

Teijin Aramid's vision on the proposal to restrict all PFASs (Per- and Polyfluoroalkyl substances) under REACH

Introduction Teijin Aramid

As a subsidiary of the Teijin Group, Teijin Aramid is global market leader in the production of aramid. Aramid, short for "Aromatic Polyamide," is a class of synthetic, high-performance fibers. Due to aramid's high strength, lightweight, heat resistance and chemical resistance, aramid fibers contribute significantly to the performance of applications in ballistic protection, renewable energy, automotive solutions, and the digital infrastructure.

Teijin's commitment to sustainable practices

Driven by the ambition to create a better future for generations to come, we are steadfast in our [commitment to sustainable practices](#). Teijin Aramid endorses the intended outcome of the proposal to restrict all PFASs (Per- and Polyfluoroalkyl substances) to safeguard human health and the environment from risks posed by PFASs. We are already actively developing PFAS-free alternatives for aramid-based applications and exploring avenues to phase out PFASs in our operations wherever feasible.

Concern PFAS REACH restriction proposal.

As we stand in support of the objective of the proposal to restrict all PFASs under REACH, it is crucial to highlight the potential unintended negative consequences that might emerge from the current draft of the restriction proposal. PFASs possess distinctive properties that render them incredibly useful yet challenging to replace with more sustainable alternatives. There is ongoing uncertainty about whether alternatives with similar technical properties will be available in the next 5, 10, or even 20 years. This includes the possibility of needing a completely different technology. Without ample time to develop and prepare for alternatives, the restriction proposal threatens the continuity of production operations of Teijin Aramid and the rest of the European Chemical Industry. Additionally, the current draft of the restriction proposal introduces additional challenges to recycling post-use materials, which counteract the proposal's objective of promoting sustainability. A comprehensive exploration of the impact of the proposal to restrict all PFASs on our processes will follow in the subsequent sections.

1. Operational impact: crucial role in equipment

Owing to the extensive integration of PFASs into the European Chemical Industry's production infrastructure and the lack of feasible substitutes, the proposed restriction severely affects the Chemical Industry's capacity to maintain secure, stable, and enduring operations. Among PFASs, fluoropolymers stand as the most significant due to their unparalleled chemical resistance, high-temperature stability, and critical role in maintaining the integrity of industrial processes. In our production facilities PFASs, and in particular fluoropolymers, play a significant role in ensuring safe and stable operations in an environment characterized by the use of strong organic solvents, concentrated acids, high temperatures, high pressures, and corrosive intermediates. Examples of its critical application in the production of aramid include tanks, piping, seals, liners, gaskets, pumps, and valves. Beyond their fundamental role in the production of aramid, these components are equally vital in upholding the integrity of recycling and closed-loop production processes. Restricting the use of fluoropolymers may inadvertently hinder our ability to achieve the ecological advantages that closing the loop offers.

The substantial percentage of equipment parts in our factory featuring PFASs (>40%) coupled with the diverse array of equipment parts (>10.000) and process conditions (>100), makes the transition to alternative materials a complex and time-consuming project. Extensive R&D, selection, testing, prototyping, and controlled industrialization is required to guarantee the integrity of our installations and process safety in this transition. Substitution with alternative materials,

such as noble metals, graphite, glass, or ceramics, presents challenges due to their limited flexibility, conductivity, and poor abrasion and dynamic characteristics. Even if alternative materials suffice, the different nature of alternative materials will require major plant redesigns and reconstructions. The huge complexity, high safety risks, downtime, and excessive costs (>200MEur) of such a project will have a major impact on the continuity of safe operations and future (re)location decisions. This impact parallels the situation faced by our raw material suppliers within the petrochemical industry, for which a derogation for the use of PFAS was included in the restriction proposal. For further detailed information please see confidential attachment.

2. Obstacle to recycling of post-use materials

The current formulation of the proposal to restrict all PFASs will introduce an obstacle to the recycling of post-use aramid materials. Teijin Aramid is proactive in collecting post-use aramid materials given their excellent recyclability. Recyclable aramid-containing products, such as ballistic vests, may contain PFAS substances as a result of post treatment in later stages of the associated value chain or from the use phase. Our recycling process is compliant with legislation with regards to the restricted, C8, C9-C14 and proposed C6 PFAS substances. The extended lifespan of applications featuring both aramid and PFASs implies that items will continue to enter recycling streams well beyond the initiation of the restriction proposal. Similarly, end-of-life materials originating from regions beyond the European Union, in the absence of comprehensive global PFAS legislation, will perpetuate the inflow of recyclable aramid products containing PFAS into recycling streams. Enforcing a complete prohibition within the European Union would significantly curtail our ability to access recycling sources and result in recyclable post-use aramid ending up as discarded waste. To safeguard the EU's progress towards a more sustainable, circular economy, it is crucial to carefully evaluate the implications of the proposal to restrict all PFASs on recycling processes and seek pragmatic solutions that preserve the viability of recycling practices. As part of such a pragmatic solution we would welcome separate and realistic limiting values.

