AT A GLANCE

Requested by the ITRE Committee

European Parliament

The Per- and polyfluoroalkyl substances (PFAS) and their role as enablers in the competitiveness of European industry

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This study examines how PFAS support EU industrial competitiveness and the potential impact of a full or partial restriction. Focusing on six key fluoropolymers and F-gases used in aerospace, defence, green energy, and semiconductor sectors, it finds that substitution is often unfeasible, particularly in aerospace, defence and semiconductors. Substantial economic losses and job impacts are predicted under both above restriction options, with risks to EU's global competitiveness.

The study recommends permanent or long-term derogations for critical sectors, extending transition periods for green technologies, and excluding F-gases from the restriction. Further research and an innovation fund to develop alternatives are recommended. Overall, a balanced approach that protects the environment while preserving industrial and technological strength is proposed.

Background

Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic chemicals and materials which have received particular attention in recent years. The European Chemicals Agency (ECHA) has acted to limit PFAS by developing a restriction on their use in firefighting foams. A universal restriction dossier was also submitted by Germany, Norway, Sweden, Denmark, and the Netherlands covering over 10,000 substances and excluding only a few fully degradable PFAS subgroups.

During consultation for the restriction dossier, two options were assessed: a full ban with an 18-month transition (Regulatory Option 1, RO1), and a ban with specific time-limited derogations (RO2).

Policy Department for Transformation, Innovation and Health
Author: Rosa RICHARDS, Robert WHITE, Richard STENNING
Directorate-General Economy, Transformation and Industry
PE 780.414 – December 2025

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The Committee on Industry, Research and Energy (ITRE) is now seeking an independent third-party analysis on the role PFAS plays in European industry competitiveness and possible consequences of a full or partial restriction. The study "Per- and polyfluoroalkyl substances (PFAS) and their role as enablers in the competitiveness of European industry" focuses on assessing the importance of six key fluoropolymers (PTFE, PVDF, ETFE, FEP, PFA, FFKM/FKM) which are believed to constitute 93% of all fluoropolymers used within Europe. The study also considers F-gases used as refrigerants.

The importance of these materials is assessed in the context of markets of strategic relevance, namely, the aerospace, defence, green energy and clean technology, and semiconductor sectors.

This study has assessed the importance of PFAS materials by conducting an analysis of alternatives (AoA), a socio-economic analysis (SEA), and an international competitiveness assessment.

Key Findings

Findings from the Assessment of Alternatives (AoA): Substitution in some specific applications may be possible. However, many wider applications across all strategic sectors may face challenges to substitute PFAS solutions which are often 'best in class'. The aerospace and semiconductor sectors have low substitution potential due to limited to no alternatives being readily available and the long development and testing times of these industries. An AoA for the defence sector is limited by a lack of publicly available data (as manufacturing data are often confidential for national security reasons). The green energy and clean technology sector represent many wide ranging PFAS applications, with the substitution potential varying within this sector on an application-by-application basis.

Findings from the Socio-Economic Analysis (SEA): The indicative SEA estimates that there will be significant damage and cost to the European economy under both restriction scenarios. A full ban (RO1) is the costliest option and could result in costs of at least €562.8 billion euros in the first year with annual costs of at least €72.8 billion after. A time-limited derogation (RO2) could be slightly less costly. RO2 is estimated to have a first-year minimum economic cost of at least €561.7 billion with annual recurring costs of at least €71.7 billion. The SEA also estimates that a minimum of approximately 39,000 enterprises and over 2.9 million employees, with SMEs making up 90% of this, could be impacted by such ROs.

Findings from the international competitiveness assessment: The regulatory trend is towards tighter controls, with global chemical companies being advised by investors to voluntarily phase out PFAS from their production. PFAS such as PFOA, PFOS, PFHxS, and PFCAs are regulated under the Stockholm Convention on Persistent Organic Pollutants, implemented by 190 signatories through national legislation. However, depending upon which derogations are enacted, the EU UPFAS restriction could become one of the strictest regimes which could be detrimental to the competitiveness of European industry due to the lack of alternatives in key industries.

Conclusions and Policy Recommendations

Overall, the study underscores the complex trade-offs between environmental regulation, industrial competitiveness, and technological innovation. The recommendations emphasise the need for nuanced, sector-specific approaches rather than blanket restrictions, recognising both the essential role PFAS play in critical European industries and the ongoing efforts to identify and develop viable alternatives.

The sector-specific recommendations are:

- **A time unlimited derogation for PFAS in aerospace applications**, due to the lack of available alternatives and the essentiality of ensuring the safety of aircraft for passengers. A time unlimited derogation to be reviewed every 10-15 years is proposed over a total exemption. Innovation funding should be made available to help facilitate the development and testing of alternative materials and systems.

  Commissioning studies to better understand the end-of-life process for aircraft and possible emissions is also recommended.
- **A time unlimited derogation for the defence sector**, due to growing global geopolitical insecurity and possibility for substantial disruption to supply chains. A large-scale defence sector chemical supply chain study is also suggested to identify more specifically which PFAS are used and where throughout the defence sector. Following from the study, more collaborative initiatives between European authorities and the defence sector are recommended to gradually and carefully substitute unwanted substances and materials in a way that ensures European security.
- To exclude F-gases from the scope of the UPFAS restriction and instead focus all regulatory control of F-gases into the existing F-gas Regulation. This will allow fostering the development of alternatives where possible in a more gradual way while still ensuring Europe retains the capacity to innovate in green technologies.
- A more detailed review of the proposed (and unproposed) time-limited derogations for green energy and clean technology uses of PFAS as this a very broad sector with alternatives at different stages of development. Alternatives are being developed, but time is needed for these to come to market. It is also recommended that a task force (possibly within ITRE or ECHA) is established to monitor and commission studies on alternatives which would further bolster European innovation and competitiveness.

Finally, given the pace of the green transition and reliance on fluoropolymers, it is recommended that stringent emission control and remediation requirements (for example at end of life) are placed on companies in this sector.

- **A permanent derogation for PFAS for the semiconductor sector**. Modern technologies, digital services, and AI depend entirely on semiconductors. Without semiconductors, Europe's digital economy will come to a standstill. The study suggests the investigation of a dedicated semiconductor chemical policy framework within the European Chips Act, following a detailed analysis of the industry and evidence-based risk assessment. Broadening the Chips for Europe Initiative, research into alternative manufacturing technologies in semiconductor and quantum fields is recommended. In addition to the research to eventually eliminate PFAS from semiconductor manufacturing under the European Genesis Programme, in the meantime a new funding stream under the Chips Act could enable the adoption of the latest abatement technologies to ensure strict emissions control of PFAS.

Two further recommendations apply across all sectors. First, to develop stronger evidence on the human health and environmental effects of these fluoropolymers. Second, to consider creating an innovation and investment fund to promote and support technological advances in abatement and remediation.

Administrators responsible: Anne PLOEGER, Kristin BECKER Editorial assistant: Irene VERNACOTOLA
Contact: ecti-poldep-b@europarl.europa.eu
This document is available on the internet at: www.europarl.europa.eu/supporting-analyses
PE 780.414
ECTI/B/ITRE/FWC/2022-108/LOT3
Print ISBN 978-92-848-3293-4 | doi: 10.2861/9425001 | QA-01-25-290-EN-C
PDF ISBN 978-92-848-3292-7 | doi: 10.2861/0399493| QA-01-25-290-EN-N