Summary of the EFCTC SEA of the value of F-gases

Context

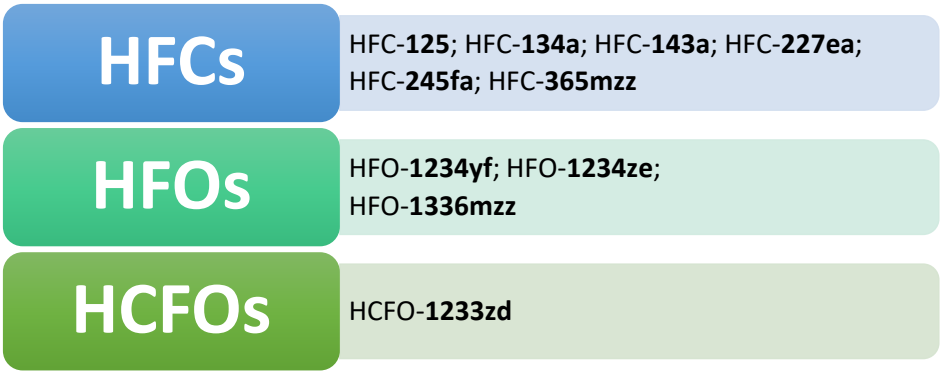
In 2022, EFCTC commissioned Ricardo Energy & Environment Ltd. to provide an independent Socio-Economic Analysis (SEA) of the contribution of the fluorinated greenhouse gas (F-gas) industry to the European Economic Area's (EEA) economy and society.

The purpose of the study is to support a response to the European Chemicals Agency's (ECHA) consultation on the upcoming restriction proposal for all PFAS substances (expected early 2023).

The analysis presented in this report is based on evidence gathered from desk-based research from literature and public statistics, and from consultation responses from the surveys of F-gas producers and importers, and downstream users.

Scope & Methodology

The scope of this assessment covers a set of 10 F-gases (and their blends), which have been identified as meeting the proposed definition of PFAS at risk of a potential REACH restriction and are of interest to the European F-gas manufacturers. The geographical scope of the analysis is the European Economic Area (EEA).



This SEA follows closely ECHA's guidelines, and in order to guide the analysis a baseline scenario is contrasted to the restriction scenario. Baseline and restriction scenario projections are extended to 2040 in order for the restriction and its effects to fully take place.

- *Baseline scenario:* represents a business-as-usual situation, i.e., a situation with no restriction in place. It incorporates effects from the existing F-gas Regulation (EU No 517/2014).
- *Policy scenario:* where the proposed PFAS restriction enters into force, restricting the F-gases in scope. The policy scenario is further broken down in two scenarios:

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- *Scenario 1* considers the proposed restriction entering into force in 2025, and businesses are able to place a range of substitutes and/or reformulated products on the market instantaneously upon restriction.
- *Scenario 2* also considers the proposed restriction entering into force in 2025, but in this case businesses may need on average 5 years to adjust operations and place their substitutes and/or reformulated products on the market.[1]

Key Findings

❖ Socio-economic impacts

The Ricardo study found out the overall socioeconomic impacts below:

IMPACT ON DOWNSTREAM USERS:

→ **Revenue losses** estimated **between €2.2 and €4.1 billion per year** between 2025 and 2040

→ **Job losses** estimated **5,100 by 2040**, almost **4% of the baseline** workforce in 2040 → **knock-on effects**: losses could reach **between 6,000 and 27,000 fewer jobs**, on average, by 2040.

IMPACT ON PRODUCERS:

→ **Turnover losses** estimated **between €550 and €640 million per year** on average between 2025 and 2040

→ around **80-90 jobs** would be **lost** by 2040, which is equivalent to around **1% of the baseline** workforce in 2040 → **knock-on effects**: losses could reach **around 300 fewer jobs** by 2040.

Possible impacts on consumers

The Ricardo study found that the proposed restriction would generate increased costs and reduced efficiency, both in the performance of the product applications and in their energy consumption, leading to an increased burden on consumers, possibly limiting their choices and reducing incentives of technological change from the current equipment containing F-gases. In turn, this could also increase the illicit trade in non-compliant products.

[1] For further info consult Ricardo's report, section 2.1.3 on the 'Methodology overview', pg. 12.

