PFAS in brief

ECHA restriction procedure for PFAS and fluoropolymers

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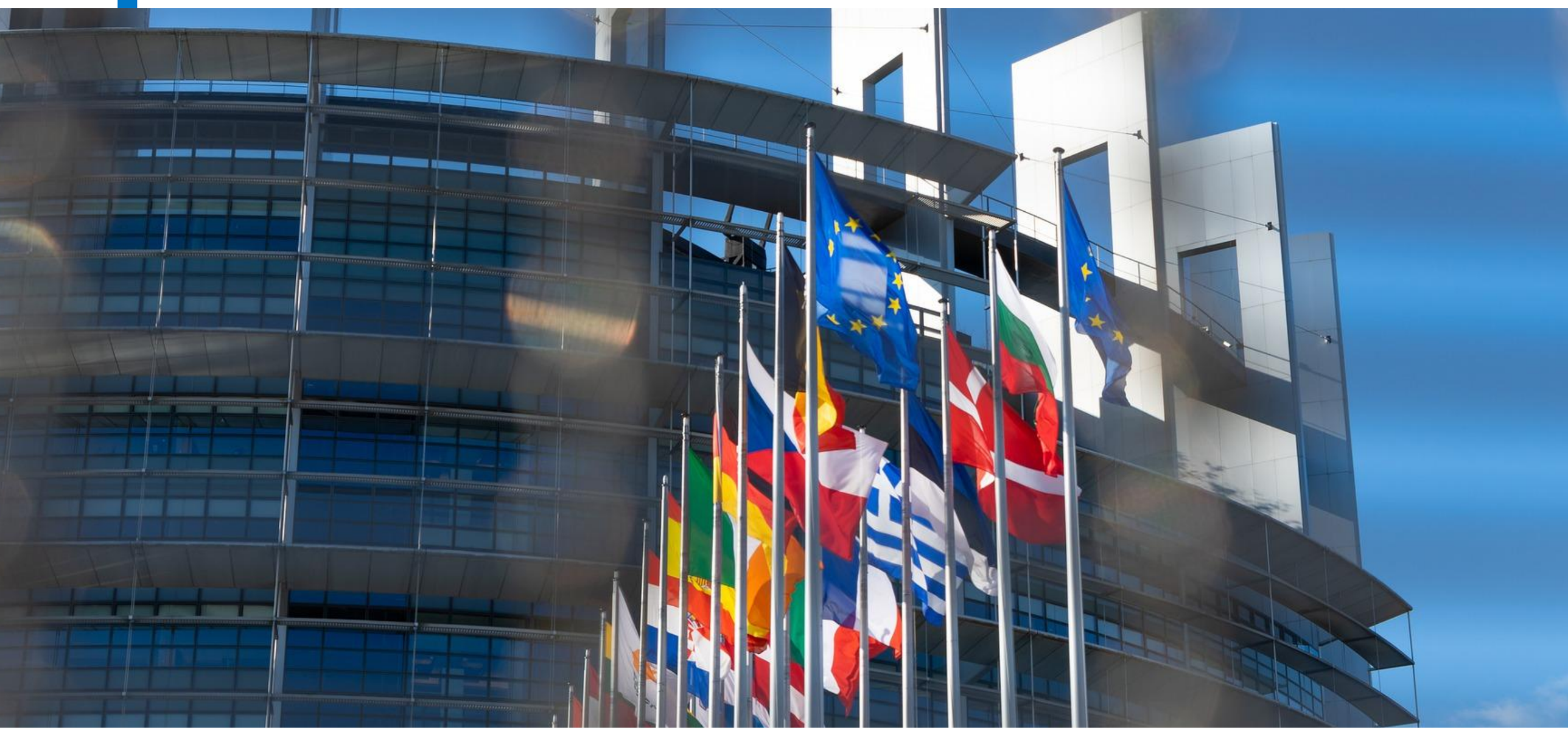
Per- and polyfluoroalkyl substances (PFAS) are used in countless forms and applications. The carbon-fluorine bonds are extremely difficult to break down, and non-polymeric PFAS can accumulate in the environment, in drinking water, and in food. For this reason, the European Chemicals Agency (ECHA) has developed a proposal to ban PFAS. The proposal was prepared by regulatory authorities from Denmark, the Netherlands, Germany, Norway, and Sweden. However, a closer look at fluoropolymers is worthwhile.



