

EPEE Position on PFAS Universal Restriction Proposal: F-gases and Fluoropolymers

Summary

November 2023

EPEE, as the voice of the Refrigeration, Air Conditioning and Heat Pump (RACHP) sector in Europe, would like to highlight its key concerns and recommendations related to the Universal PFAS Restriction proposal, as submitted [to ECHA](#). The definition given of PFAS covers a wide range of fluorinated gases (F-gases)¹ as refrigerants, and all fluoropolymers² in RACHP equipment. As currently proposed, the restriction proposal would have a detrimental effect on those crucial applications, which is why EPEE recommends a full –time-unlimited derogation, with a review clause 10 years after the date of the entry into force.

The importance of RACHP to society

Cooling and heating are a fundamental need for society, as:

- Refrigeration ensures healthy and affordable food supplies and reduces CO₂ emissions by avoiding food waste.
- Refrigeration helps to safely transport and store medicines and vaccines.
- Comfort cooling is necessary in areas where temperatures are increasingly becoming a threat to productivity and health, including in hospitals.
- Using heat pumps for comfort heating is key to achieving the decarbonisation of heating.

Heating and cooling directly impact the health and well-being of Europeans. For instance, for cooling, those direct benefits align with eight of the [UN's Sustainable Development Goals](#).

Equipment operates in homes, office buildings, commercial and industrial sites, but also in airports, hospitals, schools, and many others places. Heat pumps offer flexibility and support district heating and cooling networks, as well as the recovery of waste heat. RACHP products comply with robust energy-efficiency requirements, and operate within strict safety codes and standards. At EU level, they are already regulated, especially by the F-gas Regulation.

In addition to the societal benefits of RACHP equipment, heat pumps are a key technology to decarbonise the building sector, which represents 36% of the GHG emissions³. By 2050, the roll-out of heat pumps will save more than 600 million tonnes of CO_{2eq}⁴ annually.

¹ For the full reply provided to ECHA on f-gases, please see: <https://epeeglobal.org/wp-content/uploads/2023/09/AEPEE-reply-part-I-PFAS-REACH-22.09.2023-F-gases.pdf>

² For the full reply provided to ECHA on fluoropolymers, please see: <https://epeeglobal.org/wp-content/uploads/2023/09/BEPEE-reply-part-II-PFAS-REACH-22.09.2023-fluoropolymers.pdf>

³ [Energy performance of buildings: climate neutrality by 2050](#)

⁴ EPEE's HFC Outlook EU Model

1. Justification for a time-unlimited derogation for F-gases

The current legislative framework

The **F-gas Regulation** is the main piece of EU legislation that regulates the use of F-gases, as the transposition of the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, including the 2016 Kigali Amendment. These global commitments aim at implementing an HFC phase-down to reduce HFC production and consumption by more than 80% based on their greenhouse impact over the next 30 years. The first two Regulations (2006 and 2014) led to a significant decrease in emissions, and the third edition to be adopted in February/March 2024⁵ will introduce stricter containment measures for HFCs, HFOs and blends. It also plans several new requirements including full F-gas product bans for several product categories with a review clause to assess via a report before 2030 the feasibility of those bans on split and self-contained air-conditioning and heat pumps below 12kW as well as on chillers below 12kW. Finally, a full phase out of virgin HFCs is planned by 2050 with a review in 2040 to assess the feasibility of this goal.

This shows that the F-gas Regulation already puts some stringent requirements for the use of refrigerants and especially of F-gases. By reducing the use and the emissions of F-gases, the Regulation has the same purpose than the PFAS restriction proposal, as it limits their environmental release and impact.

Aside from the F-gas Regulation, RACHP equipment falls within the scope of both the Ecodesign Directive and Energy Labelling Regulation, under which equipment complies with energy efficiency requirements. It also falls within the Waste Electrical and Electronic Equipment (WEEE) Directive, which covers equipment end-of-life, including by recovering and reclaiming refrigerants. Safety requirements also provide a framework for the use of F-gases.

Emissions of the sector

EPEE created and continues to update its *HFC Outlook EU* model to project pathways for the refrigerant transitions in view of the EU F-Gas Regulation, in collaboration with Gluckman Consulting. This is based on value chain data provided by members and it aims to forecast the refrigerant development in RACHP equipment in the years to come. Its projections are built bottom-up, providing an analysis of the stock of equipment in more than 50 F-Gas market sub-sectors. This includes the RACHP sectors but also non-RACHP HFC applications such as MDIs, technical aerosols and foams.

