



Joint NGO Position Paper on the Proposal to Revise the EU F-Gas Regulation – June 2022

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Introduction

The EU F-Gas Regulation is a landmark piece of European Union (EU) climate legislation for reducing emissions of fluorinated gases (F-gases) such as hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF₆). After six years in force, the legislation is now being revised. This paper identifies several areas where the European Commission proposal (COM proposal) should be strengthened.

The context for revisions to the COM proposal should be to align it with the EU Green Deal objectives, namely the climate neutrality, toxic-free environment and zero pollution ambition as well as the Do No Significant Harm (DNSH) principle as enshrined in the Taxonomy for Sustainable Finance.

Since the phase-out of ozone depleting substance (ODS) began more than 30 years ago, the key sectors relying on ODS have undergone several transitions – from chlorofluorocarbons (CFCs) to hydrochlorofluorocarbons (HCFCs) to HFCs. With the adoption of the Kigali Amendment, the world is poised to phase down HFCs, however some low-GWP HFC (and SF₆) substitutes (e.g. hydrofluoro-olefins (HFOs), perfluorinated nitrile and ketone) and their degradation products belong to the group of per- and polyfluoroalkyl substances (PFAS). PFAS are also known as ‘forever chemicals’ since their lifetime is around 1,000 years before they degrade.¹ Their toxic and persistent bioaccumulative effects have resulted in severe contamination of soil, water and food as well as harmful exposure to humans. Experts worldwide, including the European Chemicals Agency, have identified PFAS as a global threat to environmental and human health. Following the precautionary principle, PFAS are not viable SF₆ and HFCs substitutes and must be avoided.

Recommendations

I. Accelerate the HFC Phase-Down Based on Maximum Technical Feasibility

Following adoption of the Kigali Amendment, the HFC phase-down schedule required adjustment to conform to international obligations. In response, the Commission modelled three options: (i) adjust HFC phase-down schedule to comply with the Kigali Amendment (option 1); (ii) adjust HFC phase-down schedule based on marginal abatement costs of up to €390 per tonne of carbon dioxide equivalent (tCO₂e) (option 2); and (iii) adjust HFC phase-down schedule based on feasibility (option 3).² In the COM proposal, the Commission proposes option 2, a steeper phase-down based on HFC replacement where feasible at ‘proportionate cost’, which is set at €390/tCO₂e, the marginal abatement cost expected for the economy overall to reach carbon neutrality in 2050. The EU has traditionally exceeded the international schedules, for example completing the HCFC phase-out ten years in advance of the accelerated HCFC phase-out and adopting an HFC phase-down four years before the Kigali Amendment. Accelerating the HFC phase-down in the EU will help set the stage for negotiating an acceleration of the Kigali Amendment, but the EU should go further than option 2 and adjust the phase-down according to the maximum technical feasibility (Option 3).

There are several reasons why Option 3 is warranted:

- **It is feasible.** According to the Commission, “feasibility is based on technologies known today” and, in a future review, “it is highly likely that the quota system schedule can be further strengthened in line with new technological developments.”³ Option 3 is feasible today and is just a small step away from an HFC phase-out. Indeed, in 2039, the maximum amount of HFCs that will be made available is 5.01 Mt CO₂e, which represents only 2.83% of the 2015 base-value. Under the HCFC phase-out, a 0.5% and 2.5% servicing tail was allowed in developed and developing countries, respectively, for ongoing needs in existing equipment.⁴ Adoption of Option 3 could therefore set the scene for a complete phase-out of HFCs at a later stage.
- **It is cost-effective.** Option 3 can be achieved at a negative abatement cost of - €23.4/tCO₂e on average across all sectors,⁵ with only mobile air-conditioning in buses, metros and trains estimated to have a marginal abatement cost of more than €390/tCO₂e.⁶ To the extent any exemptions for these sectors are required due to disproportionate costs, an exemption procedure already exists in Article 11(4).
- **It aligns with EU climate objectives.** The EU aims to be climate-neutral by 2050, an objective at the heart of the European Green Deal and in line with the EU’s commitment to global climate action under the Paris Agreement. Given the lifetime of HFC-based equipment - typically 10-30 years for cooling and heating equipment, 40 years for electrical switchgear and 50 years for foam products - full-scale and prompt transition to climate-friendly solutions is needed to avoid an

unmanageable burden on future generations to contain HFC leakage during use and recover HFCs at end of life.

