BRIEFING

environmental investigation agency

CLIMATE

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A CONCISE GUIDE TO THE PHASE-OUT OF HYDROFLUOROCARBON SUPER POLLUTANTS IN THE EUROPEAN UNION'S F-GAS REGULATION

HFCs are responsible for two per cent of current global greenhouse gas emissions

BACKGROUND

Fluorinated greenhouse gases (F-gases) are synthetic gases, many with very high global warming potentials (GWP).[1]

They are widely used as refrigerants in air-conditioning, refrigeration and heat pumps, as well as a range of other products and processes, including electrical switchgear, fire protection, foam blowing and aerosols.

In recent decades, F-gas emissions — particularly hydrofluorocarbons (HFCs) — have increased significantly, posing a major threat to the climate.[2]

While HFCs are being phased down globally under the Kigali Amendment to the Montreal Protocol, current measures are inadequate to help meet the 1.5°C goal of the Paris Agreement.[3]

In February 2024, the European Union (EU) revised its previous 2014 F-Gas Regulation, introducing a world-first HFC phase-out and strengthening overall F-gas controls.

This document outlines the key measures on HFCs in Regulation (EU) 2024/573 on Fluorinated Greenhouse Gases (hereinafter the EU F-Gas Regulation or the Regulation). Further details are available in EIA's EU F-Gas Regulation Handbook.

EU-WIDE HFC PHASE-OUT

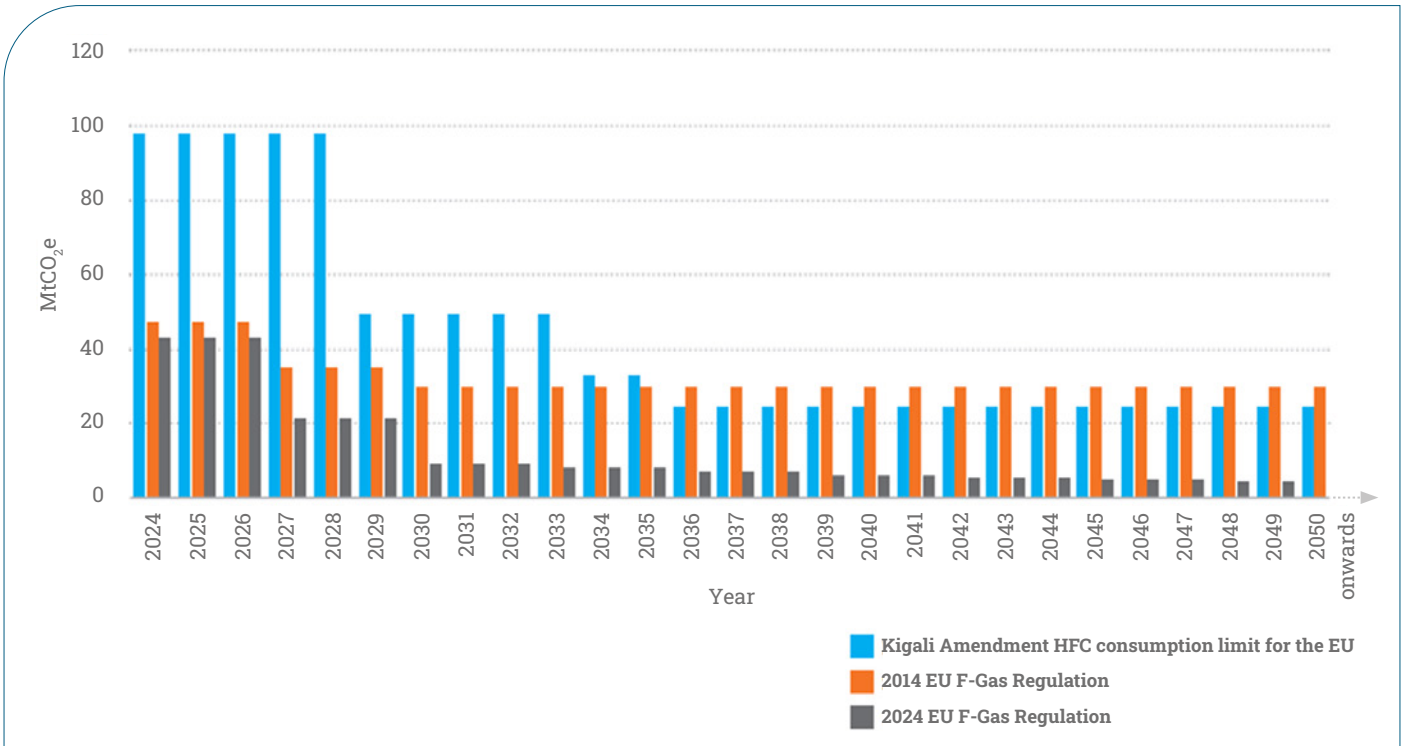
The EU F-Gas Regulation sets out an HFC phase-out, a progressive reduction of HFCs placed on the market each year based on the carbon dioxide equivalence (CO_2e).

