Teknologiateollisuus

Technology Industries of Finland – Comments on the proposal for a restriction of per- and polyfluoroalkyl substances (PFAS)

Finland's Technology Industry's companies are committed to reducing the presence of harmful substances in their products to promote a more circular economy and enhance human health. However, the proposed ban on the production, use, and market availability of PFAS substances would significantly impact our industries' competitiveness and ability to manufacture robust and reliable products. Many applications in which PFAS is used play a critical role in achieving the objectives of the Green Deal.

The use of PFAS substances in the past 50 years has enabled the EU technology and manufacturing industries to become increasingly green, resource efficient and safe. If the proposal is pushed forward as it is, this would result in these sectors taking back steps several decades in terms of technological, environmental and safety improvements. The proposed way forward with a universal restriction is not the right way forward; it is not proportionate, it does not respect intensive capital investments made, nor does it consider the essential use of certain PFAS chemicals in the society.

Therefore, in order to go forward in a responsible and controlled manner with eventually phasing out PFAS chemicals, in our view:

1. Restricting substances should not be implemented without a differentiated consideration of their uses and the consequences.
2. A risk-based and substance-based approach should be used for PFAS. We consider the proposed universal restriction of all PFAS, regardless of their toxicity and risk profile, disproportionate.
3. Use of PFAS must remain possible as long as there is no full-scale availability of suitable and technically developed substitutes.
4. The introduction of an information obligation for "intentionally added" PFAS prior to the introduction of targeted restrictions will allow all relevant uses to be included in the assessment in due time and any necessary exemptions to be applied for.
5. A long-term general derogation with review before expiration of fluoropolymers without relevant risk is necessary.
6. A clearly defined procedure for the application, review and extension of derogations is crucial, especially in the case of a broad restriction on previously non-declarable substances. The derogations currently envisaged are insufficient and do not take into account the relevance of PFAS for a wide range of uses and ongoing innovations in the technology industry.

7. The repair-as-produced principle shall be applied. Indefinite derogations for spare parts, refurbished parts, and equipment shall be granted.
8. Ensuring effective enforcement through the market surveillance system will foster a level playing field.

Restriction impedes innovations

The restriction proposal for PFAS substances fails to acknowledge their importance in a wide range of crucial applications. A complete ban would curtail the ability of technology industries to innovate and create new products, given that PFAS in general is used in various technology sectors such as semiconductors, displays, electronics, sealings, valves, automation and control systems, energy storage, hoses, filters, and membranes. In addition, specific fluoropolymers are used in high voltage application (connectors) and radio frequency equipment (mobile telecom network equipment). Several of the technologies developed by our companies play a key role in the green transition and currently depend on the use of PFAS chemicals.

PFAS often plays a critical role in the overall functionality and safety of the technologies used in industry as well as the products produced by it. PFAS offer important benefits not matched by any known existing alternative such as improved friction and wear resistance in safety critical components.

- Fluoropolymers are used commonly in high-performing industrial **seals, valves and pumps** connected to chemical / fuel systems to prevent leakages. Tight and reliable valves are necessary for all process industries so that harmful/lethal fuels and chemicals are not being emitted outside the process. They are also **needed in the EU's transition to a hydrogen economy**; Tightness is essential, where hydrogen is conveyed through the process pipeline. Due to the very small molecule size of H2, the sealing performance cannot be decreased from the current level. Also, in energy-efficient systems, low friction is critical, as friction in valves, especially in **pressure regulators**, causes increasing hysteresis, meaning decreased regulation performance. The majority of valves contain these guides and coated o-rings.

- Sealings and gaskets made of fluoropolymers or fluoroelastomers are also used in demanding industrial **gas and liquid measurements: liquid concentration in process industry, power transformer insulation, biogas quality and process control, bio-decontamination processes** etc. Only PFAS compounds are able to survive heat and chemical stresses in these harsh environments.

- Fluoropolymers are used in **Lithium batteries** to eliminate short circuits and thermal runaway.

- Fluoropolymers are used in **automation and control systems** is harsh industrial environments to ensure reliability of critical infrastructure.

- **Radio frequency coaxial cables** use PTFE as dielectric with excellent performance characteristics including low energy losses and inherent flame retardancy.