- **It avoids inadvertent-but-predictable climate consequences.** HFC manufacturing processes are energy intensive, involve the use of ODS and greenhouse gases (GHGs) as feedstocks and produce by-product GHGs that are released into the atmosphere. The most well-known is HFC-23 (GWP 14,800), a by-product of HCFC-22, which is a feedstock for lower-GWP HFCs incentivised under the HFC phase-down, such as HFC-32 and HFOs. Atmospheric emissions of HFC-23 are at record levels, underscoring the problem is still unresolved.⁷ Moreover, the HFC manufacturing process releases other GHGs that are unreported and have not yet captured the attention of policymakers.⁸
- **It positions the EU to lead at the Montreal Protocol.** With a near HFC phase-out on the books, the EU would be in a strong position to lead international efforts to accelerate the Kigali Amendment in the coming years, reinforcing EU climate ambition while futureproofing the EU F-Gas Regulation.

For these reasons, the EU should adopt an HFC phase-down schedule that aligns with the maximum feasibility and implementation improvements, namely Option 3.

II. Align HFC Production Steps with Consumption

The COM proposal outlines differentiated schedules for HFC production and consumption (placing on the market), allowing production to lag significantly behind consumption. There are several problems with this approach. **First**, the baseline for HFC production in the Kigali Amendment includes a percentage of HCFC production from 1989, calculated here as 28%.⁹ While this may have made sense in the international context to accommodate non-EU countries that found themselves still phasing out HCFCs at the time of adoption of the Kigali Amendment, the EU had already prohibited HCFC production in 2010.¹⁰ In other words, the baseline for HFC production in the COM proposal is inflated, a product of international negotiations. **Second**, the Montreal Protocol has historically aligned the baselines and schedules for ODS production and consumption to ensure consistent, proportionate reductions in global production and global consumption.¹¹ Here, the COM proposal undermines this logic, with the practical implication being that at the same time the EU is phasing out HFC consumption, it will be producing surplus HFCs for export to the global market, undermining climate objectives. The better approach, which will make EU leadership more credible, is to align the two baselines and schedules to ensure consistency and secure the additional climate benefit from early action in the EU.

III. Introduce Annex IV Bans on New HFC-Based Equipment

Placing on the market (POM) prohibitions in Annex IV, also called bans, are the most effective measure in the EU F-Gas Regulation, providing clear market signals with little administrative burden and costs. Moreover, bans are critical measures for small- and medium-sized enterprises (SMEs), which otherwise become locked into HFC-based equipment and face increasing costs or early obsolescence of equipment as the HFC phase-out progresses. Bans serve as clear signposts for SMEs that lack the capacity to monitor regulatory changes, safeguarding them from technological obsolescence and high servicing costs, while also limiting demand for black market HFCs. Following a comprehensive review of each subsector for the current EU F-Gas Regulation, the Commission-funded *Preparatory Study* (2011) and the Commission-published *Impact Assessment* (2012) concluded that the transition to safe and energy-efficient alternatives relying on natural and low-GWP technologies available at the time was both cost-effective and feasible in most subsectors by 2020.¹² Yet the EU F-Gas Regulation as proposed (2012) and adopted (2014) contained very few bans and this shortcoming has been repeated in the COM proposal. Annex I shows what could have been had a full slate of bans been adopted in 2014.