The need for a 12-year derogation period or full control on use, disposal, and recycling

To minimize the adverse effects of the restriction proposal on the aramid fiber supply chain, the need for at least a 12-year derogation period becomes evident. While an exemption has already been granted to a portion of our raw-material suppliers from the petrochemical and mining industry, this exemption does not extend to the remainder of the aramid fiber supply chain despite the similarity of our industry's utilization of PFAS-containing products. Yet finding substitutes or developing alternative technologies that can replicate the unique features of specifically fluoropolymers as well as planning and executing a comprehensive transition strategy requires considerable time and resources. The time offered by a 12-year derogation period allows for a more cautious and thorough approach and subsequently enhances the potential of successfully identifying and implementing sustainable solutions.

While we aim to adhere to the 12-year timeframe, it is crucial to acknowledge that in such a complex transition challenge the exact duration required cannot be conclusively determined in advance. Although alternatives may be attainable for specific applications, such as piping and gaskets, the feasibility of substitutes for other applications can vary. In addressing the feasibility question, a more preferred option would be to consider full control on use, disposal, and recycling, of PFASs or specific subclasses of PFAS such as fluoropolymers.

Recent scientific findings caution against uniform grouping of all PFAS for risk assessment solely based on their persistence, emphasizing the need for case-specific subgroups (J.K. Anderson et

al., *Regulatory Toxicology and Pharmacology*, 2022)¹. Fluoropolymers distinguish themselves within the broader category of PFASs due to their unique chemical properties and safety attributes. Fluoropolymers fulfill the OECD criteria as polymer of low concern (PLC) as they pose no hazard to public health or the environment due to their high molecular weight, water insolubility, limited bioavailability, and non-toxic attributes. While Fluoropolymers are prominently featured in our production equipment, there is no emission during the use-phase. PFAS-containing equipment can be disposed of entirely isolated from other waste streams. The chemical industry has extensive experience in controlling such streams. This experience can be expanded to the controlled use, disposal, and recycling of certain PFASs, such as fluoropolymers. Controlled use of PFASs under strict conditions of collecting and disposal after use would perfectly align with the objective of the PFAS restriction proposal to avoid any emission to the environment and people.

Impact on European Targets/Objectives/community

In the absence of a 12-year derogation period, full control over the use, disposal, and recycling of PFASs, or an exemption for fluoropolymers to the aramid supply chain, the proposal to restrict all PFASs would compromise the ability of Teijin Aramid to ensure continued safe operation of our production facilities in the European Union. Consequently, the company is prompted to contemplate relocating beyond the European Union and ceasing aramid production within its borders. Such a move could in turn have grave consequences for the strategic autonomy of the European Union and the ability of the European Union to realize its green, industrial, and digital transformational objectives, and potentially erode its leading position in technology. Further elaboration on these implications will follow below.

1. Strategic Autonomy

A potential relocation of aramid production away from the EU would represent a significant setback for the European Union's pursuit of strategic autonomy as it would increase the dependency on a limited number of countries for indispensable raw materials. The strategic sectors in which para-aramid is an essential component are military, law enforcement, telecom, aerospace, automotive, composite, (renewable)energy, and protective clothing. Teijin Aramid is the only EU aramid polymer producer, which is also essential for safety such as ballistic performance. The discontinuation of aramid polymer and material production within the European Union would render these strategic sectors in the EU entirely reliant on the import of aramid from the United States, Korea, or China. Such heavy dependence not only exposes the EU to potential disruptions in the supply chain, but also leaves it vulnerable to unilateral decisions and political-economic pressures by these countries to restrict aramid availability.

2. Vital to the EU's green, industrial, and digital transformational objectives

A safe and sustainable supply of aramids is also vital in realizing the European Union's green, industrial, and digital transformational objectives. Aramids are an enabler in renewable energy production, drive energy efficiency through lightweight applications, adhere to circular economy principles. As such, the role of aramids in advancing the EU's sustainable ambitions is indispensable and any shift in aramid production will have a potential detrimental effect.