- Fluoropolymers are used in **breathing vents**, which are plugs with a permeable membrane used to seal enclosed equipment against humidity and other environmental conditions. Without the vent's hydrophobic properties combined with permeability, water or water vapor penetrates the enclosure and condenses within the equipment, eventually leading to corrosion, loss of reliability of the function of the equipment, and electrical safety risks. In many cases these vents are listed as safety critical items in approval tests. PTFE membrane is difficult if not impossible to replace.

- Membrane or porous filters are used to control the flow of gases through the probe of a measurement instrument. These are often made of PTFE. The filter allows gases to reach the sensor within the instrument while keeping water and particles out. Without a filter, water would reach the probe and the measurement would become inaccurate and unreliable, with the sensor also recovering very slowly. If a filter with poorer properties was to be used, the flow would slow down, again impacting the measurement accuracy and response time. In addition, the upper limit for temperatures in which the probe could be used would become lower, ruling out some of the most challenging applications relying on these measurements.

- The use of PFAS substances in components such as **power modules, capacitors, LCL filters, conformal coating PCBAs (Printed Circuit Boards Assembly), cables, batteries, semiconductors, chip, and charging resistors** is essential for the functionality of products. These components are essential for safety-related areas where resistance to elevated temperatures, pressure, abrasion, and other extreme conditions are required.

- **Semiconductor parts, cables, and coatings** play a critical role in ensuring the reliability and performance of **industrial electronic and electrotechnical products** - especially in heavy industry applications. They cannot suddenly stop functioning; there would be catastrophic consequences in **nuclear plants, marine applications, oil refineries etc.**

- Many of these components are essential to the success of the European Green Deal, as they enable the creation of essential technologies like **PV systems, wind turbines, measurement of solar and wind conditions** for optimal placement of renewable energy plants, etc.

Developing new technologies requires significant investments in R&D and with total PFAS ban companies and technology suppliers would need to move most of their R&D efforts from future technologies to finding PFAS replacements. Target in R&D would be to maintain current performance and not to improve e.g., energy efficiency and to reduce greenhouse gas emissions.

Supply Chain Disruption

Numerous technological components rely on PFAS-based materials. Imposing restrictions on PFAS could disrupt established supply chains, resulting in delays or shortages of critical components in various applications.

The ban on PFAS in its proposed scope, and its impacts on component availability, manufacturing, and product quality, would affect not only our companies and their direct customers, but societies all over the globe in numerous and partly unpredictable ways.

Our customers range from consumers to businesses, governments, and private and governmental research institutions, some of their applications of our products directly affecting people’s health and safety, quality of life, and security of supply. An abrupt inability to supply our products to these critical uses could put millions of lives at risk.

Competitiveness and Regulatory Uncertainty

European technology companies might encounter a competitive disadvantage compared to regions with less stringent PFAS regulations. This could lead to a shift in manufacturing and investments to countries outside the EU, ultimately affecting the overall competitiveness of European tech firms. For example, China is planning to continue using PFAS chemicals. If the EU industry takes a several decades step back in competitiveness against China because of the PFAS restriction, this would have huge consequences to growth and jobs in the EU. The U.S. has recently taken up measures to limit China's access to high-tech semiconductors and other critical technology. This effort would not match the consequences that a universal PFAS ban would mean for the EU and its ability to stay on top of the technology race.

Moreover, cost-efficient means to test for the broad range of substances the PFAS group contains should be available before such a ban comes into force in order to reduce the burden on companies and enforcement authorities and enable them to verify compliance.

We are concerned about the authorities' ability to enforce a very broad PFAS restriction covering more than 10.000 substances – in particular, we see the lack of laboratory capacity and suitable analytical methods as limiting factors for proper enforcement. Inefficient enforcement will make it easy for 'free riders' to place non-compliant products on the European market, thereby compromising the competitiveness of European industry.

Rapid changes in regulations, such as the proposed PFAS restriction, hinder the long-term planning and investments of European industries, thereby negatively impacting growth, innovation, and potentially resulting in job losses. The European technology industry is at the forefront of driving the green transition. Until a viable solution to replace PFAS in essential technologies is identified, a total ban on PFAS should not be introduced.