To avoid another lost decade, the COM proposal in Annex IV should be strengthened in several ways:

- Annex IV should be amended with a blanket ban on all new HFC-based equipment by 2030, to coincide with the HFC phase-down and ensure adequate HFCs for servicing requirements.
- The standard GWP threshold of 150 should be eliminated and replaced with a GWP threshold of 5 in all HFC-related Annex IV prohibitions;
- Specific earlier sub-sectoral bans should be put in place to signpost the HFC phase-out and ensure that adequate HFCs are available for the sub-sectors that will take longer to convert. Bans on new HFC-based equipment and products should be put in place at the earliest date that is technically feasible, with a GWP threshold of 5. For example, a prohibition on the use of fluorinated gases with a GWP > 5 in all new refrigeration equipment should be put in place from 2025.
- Where possible a ban on all “fluorinated greenhouse gases,” should be adopted, thereby excluding the use of HFOs. This would facilitate the transition to sustainable alternatives, avoiding the climate and environmental impact of F-gases. For example, given the recent adoption of standard IEC-60335-2-40, the proposed ban on split air-conditioning and heat pump equipment with a GWP of 150 or more should be brought forward from 2027 to 2025, and the prohibition extended to all fluorinated gases. Prohibitions on the use of fluorinated gases in other new air-conditioning equipment should be put in place by 2027 at the latest. The exemption process in Article 11(4) provides a safety net to allow for time-bound exemptions, if needed for some applications which may currently rely on HFOs as alternatives.
- Definitions of equipment should be clarified to avoid the circumvention of prohibitions by renaming equipment, and to ensure that all relevant equipment is covered, particularly in the refrigeration, air-conditioning and heat pump sector.¹³ It is not entirely clear, for example, where ice makers, humidifiers, dehumidifiers and ice rinks sit within the current Annex IV bans, if at all.
- References to exemptions for safety standards in the Annex IV bans (i.e. on split systems, fire protection, foams and technical aerosols) should be removed and instead individual exemptions adopted, where necessary.

IV. Ban Use of HFCs with Very High GWP (2500 and more)

From 2024, the COM proposal prohibits the use of F-gases listed in Annex 1 with a GWP of 2500 or more for servicing or maintenance of refrigeration equipment, except for low temperature (-50°C) and military applications. The prohibition is not applied to reclaimed or recycled F-gases until 2030. EIA investigations have highlighted the continuing high demand for very high-GWP HFCs, in particular HFC-404A (GWP 3922), for sale on the black market.¹⁴ Given the plethora of available natural refrigerant solutions as well as lower-GWP HFC drop-in solutions, there is simply no need for continued use and emissions of very high-GWP HFCs like HFC-404A. The Evaluation Report acknowledges that leakage rates are higher in commercial refrigeration applications compared to air-conditioning and that higher leak rates are observed for HFC-404A.¹⁵ Allowing reclaimed and recycled HFC-404A until 2030 sends the wrong signal, further perpetuates the demand for these super greenhouse gases and facilitates large-scale black-market trade in these gases. The use of HFCs with a GWP of 2500 or more should therefore be completely prohibited. This will require: (i) removing exemptions for military equipment and equipment intended for applications designed to cool products to temperatures below -50°C; (ii) advancing the timeline for allowing reclaimed and recycled F-gases under Article 13(3)(a)-(b) from 2030 to 2025; and (iii) banning the import, export, POM and use of virgin F-gases with GWP>2500 from 2025.

V. Improve the Framework of the Allocation Fee

The COM proposal proposes to allocate HFC quotas at a fixed cost of €3/tCO_{2e}.¹⁶ This is intended to overcome a major shortcoming in the current EU F-Gas Regulation, the free grandfathering of HFC quotas which has resulted in: (i) more than 5.6 billion euros of windfall profits to quota holders between 2015-19 (based on the estimated average price premium over the same period of €8/tCO_{2e} multiplied by the quota relevant placing on the market)¹⁷; (ii) ongoing abuse of the new entrants reserve; and (iii) significant illegal HFC trade.¹⁸ In the COM proposal, the maximum annual revenue will decrease over time as follows: €125 million in 2025-2026, €53 million in 2027-2029, €27 million in 2030-2032, €25 million in 2033-2035 and €20 million in 2036-2038.¹⁹ The revenue would offset administrative costs associated with implementing the quota and licensing systems, links to the EU Single Window Environment for Customs and enforcement with the remainder flowing to the EU budget as general revenue.²⁰