Without aramids, the EU's ambition to scale up renewable energy production would face significant obstacles. Aramids are essential for the EU's capacity to harness its offshore wind potential and to integrate hydrogen as a clean energy carrier. Submarine high-voltage power cables, which

¹ Anderson, J. K., Brecher, R. W., Cousins, I. T., DeWitt, J., Fiedler, H., Kannan, K., Kirman, C. R., Lipscomb, J., Priestly, B., Schoeny, R., Seed, J., Verner, M., & Hays, S. M. (2022). Grouping of PFAS for human health risk assessment: Findings from an independent panel of experts. *Regulatory toxicology and pharmacology : RTP*, 134, 105226. <https://doi.org/10.1016/j.yrtph.2022.105226>

interconnect offshore wind farms and integrate renewable energy sources, depend on aramid reinforcement to provide a robust solution across ocean depths that are not feasible with alternative materials. Similarly, mooring tendons made with aramid ensure the stability and longevity of floating wind farms enabling them to harness wind energy in deep waters where fixed foundations are impractical. As the EU seeks to expand hydrogen applications and integrate hydrogen as a clean energy carrier, aramid based reinforced thermoplastic pipes become integral to the success of the hydrogen economy. As the EU intensifies its focus on expanding renewable energy capacities, the demand for aramid in the production of these crucial components will continue to grow.

Another compelling facet of aramids' impact on the EU's sustainable journey lies in aramids' exceptional lightweight and durability properties. Aramid's lightweight nature proves invaluable in achieving increased energy efficiency across industries. For instance, aramids have become an invaluable solution in producing lighter tires for transportation, resulting in reduced fuel consumption and emissions. Aramid-reinforced composites in automotive and aerospace industries further exemplify the potential for enhancing energy efficiency. Aramid's remarkable durability and resistance to degradation make it an ideal choice for crafting long-lasting products. Aramid-reinforced conveyor belts and cables in industrial settings can endure harsh conditions, reducing the frequency of replacements and thereby reducing waste generation and preserving valuable resources. Curtailing the use of aramid could hinder progress in achieving energy efficiency goals, reducing waste, and minimizing the ecological footprint.

Aramids are also essential components for the EU's digital transition to high-speed broadband internet connectivity and the deployment of 5G networks across the European Union. As a strength member aramid provides crucial mechanical support and protection to delicate optical fibers, enabling high-speed data transmission over long distances, critical for the EU's advancement in areas like 5G technology, cloud computing, and the Internet of Things (IoT). Supply chain disruptions can have a negative impact on the European Union's ability to achieve its digitalization ambitions.

3. Safeguarding Research

One should also not disregard the potential consequences of a discontinuation of aramid production in the European Union on the progress of research. Preserving aramid production knowledge and fostering its evolution is integral not only for sustainable practices but also for reinforcing the EU's technological leadership. With a strong ambition to create a better world for future generations, Teijin Aramid actively engages in European Union and national projects centered on fostering innovation and advancing progress. We have been mechanically recycling end-of-life aramid for more than 20 years and in May 2023 the company reached a milestone by successfully producing aramid filament yarn with recycled content on an industrial scale using a newly developed yarn to yarn recycling process. While the first industrial-scale production of aramid using recycled material underscores the company's commitment to a circular economy in line with the European Union's Green Deal vision, these developments are the result of years of research and require vast resources.

A potential need to relocate aramid production and research outside of the EU could stifle future innovation and hinder the development of alternative materials and processes. This, in turn, might impede the European Union's capacity to drive progress and remain at the forefront of global advancements. Conversely, granting an exemption of 12 years for PFASs for the chemical industry could potentially be a catalyst for European industry to seize a leadership position in the development of alternative materials. Affording the necessary time and flexibility for research would not only sustain aramid production in the European Union but also fortify Europe's role as a global technological frontrunner.

Conclusion

In reaction to the proposal to restrict all PFASs, Teijin Aramid recognizes the overarching objective while simultaneously identifying concerns within the existing draft. A swift phase out of PFASs in the aramid supply chain without adequate time for the development of alternatives poses threats to the continuity of safe and stable production of aramid and the recycling of aramid materials. Given the discussed complexities, Teijin Aramid advocates for controlled use and disposal of PFAS, or specifically subclasses of PFAS such as fluoropolymers, under stringent conditions to avoid environmental emissions and safeguard public safety. The fluoropolymers are used in industrial production processes of aramid and not in consumer products. Alternatively, a well-structured 12-year transitional phase for the aramid supply chain is required, aimed at enhancing the prospects for the successful identification and integration of sustainable solutions. Rushing the phase out of PFASs without viable substitutes risks an EU-wide aramid production discontinuation, impacting not only Teijin Aramid but also the EU's vital interests in critical sectors. Embracing a safe and sustainable supply of aramids is not only vital for the strategic autonomy of the European Union and the success of strategic sectors, but also plays a crucial role in the enabling the European Union to realize its green, industrial, and digital transformation objectives while sustaining its position as a global technological frontrunner.



Peter ter Horst

CEO Teijin Aramid