Sustainability Commitments and Spare Parts

Many companies are committed to providing spare parts well into the future. A total ban on PFAS could shorten the operational lifespan and compromise the safety of numerous costly and resource-intensive technologies if repairs and spare parts become unavailable due to the ban. The lifetime of industrial equipment is often 30 – 50 years. Use of alternative chemicals, if found, is likely to mean changes in product design, which again means that it may not be possible to produce spare and replacement parts to be used in the existing equipment.

Fluoropolymers are used in many industrial applications in seals and gaskets, which need to be replaced at regular intervals. If these spare parts are not available, this would in a short time frame disable a significant amount of EU energy production and distribution capacity, transportation vehicles, as well as manufacturing activities.

This risks the creation of massive stranded assets in the EU industry, and demolishing investors' willingness to invest in the EU. Therefore, respecting the repair-as-produced principle is necessary.

It is also worth noting that original equipment manufacturers are often committed to supplying their customers the necessary spare and replacement parts. Should an EU wide universal PFAS restriction make this impossible, who would be legally responsible and liable for the technologies becoming stranded assets?

It is essential to provide a derogation without a time limit to the manufacturing industry which develops critical appliances that play a major role in the functioning and safety of society e.g., energy production and distribution, including nuclear power plants, industrial plants dealing with toxic, corrosive, and flammable substances, lifts, transport vehicles, mobile communication networks. The life span of such plant or application is measured in tens of years, during which time it is essential that any spare parts are available. Bringing forth a part that contains a new substance or is missing a previous one, hence is different from the original at least by composition but likely also by structure and design, does not require testing on only the part itself but the complete device, machinery, or system, which is unfeasible on an industrial scale and disrupts production.

Many of our solutions are used in critical applications with challenging environmental conditions and strict requirements. For example, in the process industry, there are meticulous standards related to materials and safety that our products need to follow. Further, in devices installed outside and therefore exposed to the elements, the conditions vary greatly as the products are used everywhere around the globe, from extremely cold and dry climates to hot and humid environments.

These environmental, regulatory, and application requirements mean that any changes to the materials and components used must be made in a controlled manner, from testing and validating to possibly re-certifying entire products or systems.

Due to the liabilities concerning repairing and spare parts, it is also essential that unlimited derogation for such sub-deliverers is granted.

Increased Costs, Performance Impact, and Environmental Concerns

The replacement of PFAS is a huge exercise due to research, development, and testing of alternative materials. PFAS are chosen for their unique properties, and often there is no alternative substance that can match their durability, thermal resistance, chemical stability, inertia and chemical compatibility, coefficient of friction, flame retardancy, hydrophobicity, permeability, gas and liquid filtering, and dielectric strength or electrical insulation. Moreover, alternatives wear out faster. Substituting PFAS is likely to lead to decreased application performance, which could adversely affect safety, emissions, and waste management, as well as increase energy and chemicals use. Many technological advancements crucial to the green transition would be unfeasible without e.g. PFAS–containing seals, lubricants, engineered surfaces, printed circuit boards, semiconductors, capacitors, wiring and cables, solar panels, fuel cells, lithium-ion batteries.

In addition to being incorporated into products manufactured and sold by our companies, PFAS-containing parts are used in production equipment. This is another critical area where the proposed PFAS ban would have significant impacts on ability to manufacture, product quality, costs, and profitability in the EU.

Types of parts containing PFAS in manufacturing and process equipment are, for example, cables, O-rings, seals and gaskets, probes, many critical filters, valves, chemical lines/piping, Teflon pumps, chambers, jigs, wafer cassettes, and chemistry benches. Additionally, PFAS are present in lubricating oils for vacuum pumps used in demanding conditions, such as

equipment containing process gases, e.g. etching machines and plasma-enhanced chemical vapor deposition (PECVD) systems.
Especially resistance to chemicals and high heat tolerance are required properties for certain parts used in production equipment. These parts have very long lifetimes, often years or decades, or as long as they are mechanically intact. Even if there were alternatives to PFAS-containing parts for these types of equipment, this would most likely require re-designs of the machinery on the manufacturers' part and lead to complete equipment system updates for end-users, again disrupting the supply chain.