From 2025, the revised EU F-Gas Regulation accelerates and extends the previous HFC phase-down schedule, establishing a 94.8 per cent reduction by 2030 from the 2015 baseline and a complete phase-out of consumption by 2050.[4]

Full implementation will avoid emissions equivalent to an estimated 500 million tonnes of carbon dioxide ($MtCO_2e$) by 2050. This represents the world's first HFC phase-out and sets the stage for an acceleration to the global phase-down under the Kigali Amendment.

Right: The EU F-Gas Regulation is supporting the uptake of sustainable natural refrigerant technologies.

Figure 1 *Comparison of EU HFC reduction schedules under the Kigali Amendment, 2014 EU F-Gas Regulation and 2024 EU F-Gas Regulation*



KEY TAKEAWAY

THE WORLD'S FIRST HFC PHASE-OUT

KEY TAKEAWAY

94.8 PER CENT REDUCTION FROM BASELINE BY 2030

KEY TAKEAWAY

AVOIDING EMISSIONS OF 500 MILLION TONNES OF CARBON DIOXIDE EQUIVALENT BY 2050

PROHIBITIONS ON NEW F-GAS-BASED PRODUCTS AND EQUIPMENT

The HFC phase-down is supported by bans, listed in Annex IV of the Regulation, which prohibit the placing on the market of new HFC-containing equipment by specified dates.[5]

In some cases, there is an eventual ban of all F-gases, including hydrofluoroolefins (HFOs), due to concerns over their environmental impact. This will stimulate a transition to sustainable F-gas-free alternatives, including natural refrigerants. Other bans specify F-gases in Annex 1, which excludes HFOs and other unsaturated hydro(chloro)fluorocarbons such as HCFOs.

Additional bans to those outlined in this graphic have existed for Annex 1 F-gases in non-confined direct evaporation systems (since July 2007), aerosol generators for entertainment (since July 2009), windows (since July 2008), footwear (since July 2006) and tyres (since July 2007).

Figure 2 (right): *Placing on the market prohibitions listed in Annex IV of the EU F-Gas Regulation*

EXEMPTIONS

A general exemption applies to military equipment. The Commission may authorise an exemption for up to 4 years if alternatives are not feasible or would entail disproportionate costs. Exemptions listed in Annex IV are:

* Except if required to meet safety requirements at the site of operation

(*) Except if required to meet safety requirements. If safety requirements at the site of operation would not allow using alternatives to F-gases, the GWP limit is 750

