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Position paper

12th May 2025

The strategic value of carbon fibre composites in a circular, low-emission Europe

Executive Summary

The European Composites Industry Association (EuCIA), together with the key European manufacturers of carbon fibres,¹ the European Automobile Manufacturer's Association (ACEA), and TECH-FAB Europe, welcome the European Commission's proposal to review the End-of-Life of Vehicles (ELV) Directive. Carbon fibre reinforced composite materials are enablers of sustainability and employed in a wide range of markets, including aerospace, renewable energy, marine, and defence. In particular, they play a crucial role in transportation applications, wind energy, aerospace..., where they deliver lightweighting and emissions reduction, enhanced safety, and longevity.

Carbon fibre enables the manufacture of high-performance, lightweight, and durable composite materials that are central to the EU **Clean Industrial Deal** objectives for decarbonisation, innovation, and industrial resilience in sectors critical to the green transition.

Carbon fibre is not classified as hazardous under World Health Organization (WHO) criteria, further underscoring its suitability for sustainable industrial development.

The European composites industry represents more than 150,000 jobs in Europe alone and the European manufacture of carbon fibre, a strategic raw material for the composites industry, is integral to this.

This paper articulates the material, environmental, and safety benefits of carbon fibre and calls for its appropriate inclusion in the evolving European regulatory framework. We propose an adaptation of the ELV regulation to better reflect these facts.

¹ EU carbon fibre manufacturers: CIT (part of Toray Group), DowAksa, Hexcel, Mitsubishi Chemical Europe, Teijin Carbon



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1. Carbon fibre: a circular, technologically essential material in Europe

- Carbon fibres combine exceptional stiffness, strength, and corrosion resistance with low weight and low thermal characteristics expansion. They are stronger than steel yet significantly lighter, making them indispensable in energy, transportation, aerospace and defence, and several consumer goods applications.
- Carbon fibre reinforced composite materials are recognised as essential to our European net zero transition and green industrial transformation through their use in the applications noted in Annex 2.
- Carbon fibre composites are circular materials that can be reused, repurposed and repaired thanks to their exceptional durability, as well as recycled through existing widely used processes, where the intrinsic fibre properties remain.

2. Safety profile: not hazardous under WHO criteria

- Carbon fibres are not classified as hazardous materials according to the WHO definition. The fibres are engineered with diameters typically $\geq 4\mu\text{m}$, safely exceeding the WHO's threshold for respirable fibres ($< 3\mu\text{m}$). PAN-based carbon fibres, which dominate automotive and industrial use, are also resistant to cleavage and do not generate respirable fragments during processing.
- Further safe handling practices and standard dust control measures ensure a secure working environment.

Note: Carbon fibres are registered as articles under REACH. Their low hazard profile as detailed in Annex 1 means that only standard worker protection measures for material handling (e.g., gloves, PPE for dust suppression) are required. More details are provided in Annex 1.

3. Proposed adaptation to the ELV Regulation proposal

We urge policymakers to recognise carbon fibre's role in Europe's sustainable industrial development and ensure its fair and evidence-based inclusion in European regulations. We recommend the following amendment:

- Restrain from the intention to add carbon fibres to Article 5, since they are not equivalent to lead, mercury, cadmium, or hexavalent chromium under the RoHS Directive.²

² JCMA publication May 9th, 2025

https://www.carbonfiber.gr.jp/english/tech/pdf/JCMA_CF_Position_ELV_directive_amendment_EN.pdf



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Signatories

 <p>DRIVING MOBILITY FOR EUROPE</p>	<p>The European Automobile Manufacturers' Association, or ACEA, unites Europe's 16 major car, truck, van and bus makers. We are the voice of the auto industry: a technological world leader and the backbone of the EU economy. https://www.acea.auto/</p>
	<p>Composite Materials Italy (CIT) manufactures woven carbon, special fabrics, multiaxial, prepregs and UD tapes. We also formulate and apply our own resins, as well as other formulations depending on the designated use and areas of application: industrial, aerospace, automotive, sport and leisure, medical, building. https://www.composite-materials.it/</p>
	<p>DowAksa, combines the strengths of two world-class companies, Dow, a global leader in providing materials science solutions, and Akса, the number one producer of acrylic fibers. The 50:50 joint venture provides fully integrated solutions including product (from precursor to carbon fiber to prepreg), engineering, technology, and knowledge to carbon fiber and carbon fiber intermediates needs of industrial markets. https://www.dowaksa.com/</p>
	<p>Headquartered in Brussels, the European Composites Industry Association (EuCIA) represents European national composites associations and industry-specific sector groups at EU level. With the support of its members, EuCIA is actively contributing to building an economically and environmentally sustainable European composites industry. www.eucia.eu</p>
	<p>Hexcel Corporation is a global leader in development and manufacturing of lightweight, high-performance structural materials including carbon fibers, prepregs and other fiber-reinforced matrix materials, honeycomb, engineered honeycomb and composite structures. Hexcel products are used in variety of end applications including Commercial Aerospace (e.g., commercial aircraft), Space & Defense (e.g., military aircraft, space launch vehicles and satellites) and Industrial markets (e.g., wind turbine blades, automotive, recreational products). Hexcel products help its customers enhance performance of their products while reducing weight, which decreases fuel consumption and associated CO2 emissions.". https://hexcel.com/</p>
 <p>MITSUBISHI CHEMICAL EUROPE</p>	<p>Mitsubishi Chemical Europe offers and sells highly developed chemical-based products. The portfolio includes performance polymers, carbon fiber & composites, polyester films, aluminum and metal composite sheets as well as semiconductor solutions for a wide range of industries. https://eu.mitsubishi-chemical.com/</p>