An allocation fee is a welcome addition, but it should be improved in two ways. **First**, recent market levels of HFC price increases are €6 per CO_{2e} tonne.²¹ This means that the fee does not even recover the profits that producers and importers can be expected to make off the quota system, much less in any way approximates the marginal abatement cost of €390/tCO_{2e} until 2050.²² **Second**, the fixed fee does not ensure a stable revenue stream for the duration of the HFC phase-out. A better approach is to increase the fee proportional to each phase-down step to provide stable revenue for the duration of the HFC phase-out, offsetting administrative costs and supporting implementation and enforcement by Member States. **Third**, higher revenue would allow for additional investments in Member States. For example, funding could support training, promote awareness raising campaigns for end-users and provide incentives to accelerate the transition to energy-efficient natural refrigerants and facilitate the HFC phase-out. It could also be used to support market surveillance and other measures to prevent illegal HFC trade, offsetting the administrative costs in Member States.

VI. Strengthen Measures to Prevent Illegal HFC Trade

A. Remove Licensing Requirement Exemptions

A valid registration in the F-gas Portal at the moment of import or export constitutes a license required under Article 22. Digitally connecting the F-gas Portal to the EU Customs Single Window Environment-Certification Exchange System has many benefits. For example, a much-improved real-time HFC licensing system which requires producers and importers to have sufficient quota at the time of placing on the market, instead of using an end-of-year balance that includes a deduction of exported quantities. Article 20 requires undertakings to have a valid registration in the F-gas Portal prior to the import or export of F-gases and products and equipment containing or relying on F-gases. However, the exemptions applied to the HFC phase-down are further applied to the licensing system, which will significantly undermine its effectiveness through the creation of loopholes which can be abused by illegal traders.

In the COM proposal, the following are exempt from the requirement to register in the Portal prior to importing or exporting through Article 20(4) and Article 20(4c):

- HFCs in temporary storage;
- HFCs imported into the Union for destruction;
- HFCs for use in feedstock applications;
- HFCs supplied for export out of the Union;
- HFCs supplied for use in military equipment;
- HFCs supplied for use in the etching of semiconductor material or the cleaning of chemicals vapour deposition chambers within the semiconductor manufacturing sector.

As currently envisaged, the licensing requirements do not fulfil the requirements of the Montreal Protocol, which requires each Party to establish and implement a system for licensing the import and export of new,

used, recycled and reclaimed “controlled substances” in Annex F of the Protocol. All HFCs in Annex F (which mirror the HFCs listed in Section I of Annex 1 of the EU F-Gas Regulation) are controlled substances, whether or not their production, placing on the market or use is exempt from the phase-down (e.g., for feedstock, military use etc.). Therefore, all HFCs should be included in the licensing system, in line with the approach taken by the ODS Regulation. Undertakings importing or exporting any HFCs, whether or not for purposes that are exempt from the HFC phase-down, should be required to register in the F-gas Portal and to have a valid licence. The exemptions listed under Article 20(4) should be deleted.

B. Improve Transparency

Increased transparency can support implementation and enforcement of the HFC phase-down. In recognition of this, the United States (US) HFC Phase Down Rule, published in October 2021, puts transparency front and centre of the legislation, noting additional public interests such as enabling local communities to monitor emissions from nearby facilities and supporting purchasers to know where they can legally buy HFCs.²³ HFC phase-down information which will be made public in the US HFC Phase Down Rule includes: (i) regularly updated company allowance allocation; (ii) information on companies receiving transferred quota and amounts received; (iii) a list of registered suppliers; detailed trade data on each import including point of entry and type of HFC; (iv) transshipment data; (v) domestic HFC production data including production for feedstock and facilities that produce HFC-23; and (vi) facility level chemical destruction data.²⁴

By comparison, publicly available EU HFC data is limited and opaque. The European Environment Agency (EEA) publishes annual aggregated data on HFC production, reclamation, destruction, feedstock use, import and export on a CO₂e basis only. No HFC type or facility level information is given.²⁵ Total annual supply of certain HFCs to EU markets is given for some HFCs but withheld as confidential for others, where supply is limited to less than three companies. Annual Eurostat customs data on imports and exports is more granular, listing HFCs by Combined Nomenclature (CN) code, however, these do not always distinguish between individual HFCs and blends.