Why should PFAS be restricted?

PFAS are chemically extremely stable; they react little or not at all with other substances, even with aggressive chemicals, and are therefore water-, dirt- and grease-repellent. Their greatest strength is simultaneously their greatest weakness: in nature, they are barely or only very slowly degraded. Non-polymeric PFAS thus accumulate in the environment and are now detectable almost everywhere analytically. For this reason, it seems sensible to restrict the use of these PFAS, particularly in consumer goods for private users or in applications with direct release into the environment. This can reduce ecological problems and health risks.

Where do fluoropolymers stand within the PFAS group, and how do they differ?

An important subcategory of PFAS is fluoropolymers. Due to their different chemical structure and properties, however, they must be regarded as a separate family within the broad PFAS group. The entire chemical group of PFAS comprises more than 10,000 substances, of which only 38 are fluoropolymers.

Fluoropolymers differ primarily in two key aspects:

- First, they are considered harmless to health and are classified according to OECD criteria as ‘Products of Low Concern’, i.e., safe.
- Second, fluoropolymers are virtually irreplaceable in numerous, even vital, everyday applications. Additionally, they enable new megatrends such as 5G data transmission, the achievement of the EU Green Deal objectives, and e-mobility.

Critics argue that the production and disposal of fluoropolymers lead to emissions into air, water, and soil. However, currently available technologies ensure effective emission control:

- Manufacturers of fluoropolymers continuously work on technical advancements to counteract emissions; environmental releases are reduced, for example, through thermal oxidation plants.
- European producers of fluoropolymers agreed in 2023 on a voluntary commitment to reduce non-polymeric PFAS emissions below the applicable legal thresholds. They also advocate for these thresholds to be adopted into binding law.
- For fluoropolymers, several mechanical recycling options are state-of-the-art. In Europe, the vast majority of products containing fluoropolymers are properly collected and energy-recovered.

A potential relocation of PFAS production and disposal outside Europe must be viewed critically in light of global total emissions; some regions of the world have far lower standards regarding regulation and emission control.

The closure of Germany's only fluoropolymer producer by its US owner is a drastic example of such relocation activities. From January 2026, Germany will be 100% dependent on imports for fluoropolymers. All pro-K initiatives to secure domestic fluoropolymer production due to 'national necessity' found no support among political decision-makers in authorities and the federal government.

Why are fluoropolymers so difficult to replace?

Due to their unique combination of properties, fluoropolymers are very difficult, often impossible, to replace in many key industries. The required chemical and temperature resistance can often only be achieved with these high-performance plastics. Although alternative materials exist for certain polymer applications, they are usually highly application-specific and require compromises in other areas.

What is the path to reducing fluoropolymers in the environment?

Recycling and circular use greatly reduce the potential release of fluoropolymers into the environment: residues and waste, for example from the production of fluoropolymer semi-finished products, as well as fluoropolymers returned from use, can be chemically converted into monomers and purified so that they can serve as starting materials for new polymers. As this involves chemical recycling, the recovered material meets the quality and properties of virgin material. Economically, this also makes sense, as the materials circulated have a wide performance spectrum, are often irreplaceable, and are correspondingly high-priced. For this share of fluoropolymer products, reliance on the limited resource of fluorspar will no longer be necessary. At the same time, the carbon footprint of recycled fluoropolymers can be reduced by more than 80% compared with newly produced fluoroplastics; such circular products thus make an important contribution to climate protection.

Various collection systems ensure that fluoropolymers do not enter the environment at the end of their life cycle. Generally, their relevance as waste is low: the total share of fluoropolymers in municipal waste streams is less than 0.01% by weight.

Finally, several studies from Europe and the US show that almost no toxic PFAS are released when fluoropolymers are incinerated. This also applies to waste incineration plants in Germany, with usual temperatures of 860 °C or above and a residence time of over 2 seconds.

What impact would a ban on fluoropolymers have on industry?