Moreover, replacing PFAS might introduce emissions of unfamiliar substances. The adoption of alternative materials could bring about new environmental challenges. The complete life cycle of alternative materials should be thoroughly examined before enforcing a total ban on PFAS to prevent regrettable substitutions. A complete ban on PFAS substances may lead to an overall negative environmental, economic and safety impact.

Effects of the proposed ban on the environment are, however, not limited to substances potentially replacing PFAS compounds. Measuring the processes in manufacturing and process industries would become more difficult. For example, industrial products are used to measure processes so that energy use can be optimized. If the quality of these measurements declined, energy efficiency would decrease, leading to unnecessarily high energy use and therefore "waste", as well as higher greenhouse gas emissions, unless renewable energy sources were used. It should however be noted that the proposed ban would affect the upscaling of renewable energy production as well.

Lack of Feasible Alternatives

The technology industry relies heavily on PFAS properties in various applications, and suitable alternatives may not be readily accessible. An abrupt restriction could jeopardise companies' operations. The proposed derogation period is insufficient in situations where viable alternative substances are yet unavailable. In a case where an alternative substance is found, it would take a very long time before it could be taken into use in critical applications to ensure the functioning and safety of the application. Testing of the functioning and safety takes easily more than 10 years in many applications, e.g. 10 years or more for lift ropes.

Even if there were viable PFAS-free alternatives, replacing the whole PFAS-containing component base would take an immense amount of work in first identifying the alternatives, testing them in product runs, validating them in actual measurement conditions and with actual customers, and possibly repeating the cycle if the results were subpar – and all of this for each subassembly and each product. In some cases, also expensive and time-consuming 3rd party approval tests (e.g. IEC/UL safety approvals, FAA/NWS configuration management control) would be necessary.

Case: An example on implementing a substitute once identified in one product model (lifts):

1. **Qualify substitutes** at material level, develop test samples & initial performance & reliability testing (1-2 years)
2. **Develop Production part**, produce & qualify production samples of the part (1-2 years depending on type of product)

3. **Build product with the new part**, ensure volumes be available for production; test & qualify at system level (1-2 years)
4. **Conformity testing**: Initiate and pass 3rd party conformity testing (1 year)
5. **Production ramp up:** Start-up of volume production from material vendors through to final product assembly (1 year)

Note: each of our companies will have to do this for each individual part and every application requires a new review.

Case: Valves used in process industry:

1. Find alternative materials (1 to X years)
2. Feasibility testing with prototypes (5-10 years)
3. Standardize new materials (2 years)
4. Re-design valves with new materials (5-10 years)
5. Certification testing of valves (20 years)
6. Offering updated with alternative material (> 25 years)

Total time required: more than 25 years.

End-of-life waste management

When alternatives are impractical, the continued use of PFAS should be considered. In industry, emissions from PFAS-containing applications during use are minimal, and companies are actively seeking methods to improve circularity. Potential harms from PFAS-containing waste should be primarily addressed through existing legislative measures rather than implementing a complete ban on these essential substances. Additionally, it's important to note that fluoropolymers are not toxic and do not break down into smaller PFAS molecules in the environment due to their chemical stability.

Typically, industrial appliances or components containing PFAS do not transition to uses where disposal cannot be managed; they remain within the same operator. At the end of their lifecycle, these applications are recycled and PFAS containing components can be collected separately. Companies are in favour of developing procedures for end-of-use waste control to collect any PFAS-containing parts.

Technology Industries of Finland (TIF) represents Finnish technology industries and has over 1,800 member companies, ranging from SMEs and start-ups to world leading MNEs. The technology industry is comprised of five subsectors: electronics and the electrotechnical industry, mechanical engineering, the metals industry, consulting engineering, and information technology. Technology industry is the most important export industry of Finland, with operations constituting over 50 % of all Finnish exports and accounting for 70 % of all private investments.

The Finnish technology industry has a direct employment effect of 338 000, constituting 12% of the country's workforce and indirect employment effect amounts to 720 000, making up a quarter of Finland's total workforce.