

Why is regulation not yet catching up?

In the previous white paper, we showed how recycling thermoplastic composites (TPC) through SPIRAL's innovative processes greatly reduced environmental impact. Since technology can never stand on its own, we would like to dive into why TPC waste still ends up in landfills or is incinerated, despite its more efficient recycling properties than its thermoset counterpart. Is there regulatory pressure to recycle TPC waste, and in what form? Very recently, we received a notion through the European Composites Industry Association (EuCIA), that reinforced composites such as TPC were portrayed as barriers to high-quality recycling by the EU.¹ While we acknowledge that TPC recycling still faces significant challenges—primarily due to regulatory and market factors—we believe it is essential to approach these barriers systematically. Rather than "throwing in the towel" and shutting down an entire industry with substantial potential for circular development and growth, we advocate for collaborative efforts among stakeholders and the alignment of regulatory frameworks. Therefore, we have prepared this comprehensive overview of the current state of play of the TPC regulatory framework.

Regulation can influence the value chain in different ways. First of all, some directives/frameworks are calling for more elaborate reporting on sustainability-related issues, such as the CSRD and SSbD. The Ecodesign for Sustainable Products Regulations (ESPR), goes a step further than reporting by establishing a framework for setting Ecodesign requirements on specific product groups. Other regulations impose extra costs on polluting activities, such as the landfill directive or the carbon tax. Some regulations apply to specific sectors, such as directives on end-of-life vehicles or European Union Aviation Safety Agency (EASA) Regulations. This complexity can hinder strategic planning and investment decisions as businesses struggle to forecast the future regulatory environment and its impact on their operations. Here we describe the most important reporting (REACH, CSRD, and

¹ European Composites Industry Association (EuCIA). (2025). *Composites in the Proposed ELV Regulation*. Retrieved from <https://eucia.eu/wp-content/uploads/2025/04/Composites-in-the-proposed-ELV-regulation.pdf>

SSbD) and action-based (ESPR, landfill directive, etc.) regulations that are relevant to TPC recycling.

REACH, which stands for Registration, Evaluation, Authorization, and Restriction of Chemicals, is a European Union regulation dating back to 2007 aimed at ensuring the safe use of chemicals. Recycling processes like solvolysis or pyrolysis are heavily regulated because they involve the use or production of chemical substances. These substances must be evaluated for their potential risks to human health and the environment, often leading to additional testing requirements or safety recommendations. In contrast, for our recycling process, the testing is more straightforward because it does not involve any additional substances, and our byproducts are minimized. However, for the broader TPC recycling ecosystem, we feel REACH does not consider circularity as a part of the criteria.

CSRD stands for Corporate Sustainability Reporting Directive (CSRD)² and has been officially in force since 1 January 2024 for companies that previously had to comply with the Non-Financial Reporting Directive (NFRD). From 2025, the sustainability report will be mandatory for large companies that previously fell outside the NFRD. For listed SMEs that have less than 250 employees and less than 50 million turnover per year, the CSRD will apply from January 2026. Even companies outside the CSRD scope may be affected, especially if they supply products to a reporting company. However, there will be limits to the amount of information that can be requested from small companies, depending on their size. Under ESRS E5: Resource Use and Circular Economy-Related Disclosures, companies are required to report on key aspects, including material consumption, energy use, water use, waste generation, recycling, and reuse. Partnering with recyclers enables businesses to create a secondary value chain, allowing them to transparently report on these categories.

Lastly, The Safe and Sustainable by Design (**SSbD**) framework is a European Commission initiative aimed at guiding the innovation process for chemicals and

² European Commission, **Corporate Sustainability Reporting**

https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en

materials. As of now, the SSbD framework is in a testing phase, serving as a voluntary reference point for EU Member States, industry, academia, and research organizations.

"REACH, CSRD, and SSbD reports do not set specific circularity targets. Instead, they focus on accurate reporting of circularity-related aspects, particularly under CSRD. As a result, these regulations currently lack strong incentives for companies to maximize value retention from waste and scrap. High-impact recycling strategies and reverse logistics are still considered a 'nice to have' rather than a mandatory goal.

Other than reporting regulations, there are several relevant action-based regulations as well. The Ecodesign for Sustainable Products Regulation (ESPR) focuses on the design and sustainability of products. It is part of the EU's broader Green Deal initiative, aiming to make products more sustainable by setting eco-design requirements. TP composites are not shortlisted as a product/material group at the moment, nor are they specifically targeted by other product specific EU rules such as construction, batteries, electrical equipment, packaging, and chemicals. These are the revised Construction Product Regulation³, the proposed Battery Regulation⁴, The RoHS5, and The Packaging Waste Directive⁶. **Furthermore, neither the Landfill directive, the Directives on end-of-life on vehicles, or the European waste framework directive state that it is or will be forbidden to landfill TPC waste,** although there are countries that are tackling this with other regulation (for example, Austria, Germany, Luxembourg and Slovenia ban the landfilling of waste exceeding a certain total organic carbon value). There is limited information available about the

³ European Parliament, **Press Release on Corporate Sustainability Reporting Directive (CSRD)**

https://www.europarl.europa.eu/pdfs/news/expert/2024/4/press_release/20240408IPR20303/20240408IPR20303_en.pdf

⁴ European Commission, **Proposal for a Directive on Corporate Sustainability Reporting COM(2020) 798 final**

<https://eur-lex.europa.eu>

⁵ **Directive 2011/65/EU - Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2011/65/EU**

⁶ **Directive 94/62/EC - Packaging and Packaging Waste Directive**

<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31994L0062>

prospect of EoL regulation of composite waste. Landfill taxes are currently applied in 22 EU Member States. The EU (simple) average is approximately EUR39-46 per tonne of waste landfilled. **Furthermore, 9 member states impose a tax on the incineration of waste**, of which the rates are typically lower than the landfill tax.⁷

Summing up, we have not been able to identify regulations that truly help the development and incentivization for TPC recycling and circular value chain creation.

Luckily, there is a growing pressure from industry groups to strengthen regulations concerning TPC waste in sectors such as aerospace and automotive. For example, in 2023, CSRD Europe, the European network for Corporate Sustainability and Responsibility, launched the “New Materials and Circular Economy Accelerator” Think Tank in collaboration with Leonardo. Furthermore, EuCIA recently launched the European Circular Composites Alliance (ECCA) together with JEC composites.

"While advocating, lobbying, and calling for action are essential (as we do with this white paper), we believe that action should not wait for perfect regulation. The case for circularity is already clear. Our open-loop recycling method demonstrates that simply rolling up our sleeves, showing up, and committing to circular practices is valuable in itself.

⁷ European Environment Agency (EEA), "Economic Instruments and Separate Collection" Available at: <https://www.eea.europa.eu/publications/economic-instruments-and-separate-collection>