On quota allocation transparency, the Commission only provides company details for incumbents, not new entrants, every three years. Amounts of quota allocated to companies are withheld. When queried over this the Commission stated that sharing quota allocation could undermine commercial interests and be harmful for companies holding quota. They further stated that revealing names of new entrants would undermine the business strategy of these companies as it would enable competitors to deduce amounts of quota they hold.²⁶

The lack of transparency in the EU F-Gas Regulation makes it hard for civil society, the broader enforcement community and other market players to scrutinise compliance. The EU F-Gas Regulation should be amended to adopt a more transparent approach to data sharing. **First**, facility level chemical specific production data information on HFC production facilities, including those that produce HFCs for feedstock should be shared. **Second**, information on all quota holders, including regularly updated information on amounts held and quotas transferred, should be available to the public.

C. Improve Supply Chain Traceability

The option to require documentation of downstream bulk HFC sales and a certificate of conformity of origin and compliance within the quota system was included in the Impact Assessment’s most ambitious option. Despite support from F-gas producers, importers and NGOs the option was dropped from the final COM proposal.²⁷ A lack of downstream supply-chain traceability risks undermining proposed measures to tackle illegal trade in HFCs. EIA investigations have highlighted the complex supply chain that illegal HFCs follow once on EU markets. Under the COM proposal, once HFCs are placed on the market in the EU, enforcement authorities have limited power to seize suspected non-quota HFCs and end-users are unable to verify the HFCs they purchase are legal. The EU F-Gas Regulation should introduce a modern approach to supply chain

traceability using a centralised database and QR codes or blockchain to track downstream sales of HFCs, akin to that being introduced in the US.²⁸

D. Require Mandatory Certification for Online Sellers

EIA investigations have documented the significant role of online marketplaces in the distribution of illegal HFCs in the EU. The Evaluation Report also identified enforcement of the online trade as a key challenge.²⁹ The online sale of F-gases should be restricted to genuine F-gas quota holders through a process of mandatory certification or through registration in the F-gas Portal along with requirements to ensure that undertakings are competent to handle F-gases. Moreover, the sale of F-gases through online marketplaces, such as Facebook, Amazon and EBay, should be banned.

E. Introduce Minimum Penalties for Non-Compliance

Article 31 sets maximum administrative fines of at least five times the market value of unlawful production, import, export, placing on the market or use of F-gases or products and equipment containing them. The Evaluation Report notes that penalties vary from one Member State to the other and in some cases their level may not be proportionate to the economic gains of illegal activities.³⁰ It would therefore be more effective to set minimum penalties for non-compliance, requiring both civil and criminal sanctions, in addition to maximum administrative fines.

F. Require Seizure of Illegal HFCs and Fund their Destruction

In Article 23(12), the COM proposal requires custom authorities to confiscate or seize non-refillable containers and, for other substances and equipment, allows custom authorities to take alternative measures, although re-export is prohibited. This creates a dilemma for customs authorities since confiscation or seizure comes at a cost for storage and destruction, which for some Member States is not a viable long-term solution. In one instance a Member State tried auctioning the confiscated illegal HFC shipment, but that was unsuccessful, due to the unknown purity and origins of the illegal HFC shipment. This provision should be strengthened in two ways to set out a comprehensive approach to confiscation or seizure. **First**, customs authorities should be required to confiscate or seize any illegal shipment, discouraging illegal HFC traders from any economic benefit of their activities. **Second**, the EU should establish a fund to assist Member States with the costs of confiscation or seizure and subsequent transport, storage and destruction, funded by the revenue from the allocation fee. **Third**, Member States should make a plan for ensuring the collection and destruction of illegal HFCs, including related costs.