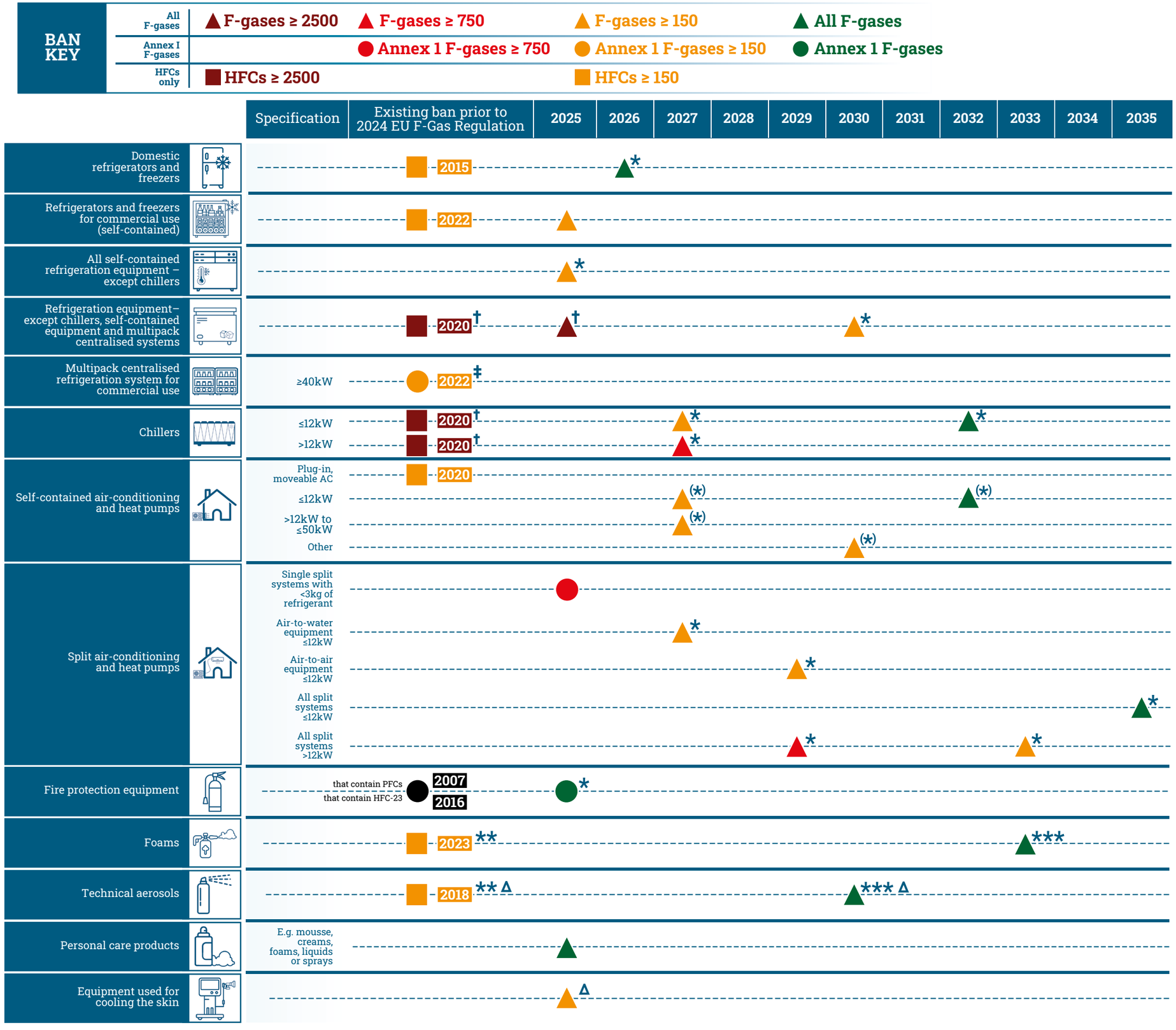
** Except if required to meet national safety standards

*** Except if required to meet safety requirements

† Except equipment intended for application designed to cool products to below -50°C

‡ Except in the primary refrigerant circuit of cascade systems where fluorinated greenhouse gases with a GWP of less than 1,500 may be used