German processors and users of fluoropolymers are important suppliers for numerous industrial key and future applications: from medical technology, automotive, aerospace, energy, and semiconductor industries to the defence sector. A blanket ban on entire substance groups based on the EU Chemicals Regulation REACH is not covered by the current legal framework and already shows far-reaching effects on essential industrial sectors, including those needed to implement the EU Green Deal. Fluoropolymer production and processing is nowhere as clean and reliable as in Germany and Europe due to strict EU chemical law and other European environmental directives. This is complemented by company-internal control mechanisms and closed production processes.

The impact of a potential PFAS ban on the resilience of Europe's industrial base was examined in the study The Per- and polyfluoroalkyl substances (PFAS) and their role as enablers in the competitiveness of European industry, commissioned by the Committee on Industry, Research and Energy (ITRE) of the European Parliament and published in December 2025.

The study examines the role of PFAS for the competitiveness of European industry and the potential consequences of a complete or partial restriction. The focus is on six key fluoropolymers (PTFE, PVDF, ETFE, FEP, PFA, FFKM/FKM), which account for around 93% of high-performance plastics used in Europe, as well as F-gases as refrigerants.
The significance of these materials is examined for aerospace, defence, green energy and climate technologies, and the semiconductor industry. The study includes an analysis of alternatives (AoA), a socio-economic analysis (SEA), and an assessment of international competitiveness.
For both the aerospace and semiconductor sectors, the study recommends a time-unlimited exemption for all PFAS due to the absence of alternatives.
In the defence sector, a time-unlimited exemption is also considered appropriate. For green energy and climate technologies, a more detailed analysis of the proposed and additional temporary exemptions is suggested.

How do other countries regulate PFAS and fluoropolymers?

Other approaches to PFAS regulation are pursued by the USA, China, Japan, and the UK, where fluoroplastics, i.e., 'polymeric PFAS', have recently been excluded from respective PFAS restriction plans:

- US authorities are also taking measures to regulate PFAS-containing products. Fluoropolymers are excluded from banned PFAS and considered of low concern.
- In the UK, the PFAS group is divided into two main categories: non-polymeric and polymeric PFAS. Fluoropolymers are included under polymeric PFAS and are exempt from restriction due to their low risk.
- In China and Japan, PFAS compounds are coming under focus through the ratification of the Stockholm Convention. Polymeric PFAS, however, are not mentioned in current legislation in either country.

The EU restriction proposal therefore poses clear locational and competitive disadvantages for domestic industry, defence capability, and the population, potentially increasing dependence on non-European markets.

What is the next step for the restriction proposal?

A blanket ban on around 14,000 PFAS had already been rejected by industry representatives and organisations before the procedure began. The restriction process itself was also criticised, for example due to the lack of standardised analytical methods and overlaps with existing regulations. During the 2023 public consultation, ECHA received over 5,600 comments from more than 4,400 organisations, companies, and individuals. In August 2025, ECHA reported the current status of the procedure in a background report and defined eight further sectors to be considered, which came to the agency's attention due to the volume of submissions. For the fluoropolymer sector, these include essential areas such as sealing applications, medical applications, mechanical engineering, technical textiles for fire services or rescue operations, and military applications for advanced defence technology and soldier protection.

ECHA now plans to complete consultations on the 14 sectors originally covered in the restriction proposal, as well as on PFAS manufacturing and horizontal issues such as 'reuse, spare parts, or recycled products', by the end of 2026.

The next public consultation on the SEAC draft is scheduled for April/May 2026 for a period of 60 days. The final SEAC opinion is expected to be published at the end of 2026, completing the scientific assessment of the proposed restriction by ECHA committees.

Subsequently, the final opinions of the Risk Assessment Committee (RAC) and the Socio-Economic Analysis Committee (SEAC) must be submitted to the European Commission. The decision on the restriction itself is then made by the European Commission in agreement with the Member States.

Currently, ECHA does not plan for RAC and SEAC to perform a sector-specific assessment of the eight new sectors from the updated background document.

The impact of this on the proposed exemptions in the mentioned areas and the scope of the restriction cannot yet be fully assessed. The regulation is therefore not expected to enter into force before 2028; transitional periods will begin thereafter.

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