This modelling revealed that emissions and leakage rates are generally low but can vary between products. Many types of small RACHP equipment are factory built sealed systems, e.g. domestic refrigerators and standalone retail display cabinets. This type of system typically has refrigerant charge in the range of 0.05 to 0.5 kg. They have a very low operational leakage rate – well below 1% per year, see Figure 1 below.

⁵ An agreement was reached in October 2023 for the third F-gas Regulation, with an entry into force expected in Q1 2024.

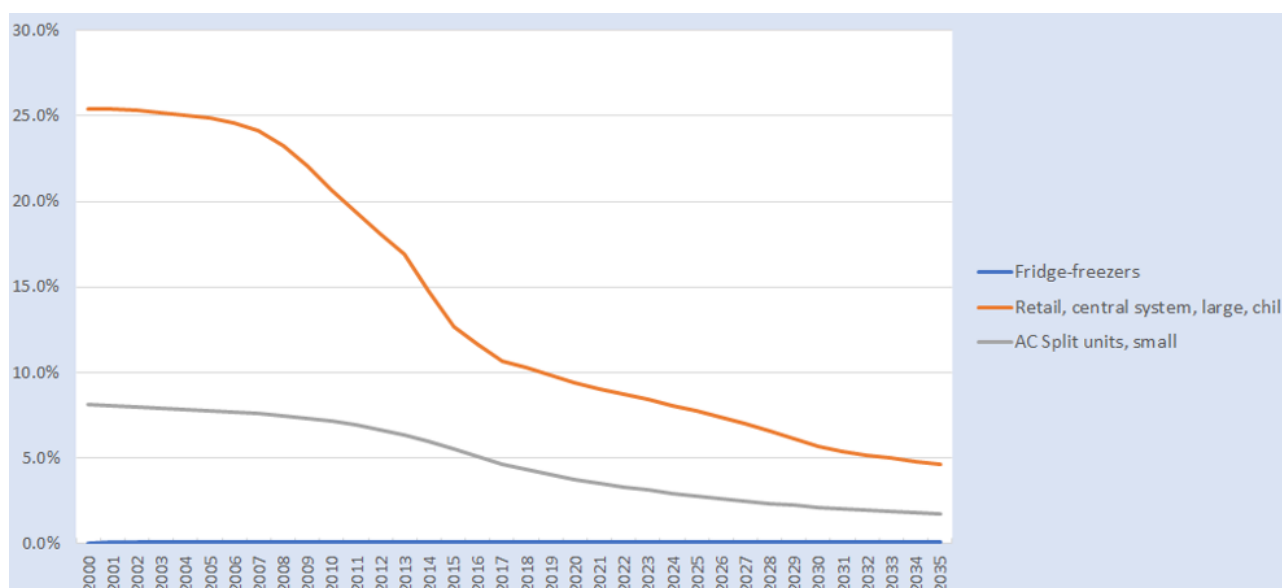


Table 1 - Modelling projections for operational leakage rates for 3 types of RACHP equipment until 2035

The global amount of refrigerant emissions is largely decreasing year by year and will be cut by more than half between 2020 and 2035 (see tables below for both HFCs and HFOs).

	HFCs						HFOs				Total
	R125	R134a	R143a	R227ea	R245fa	R365mfc	R1233zd(E)	R1234yf	R1234ze(E)	R1336mzz	
2020	10.016	19.071	3.653	200	72	114	1	1.546	94	0	34.766
2025	8.503	16.099	2.424	169	-	-	15	3.617	384	6	31.218
2030	4.809	9.703	187	81	-	-	29	6.022	670	12	21.512
2035	2.654	4.301	20	-	-	-	43	8.686	999	17	16.720

Table 2 - Modelling of emissions of refrigerants by molecule in tons between 2020 and 2035

Degradation products of F-gases

One of the main rationales behind the inclusion of F-gases in the restriction proposal of PFAS fluorinated greenhouse gases is the degradation in the atmosphere of some F-gases into trifluoroacetic acid (TFA), which belongs to the PFAS definition. However, many independent experts and scientists consider TFA to be of low concern for human health and the environment.