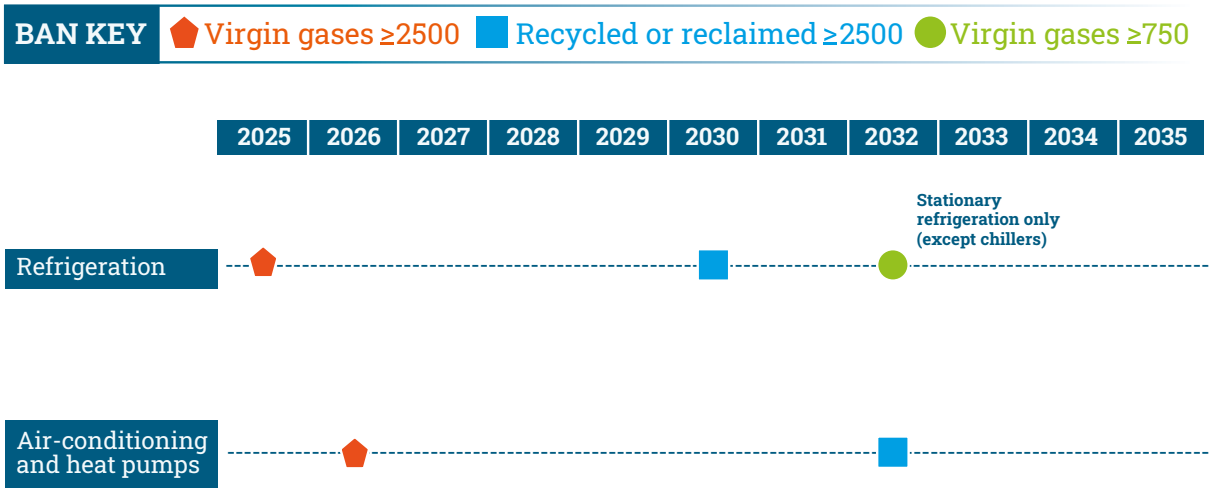
Δ Except if used for medical applications



USE BANS

The updated Regulation prohibits the use of high-GWP F-gases for the maintenance or servicing of refrigeration, air-conditioning and heat pump equipment.[6]

Figure 3: *Use bans under Article 13 of the EU F-Gas Regulation*



PREVENTION OF EMISSIONS

Operators of equipment reliant on F-gases must take all necessary precautions to prevent unintentional releases of such gases, including HFOs.[7]

PROOF OF HFC-23 BY-PRODUCT DESTRUCTION

The revised Regulation bans placing F-gases on the EU market unless companies prove that any HFC-23 by-product from the F-gas production process has been destroyed or recovered for subsequent use, using best available technologies.[8] Producers and importers must provide a declaration of conformity, which includes:

- the origin and production facility of the F-gases, including the identification of facilities that produced any HCFC-22-related precursors as part of the production process
- evidence of availability and operation of approved abatement technologies
- any additional information to support tracking of the gas prior to import.

LEAK CHECKS AND DETECTION SYSTEMS

Operators and manufacturers of equipment containing F-gases must take all necessary precautions to prevent the unintentional release of such gases, including during transport or storage, without undue delay.[9]

Additionally, leakage check thresholds and frequencies have been extended to all F-gases (including HFOs) with tightened requirements.[10] The frequency of checks depends on the amount of gas contained and presence of leakage detection systems.[11]

RECOVERY AND DESTRUCTION

Operators of the cooling circuits of refrigeration, air-conditioning equipment, heat pumps, refrigerated trucks and trailers, fire protection and equipment containing F-gas-based solvents must ensure those substances are recovered and subsequently recycled, reclaimed or destroyed by a certified person.[12] When removing foam panels that contain F-gases, building owners and contractors must ensure those gases are properly destroyed.