G. Require Evidence for the Return of Refillable Containers

In Article 11(3)(b), the COM proposal prohibits placing on the market "containers that could be refilled but are imported or placed on the market without provision having been made for their return for refilling." It is unclear what evidence must exist of such "provision" for return for refilling or how it is to be provided, raising the risk that refillable containers will simply be used as non-refillable containers (also prohibited) – a particular problem in illegal HFC trade.³¹ To this end, the Commission should be empowered to adopt delegated acts outlining the evidentiary requirements to satisfy this requirement.

VII. Strengthen the Obligation on HFC-23 By-Product Destruction

In the COM proposal, Article 4(5) prohibits the placing on the market any fluorinated greenhouse gas unless evidence has been provided that HFC-23 by-product has been destroyed or recovered in line with the best available techniques.³² This was a carry-over from the current EU F-Gas Regulation, with the Commission including an additional requirement for importers and producers to draw up a declaration of conformity and providing itself the possibility to adopt implementing acts. The purpose of Article 4(5) is to ensure the HFC phase-down does not contribute to additional HFC-23 emissions, since the manufacturing process for

many HFCs incentivised under the HFC phase-down (including *e.g.* HFC-32, HFC-125, HFC-1234yf and HFC blends thereof) may result in HFC-23 by-product emissions.³³ While Article 4(5) is a welcome addition, it requires strengthening. **First**, importers and producers should be required to report on compliance with Article 4(5) under the reporting provisions in Article 26. The information to be reported should be drawn from the Technical Advice published by the Commission on HFC-23 by-product destruction, adopted in 2015.³⁴ **Second**, this reporting should be verified pursuant to Article 26(8), which ensures the veracity of reports for annual placement on the market of HFCs and could be easily extended to cover HFC-23 by-product destruction. **Third**, although the Commission is empowered to adopt implementing acts to determine the detailed arrangements relating to the declaration of conformity and supporting documentation, the EU F-Gas Regulation should detail what those should entail, including the required disclosure of the production facility of origin, proof of HFC-23 by-production abatement and traceability.

VIII. Update Standards and Building Codes in the EU

Outdated standards and building codes have presented significant barriers to the uptake of climate-friendly alternatives relying on flammable natural refrigerants, such as hydrocarbons, in commercial refrigeration, air conditioning and heat pumps. In 2016, the Commission published a report on barriers posed by standards and codes,³⁵ and in 2017 adopted a standardisation request under Regulation (EU) No 1025/2012, requesting a draft standardisation deliverable with technical specifications on the use of flammable refrigerants.³⁶ Over the last several years, progress has been made at the international level, most notably through two revised standards under the International Electrotechnical Commission (IEC) increasing the allowable charge size of flammable refrigerants. IEC 60335-2-89 in commercial refrigeration appliances was published in 2019,³⁷ while IEC 60335-2-40 affecting electrical heat pumps, air-conditioners and dehumidifiers is expected to be published in June 2022.³⁸ Both have significant implications on the uptake of alternative technologies relying on flammable natural refrigerants in these sectors. Part of the effort around standards has been, in addition to updating outdated ones, mainstreaming them across the European Union standardisation framework and removing other barriers created by building codes. The COM proposal does little to build upon these latest developments to mainstream them across the EU, something that could hinder their uptake, in particular since many of the Annex IV bans have exceptions for safety standards. To this end, the COM proposal should be improved in several ways. **First**, the Commission and Member States should be tasked with ensuring that European and national standards are immediately updated to reflect the new allowable charge sizes of flammable refrigerants, in conformity with IEC 60335-2-89 and IEC 60335-2-40. The Commission should also be tasked with ensuring other standards posing barriers to natural refrigerant uptake – notably the EN378 series – are duly updated. **Second**, Member States should be tasked with ongoing removal of barriers posed by building codes and local legislation, to the extent they conflict with IEC 60335-2-89 and IEC 60335-2-40 (as well as other standards), coupled with periodic reporting on their efforts and any exceptions to their removal. **Third**, the Commission and Member States should ensure representation of civil society environmental and social interested wherever standards are developed.