For more than a decade, the Environmental Effects Assessment Panel (EEAP) of UNEP has commented on the issue and concluded in 2022 that “all PFAS should not be grouped together, persistence alone is not sufficient for grouping PFAS for the purposes of assessing human health risk” and that “based on projected future use of these precursors of TFA [including HFC/HFO], no harm is anticipated”.⁶

⁶ See EEAP, 2022 Assessment report : <https://ozone.unep.org/system/files/documents/EEAP-2022-Assessment-Report-May2023.pdf>

Granularity of applications

It is important to highlight that the use of F-gases falling under the definition of PFAS is fairly diversified across RACHP applications. For instance, for sealed refrigeration systems (such as retail stand-alone systems) the use of ultra-low GWP refrigerants is common, while for industrial refrigeration (chillers, DX) some small equipment is not well suited for non-fluorinated gases.

The wide product variety and application specificity of the sector has to be taken into account.

Impact of a potential restriction

A broad ranging PFAS ban would have adverse consequences on the full value chain, including:

- The restriction would impede the optimal **refrigerant choice for new equipment**, likely hindering the ongoing and future R&D towards the development of even safer and more energy-efficient devices.
- Restricted system maintenance and refrigerant refilling could lead to **premature obsolescence** of equipment.
- The **circular loop enabled by the recovery, reclamation and reuse of refrigerants** could be hindered if the Restriction does not foresee an appropriate exemption.
- As the restriction foresees very low thresholds for manufacture, use and placing on the market, it does not take into account processes and procedures for the **manufacturing, supply chain, recovery and recycle of F-gases**. If some impurities are detected in gases that are not fundamentally PFAS, it could result in unintended consequences. It is recommended that a specific concentration limit for fluorinated impurities is established for virgin and reclaimed refrigerants (which should be exempted from this restriction). For consistency, should be based upon the AHRI 700 2019 Standard.
- To secure global competitiveness, the export for PFAS F-gases should be exempted, otherwise the prohibition will result in a **technical barrier to trade**.

Our recommendations for consideration

Considering the data and the impacts that EPEE has provided in its reply to the Public Consultation, we would like to make the following recommendations:

Since the F-gas Regulation already regulates the use of F-gases, the Universal PFAS Restriction **shall exempt the use of F-gases for Refrigeration, Air-Conditioning and Heat Pump (RACHP) applications**. Alternatively, the Universal PFAS restriction should **include a full time-unlimited derogation for F-gases used in RACHP applications, with a review clause 10 years after the entry into force of the Restriction to assess the availability of alternatives**.

- A full time-unlimited derogation for:
 - maintenance and refilling of equipment to avoid premature obsolescence;
 - reclamation and recycling of refrigerants; and
 - export of pre-charged equipment containing F-gases.
- A reconsideration of the thresholds used in the Restriction Proposal and of their feasibility, as they may jeopardize the efforts to recover, reclaim and reuse refrigerants to achieve a Circular Economy. In the case of F-gases, standard distillation and purification methods used for F-gases (virgin and recycled) allow impurities in the range of 0,5%.

2. Justification for a full time-unlimited derogation for fluoropolymers

Use of fluoropolymers

The use of fluoropolymers is essential for the functionality and tightness of RACHP products. Due to harsh conditions within the equipment, materials used need to withstand high pressure and high temperature. Fluoropolymers present key unique characteristics:

- Sealing to prevent the release of refrigerant into atmosphere, which also avoids leakages during transport of refrigerants;
- Temperature and pressure resistance facing differentials from -50°C to 175°C and from near vacuum conditions up to 120 bar;
- Persistence and chemical inertness, which allow the products to last for long and reduce waste;
- Unique electrical properties, like the low dielectric constant that does not break down when subjected to important electric fields;
- Low friction that enables components to be more sustainable and require fewer repairs.

While many alternatives may be acceptable for just one or two of these properties, there is no one alternative that fulfills these needs simultaneously. There is no viable, existing alternative to fluoropolymers today that could fulfil all the same criteria with the same level of efficiency and safety.

Impact of a potential restriction

A ban on fluoropolymers in RACHP products would likely lead to an increase of GHG emissions and would require significant re-engineering and redesigning of thousands of components. While there is a time-unlimited derogation proposed in the Restriction Proposal for “refrigerants in RACHP equipment in buildings where national safety standards and building codes prohibit the use of alternatives”, this derogation does not cover fluoropolymers, making it pointless as equipment will not properly function without fluoropolymers.

