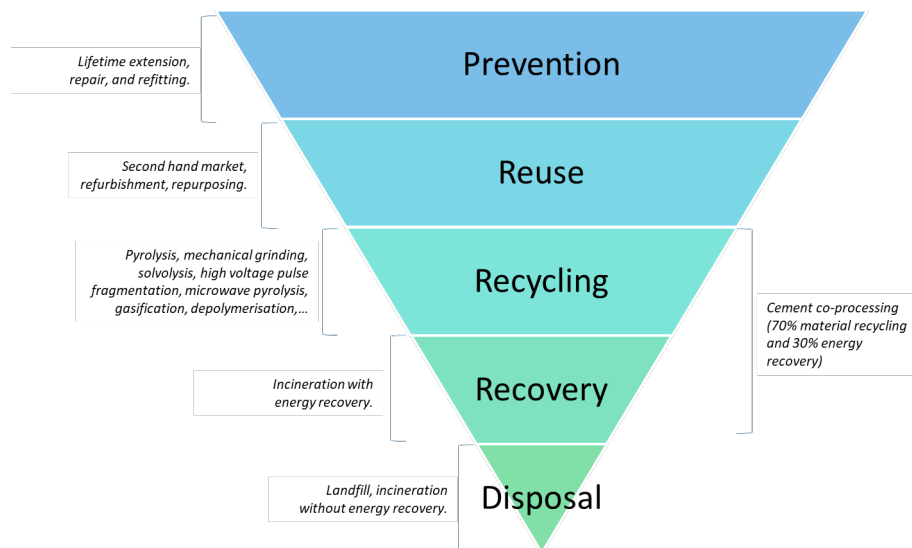


Figure 2: desired and actual practices for treating end-of-life composites from wind and boating according to the EU waste hierarchy

SIX WAYS TO SET A REGULATORY FRAMEWORK SUITED TO CIRCULAR COMPOSITES

Addressing these challenges is impossible without a more supportive regulatory framework for treating end-of-life composite materials. And it starts in the boating and wind industries where the waste can be easily located, collected, and ultimately sorted and treated. These sectors offer the best opportunity for the composite material waste value chain to develop a business case for sustainable solutions in line with the EU circular economy objectives.

Building such a supportive regulatory framework starts by setting dedicated waste codes for end-of-life composite materials from the boating and wind industries. These codes will create the much-needed visibility on the EU volumes, facilitate separation and collection, and ensure reliable quality of input material for waste solution providers.

Waste codes are also the first crucial step towards setting EU-wide recycling targets, implementing a landfill ban on end-of-life composite materials from decommissioned rotor blades and nacelles, and boats, and easing transport and shipment of composite material waste to the proper facilities across Europe. These could – in time – be extended to composite material waste from other sectors when sustainable waste treatment solutions have an established business case and the composite material waste from those sectors can be easily sorted and collected.



We therefore call on the EU’s institutions to amend Europe’s waste policy to:

1. Revise the List of Waste to create dedicated waste codes for end-of-life composite materials from decommissioned wind turbine rotor blades and nacelles, and boats (see Annex I).
2. Revise the Waste Framework Directive to set progressive targets for the reuse and recycling of composite material waste from decommissioned wind turbine rotor blades and nacelles, and boats covered by the waste codes in Annex I.
3. Revise the landfill directive to set a landfill ban on the waste from decommissioned wind turbine rotor blades and nacelles, and boats covered by the waste codes in Annex I.
4. Revise the waste shipment regulation to create dedicated codes for end-of-life composite materials from decommissioned rotor blades and nacelles, and boats to allow better intra-European transport. And to ensure composite material waste are subject to the Green control procedure of the Basel Convention.
5. Recognise cement co-processing as a recycling process according to the Waste Framework Directive 2008/98/EC for its raw material recyclability.⁸
6. Enable on-site dismantling of recreational boats by simplifying permitting and licensing rules and procedures for occasional dismantling, including the potential use of mobile units (or inclusion in repair and maintenance licenses).

ANNEX I

We recommend adding a new four-digit chapter heading for composite material waste. And at least two six-digit codes to clearly identify the relevant types of composite material waste in the European List of Waste.

16	Wastes not otherwise specified in the list
16 12 (New)	Fibre reinforced polymer composite material waste (New)
16 12 01 (New)	Fibre reinforced polymer composite material waste from decommissioned wind turbine rotor blades and nacelles. (New)
16 12 02 (New)	Fibre reinforced polymer composite material waste from decommissioned boats. (New)

⁸ CEMBUREAU et al., 2023, Cement co-processing is a sustainable solution for recycling end-of-life composite materials,