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	<p>TECH-FAB Europe is the association of European technical textile producers. Our products are high-performing engineered textiles that bring lightweight solutions, strength, and many other benefits to our everyday lives, with sustainability at heart, complying to the European Green Deal to create a climate-neutral economy by 2050. https://tech-fab-europe.eu/</p>
	<p>Teijin Carbon is specialized in the production and development of carbon fibers and carbon fiber-based materials. Under the carbon fiber brand Tenax™ and Tenax Next™, Teijin Carbon offers high-performance material solutions for industries such as aerospace, automotive, energy, electronics, civil engineering and sporting goods. With Tenax Next™, the company also pioneers sustainable innovation by using circular feedstock, significantly reducing its carbon footprint. Teijin’s carbon fibers enable the creation of lightweight yet incredibly strong components. They also excel in fatigue resistance, corrosion resistance, and chemical stability, making them ideal for a wide range of applications. https://www.teijin.com/</p>

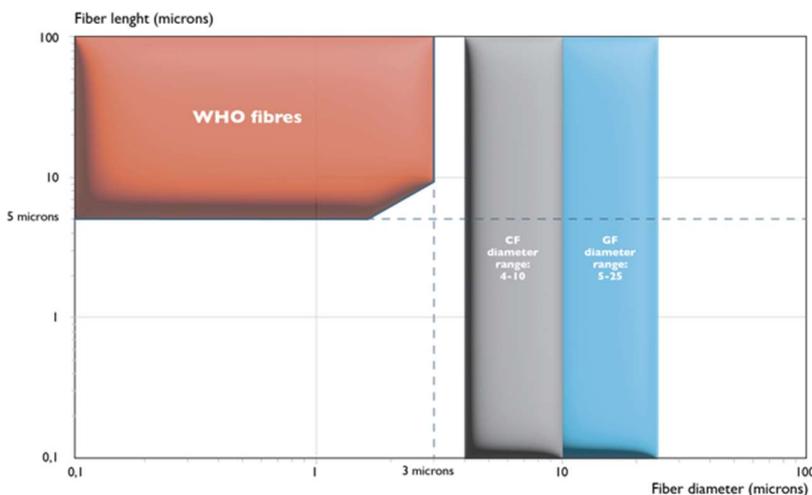
Annex 1: Airborne dust risk assessment

Scientific evidence has been available since the 1970s that dust and airborne fibres which are sufficiently long, thin and bio-persistent can enter the lungs and may become the cause of chronic inflammation and increase the risk of developing mesothelioma.

The potential hazard posed by this type of substance thus depends on a combination of size (morphology) and nature. As for the nature, carbon fibres are certainly bio-persistent since they do not dissolve in the human body. As for the morphology, the WHO has set³ the following environmental health criterion:

- length $L > 5 \mu\text{m}$ (up to $100 \mu\text{m}$)
- diameter $D < 3 \mu\text{m}$
- length-to-diameter ratio $R > 3$.

Since carbon fibres have typically a diameter D ranging from 4 to $10 \mu\text{m}$, they do not fall within the scope of the above health criterion.



(Chart created with reference to the document *Determination of airborne fiber number concentrations: a recommended method, by phase-contrast optical microscopy*, World Health Organization Geneva, 1997.)

Figure 1: Diameter and length range of fibres defined as hazardous by WHO and the range for carbon fibres (CF) and glass fibres (GF).

³ "Determination of airborne fiber number concentrations: a recommended method, by phase contrast optical microscopy," WHO Library Catalogue (1997), ISBN: 92 4 154496 1.



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Annex 2: Carbon fibre key applications

Carbon fibre, first adopted in military aircraft in the 1970s, is now widely used in aerospace for its light weight, strength, and corrosion resistance, benefiting everything from fuselages to electric aircraft.

Carbon fibre's strength, light weight, biocompatibility, and radiolucency make it an ideal material for a wide range of medical applications, including surgical instruments, orthopedic implants, prosthetics, and braces, enhancing both device performance and patient outcomes.

Lightweight and strong, carbon fibre is widely used in motorsports, high-performance cars, as well as electric and hydrogen vehicles to enhance performance, extend range, and enable safe high-pressure hydrogen storage.

Wind energy is another growing industry that is increasingly reliant on carbon fibre. To enable the manufacture of the huge offshore wind turbine blades being designed today, carbon composite is needed in select locations to impart stiffness and reduce weight.

Carbon fibre's strength and light weight have made it popular in sports, from professional to consumer products like rackets, bikes, and skis, enabling lighter, stronger, and more durable equipment.

Over recent years, carbon fibre has in fact become part of our everyday lives. Designers are increasingly introducing carbon fibre in consumer goods as a result of its properties, design flexibility, and visual appeal. Smartphone cases, internal and external parts of laptops, watches, furniture, and even musical instruments, are just a few examples.

Market data

- Carbon fibre reinforces 18% of the global composites market, estimated at 41 BUSD in 2023.ⁱ
- Global demand for carbon fibre reinforced composites will increase by 7.7% in 2024.ⁱⁱ

ⁱ JEC Observer 2024, <https://digital-magazine.jeccomposites.com/special-issues>

ⁱⁱ AVK Market Report 2025, https://www.avk-tv.de/wp-content/uploads/2025/02/AVK_MarktReport_2025_long_final_en-1.pdf