Lack of alternatives

Two alternatives would have to be considered for fluoropolymers:

- A return to previously used components, which were replaced for efficiency and/or safety reasons (for instance, lead)
- Development and implementation of innovative components.

Finding an alternative is a lengthy process. It requires time to ensure that it meets safety, performance and efficiency standards while maintaining compatibility with existing infrastructure and equipment. The derogation for the RACHP applications needs to cover the maintenance and refilling of equipment as well, for its full lifecycle, to avoid premature obsolescence. A similar consideration is needed for the treatment of waste containing fluoropolymers, to ensure circularity in the sector.

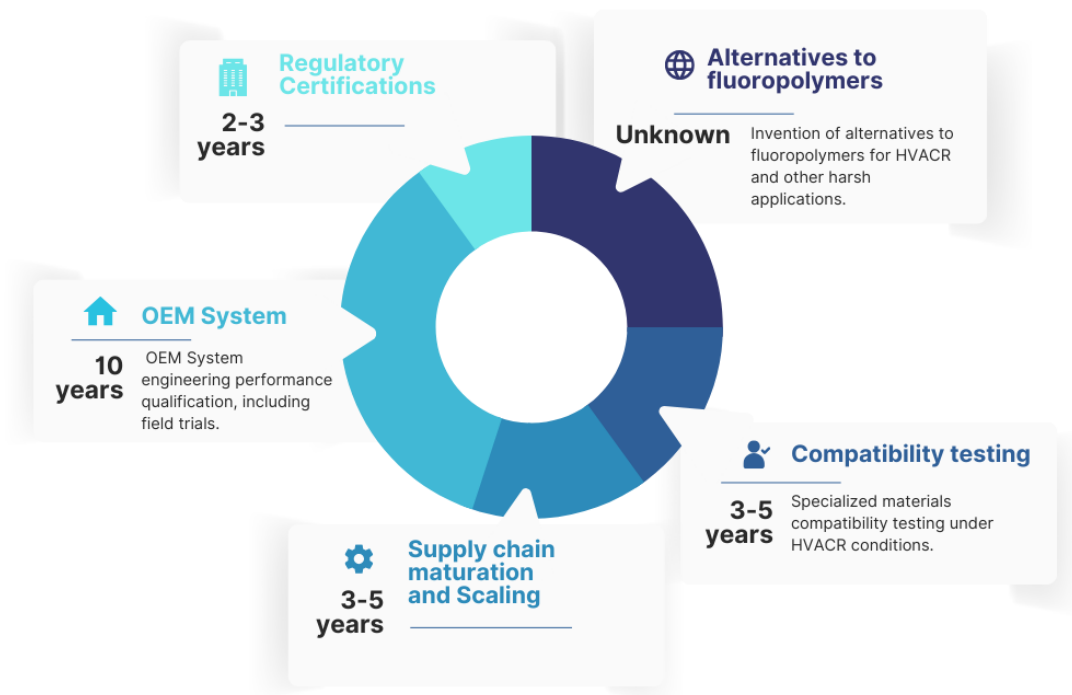


Figure 1 - Internal estimation of time for developing alternatives to fluoropolymers, based on experiences conducted by the industry

Key considerations

All fluoropolymers fall under the proposed definition in the proposal. These substances, such as PTFE and FPM, among others, are critical to most of the components that make these systems run efficiently and at best performance. This includes vapour compression systems, which ensure the smooth, efficient and optimal performance of RACHP equipment and systems, and key applications such as comfort heating and cooling, refrigeration, and air conditioning.

Fluoropolymers are pivotal in their embedded design of the components and cannot be replaced by drop-in materials. The consequence of the possible ban as proposed would therefore be a forced, immediate need to completely redesign most products, while it is unclear when (or even if) efficient alternatives to fluoropolymers will be invented.

EPEE's recommendations

EPEE recommends a full –time-unlimited derogation for fluoropolymers for the RACHP sector, with a review clause 10 years after the entry into force to assess the availability and viability of alternatives.

Considering the data and the impacts that EPEE has provided in its reply to the Public Consultation, we would like to further recommend:

- A full time-unlimited derogation for spare parts, waste treatment (especially as fluoropolymers are inert) and export;
- Setting realistic concentration thresholds that would not hamper the circularity of the components.