IX. Require Extended Producer Responsibility Schemes

In the COM proposal, Article 9 requires Member States to “encourage the development of producer responsibility schemes for the recovery of fluorinated greenhouse gases.” This provision is identical to the one in the current EU F-Gas Regulation, which was adopted when the polluter-pays principles and extended producer responsibility (EPR) were less defined at the EU level. According to the Evaluation Report that accompanied the F-Gas Regulation and Impact Assessment, just four Member States confirmed that a producer responsibility scheme was in place (DE, DK, FR and PT) and a further two more were planned (EE and MA).³⁹ In the intervening years, however, EPR has become a mainstream EU policy approach, most significantly with the revision of the Waste Framework Directive (WFD), amended in 2018 to set out minimum requirements for EPR schemes—such as take-back and collection systems and coverage of costs related to transport and treatment—to ensure harmonisation across the EU.⁴⁰ In light of this, Article 9

should therefore be improved in two ways. **First**, Member States should require EPR, not simply encourage it, as it supports containment and end-of-life recovery. **Second**, the EU should set out certain additional minimum requirements relevant to the HFC industry, such as on collection, reclamation, recycling, disposal facilities, equipment provision to certified technicians, reporting and awareness-raising. This would be similar to the approach to EPR schemes in the Directive (EU) 2019/904 on the Reduction of the Impact of Certain Plastic Products on the Environment (also referred to as the “Single-Use Plastics Directive”), which included additional minimum requirements for single-use plastics to those found in Article 8a of the WFD. This can either be done by inserting the minimum requirements in the EU F-Gas Regulation itself or by empowering the Commission to adopt implementing acts.

X. Ensure Training and Certification Programmes Cover Natural Refrigerants

As drafted, Article 10(1) is unclear whether certification programmes are required to certify that natural persons have the practical skills and theoretical knowledge for “other relevant alternatives to fluorinated greenhouse gases” (read: natural refrigerants) or whether only training needs to be provided. This is due to the use of multiple commas and qualifying clauses—which makes it ambiguous—and was clearly not the intention of the Commission.⁴¹ To fix this, Article 10(1) should clearly state that certification programmes in Member States must include certification for natural refrigerants, thereby ensuring familiarity and their safe handling during installation, servicing, maintenance, repair and decommissioning.

Article 10(2) specifies that training must include “other relevant alternatives to fluorinated gases” but does not specify the timing or the quality of the training. To fix this, Article 10(2) should request Member States to adopt a training plan within a year from the entering into force of the EU F-Gas Regulation. Such a plan should contain a timeline for the full training on all alternatives for all professionals, provisions to adapt school and university teaching programmes, training targets (such as a target for 50% of professionals trained on all refrigerants by 2025) and a multi-annual budget for its implementation.

XI. Mandate an Early Phase-Out of Sulphur Hexafluoride (SF₆) in Switchgear and other Equipment

SF₆ - the most potent GHG with a GWP 25,200 - should no longer be used in electricity grids. Market-ready and reliable alternatives to SF₆ exist and are already being deployed by some switchgear manufacturers. These alternatives should become the norm. SF₆ should be banned as soon as possible, well before the 2031 date proposed by the European Commission. To avoid loopholes, exemptions should only be granted based on objective tests, the sole criterion being that there are no SF₆-free solutions available on the market. Emission containment and reporting obligations should be set for both existing and new switchgear, and leakage should be addressed through strict labelling, reporting and monitoring.

SF₆ alternatives should be entirely F-gas-free. Substitutes such as fluoronitrile and fluoroketone pose a threat to environmental and human health as they are per- and polyfluoroalkyl substances (PFAS) that have a lifetime of around 1,000 years before they degrade. Only truly clean and sustainable alternatives should be allowed.