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❖ **Environmental and human health impacts**

The health and environmental impacts of HFCs and H(C)FOs and their breakdown products, as well as of non-fluorinated alternatives, have been extensively studied and are well known.[2] Extensive toxicological testing has demonstrated that the F-gases in scope have very low toxicity to both terrestrial plants and aquatic organisms such as algae, invertebrates, and fish, as well as to humans, and display no observable evidence to suggest genetic, reproductive, developmental, or carcinogenic toxicity in humans. Some HFCs and H(C)FOs in scope can degrade into trifluoroacetic acid (TFA), which can persist in the environment. According to a report by the UNEP Environmental Effects Assessment Panel, TFA produced by the environmental degradation of HFCs and HFOs is found in low concentrations which are not likely to have adverse toxicological consequences. With regards to human health effects, Ricardo concluded that there is little evidence to date to suggest any adverse health effects in humans from exposure to TFA.

Ammonia (NH_3) is one of the five main air pollutants under Directive (2016/2284/EU), and it is reported to be acutely toxic. However, it has a very low GWP value of essentially zero and is recognised by the European Commission as a suitable alternative to F-gases used in refrigeration systems such as HFC-134a. Carbon Dioxide (CO_2), due to its non-flammable and relatively non-toxic properties, is suitable to be used as a refrigerant for some applications. Depending on concentration levels in the air the effects on health vary; being an odorless gas, CO_2 can pose risks to humans in areas not equipped with sensors to detect releases over the safe concentration level. Finally, hydrocarbons such as propane (C_3H_8), propylene (C_3H_6), and propane butane/isobutane blends are all considered to be of low toxicity to humans but presents physical hazards such as blast and high flammability, in contrast to both HFCs and HFOs.

The Ricardo study concluded that the upcoming proposed restriction could only have a marginal impact in avoiding health effects associated with exposure to the F-gases in scope. The potential health risks to humans presented by the exposure to F-gases and their non-fluorinated alternatives is to an extent mitigated by existing EU and national legislation. Should the restriction come into force in the form of a full ban of the F-gases in scope, some of these F-gases will be likely replaced by non-fluorinated alternatives. CO_2 and hydrocarbons, like F-gases, are also known for their low toxicity, however, they present different physical hazards, such as blast and flammability. While the classification of ammonia as toxic ensures that this substance is being stored, handled, and used, under far stricter safety measures, the potential health risks are significantly high due to its toxicity and its air pollution effects.

Moreover, a blanket restriction of all PFAS might not contribute to the reduction of Green-House Gases (GHG) emissions. In fact, the restriction could potentially lead to worse GHG emission outcomes compared to the baseline scenario by hindering the substitution to low GWP solutions. It should also be noted that unavailability of alternatives in time could potentially increase the risk of illegal trade of HFCs and potentially result in higher GHG emissions and a higher risk of climate change.

[2] Please check the notes below as well as Ricardo's report, pg. 108-115.

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Ricardo's recommendations

Ricardo provided the following recommendations:

OPTION 1 - DEROGATION / EXEMPTION

for the low GWP F-gases in scope and their blends (i.e., H(C)FOs and their blends)

- would allow the sector to **meet the EU climate targets** and maintain operations
- ould **work alongside** the phase down of **the F-gas Regulation**, ensuring compliance through transparency and coherence of objectives

OPTION 2 - TRANSITIONAL AGREEMENT

to allow for continued use of F-gases in scope within a certain timeframe

- would **encourage R&D** into non-PFAS alternatives (chemical or technical) and allow business to respond to the changes required
- would need to be **in line with** the phase-down of the **F-gas Regulation** to prevent double regulation and non-compliance due to lack of coherence

About EFCTC

The European FluoroCarbons Technical Committee is a Cefic Sector Group that monitors legislation related to HFCs (hydrofluorocarbons), and HFOs (hydrofluoro-olefins) in the EU and at global level.

Fluorocarbons are used as feedstock, as refrigerants, as solvents and as blowing agents for insulation plastic foams.

Contact: **EFCTC Chairman:** Dr. Nick Campbell, nick.campbell@arkema.com
EFCTC Secretariat: Elisa Consoli, eco@cefic.be

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