XII. Additional measures to address rising sulfur dioxide (SO₂) emissions

In the COM proposal, the fumigant sulfur dioxide (SO₂) has been added to Annex II Group 3, which would subject it to some containment provisions under the Regulation (under Article 4, prevention of emissions and producer responsibility schemes), but not others (e.g. Article 8, recovery and destruction).

Sulfuryl fluoride has a 20-year GWP of 7,150 and is increasingly used in place of methyl bromide as a structural and postharvest fumigant of dried fruits, tree nuts, grains flours and timbers. SF₂O₂ emissions are growing globally and expected to increase significantly in the future. In Europe, SF₂O₂ emissions have grown from around zero in 2000 to 0.25 Gg/year in 2019, mainly due to uses in the post-harvest treatment sector.⁴² Alternatives to sulfuryl fluoride exist, such as irradiation and temperature treatments.⁴³

Given the extremely high GWP of SF₂O₂ and significantly increasing emissions, additional measures are needed to ensure replacement with benign alternatives over time. This could take the form of a ban on the use of SF₂O₂ under Article 13, alongside the extension of recovery and destruction requirements under Article 8.

Conclusion

In this critical decade of climate action, with the revision of the EU F-Gas Regulation, the EU has a singular opportunity to take decisive action on fluorinated greenhouse gases, eliminating their use in the Union and spearheading the global transition to alternative climate- and environment-safe technologies.

Annex I: What Could Have Been

To illustrate what could have been, the following table outlines when bans could—and should—have been adopted for various subsectors based on the *Preparatory Study and Impact Assessment*, underscoring the missed opportunities in refrigeration, air-conditioning and heat pumps sectors, in particular:

Sector	Subsector	2012 Impact Assessment Feasibility of Ban		Ban Included in Annex III in 2014 Revision?
		2020	2030	
Domestic Refrigeration	Refrigerators/Freezers ⁴⁴	Yes	Yes	Yes, for 2015
	Stand-Alone Systems ⁴⁵	Yes	Yes	Yes, for 2022
Commercial Refrigeration	Condensing Units ⁴⁶	Yes	Yes	No
	Centralized Systems ⁴⁷	Yes	Yes	Partial, for 2022
Industrial Refrigeration	Small < 100 kW ⁴⁸	No	95% feasible	No
	Large > 100 kW ⁴⁹	Yes	Yes	No
Transport Refrigeration	Refrigerated Vans ⁵⁰	Yes	Yes	No
	Refrigerated Trucks ⁵¹	No	Yes	No
	Fishing Vessels ⁵²	No	95% feasible	No
Mobile Air Conditioning	Cargo Ship AC ⁵³	Yes	Yes	No
	Rail Vehicle AC ⁵⁴	No	60% feasible	No
	Passenger Ship AC ⁵⁵	No	90% feasible	No
Stationary Air Conditioning	Moveable Systems ⁵⁶	Yes	Yes	Yes, for 2020
	Split Systems ⁵⁷	Yes	Yes	No
	Multi-Split/VRF System ⁵⁸	No	Yes	No
	Rooftop Systems ⁵⁹	Yes	Yes	No
	Chillers (Displacement) ⁶⁰	Yes	Yes	No
	Centrifugal Chillers ⁶¹	No	Yes	No
Fire Protection	Heat Pumps ⁶²	Yes	Yes	No
	Fire Prot. HFC-23 ⁶³	Yes	Yes	Yes, for 2016
	Fire Prot. HFC-227ea ⁶⁴	No	90% feasible	No
Aerosol	Technical Aerosols ⁶⁵	No	95% feasible	Yes, with an exception
Foams	XPS ⁶⁶	Yes	Yes	Yes, for 2020
	PU Spray Foam ⁶⁷	Yes	Yes	Yes, for 2023
	Other PU ⁶⁸	Yes	Yes	Yes, for 2023

An unintended consequence of this lost decade is the significant illegal HFC trade witnessed today, as subsectors that should have already transitioned to HFC alternatives have not, inflating demand under the HFC phase-down and creating a lucrative black market. The importance of introducing bans into Annex IV is paramount.

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