EXPANDING CRITERIA

Recovery requirements will be expanded to cover cooling circuits in the following mobile equipment from 12 March 2027: refrigerated light-duty vehicles, intermodal containers including reefers and train wagons, heavy-duty vehicles, vans, non-road mobile machinery, trains, metros, trams and aircraft.[13,14]

DESTRUCTION TECHNOLOGIES

Only destruction technologies approved by the Montreal Protocol and those that comply with EU and national laws on waste are allowed.[15]

EXTENDED PRODUCER RESPONSIBILITY (EPR)

ESTABLISHING EPR SCHEMES

By 2028, member states must put in place EPR schemes to finance the recovery, recycling, reclamation or destruction of F-gases contained in waste electrical equipment.[16]

MANDATORY CERTIFICATION AND TRAINING FOR F-GASES AND NATURAL REFRIGERANTS

MINIMUM STANDARDS

New EU-wide minimum certification standards must be in place by September 2025.[17]

COMPREHENSIVE PROGRAMMES

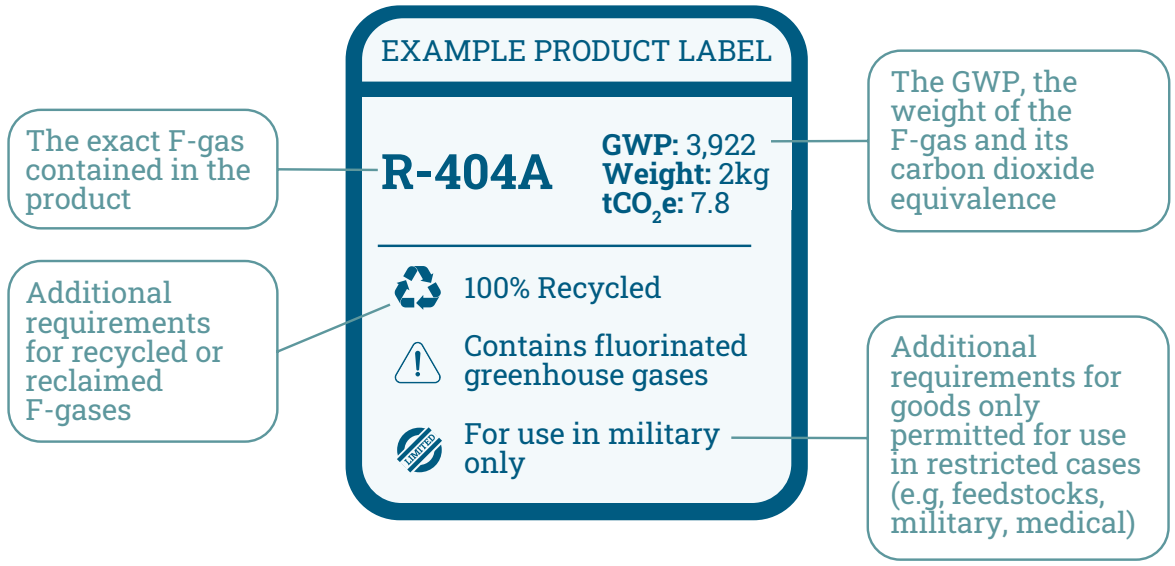
Programmes should cover installation, servicing, maintenance, repair, decommissioning, leak checks, recovery and energy efficiency practices.[18]

LABELLING REQUIREMENTS

Products and equipment containing F-gases must display certain information on the product and in manuals. Labels must be updated when systems are retrofitted or refilled with a different refrigerant.

For products and equipment containing F-gases with a GWP of 150 or more, the information must be included in advertisements.[19]

Figure 4: *Labelling requirements under Article 12 of the EU F-Gas Regulation*



ANTI-DUMPING MEASURES

To reduce the risk of inefficient high-GWP HFC-based equipment being 'dumped' onto the markets of developing countries, the export of certain equipment and products listed in Annex IV that use F-gases with a GWP of 1,000 or more is prohibited.[20]

Figure 5: *Reports and reviews required under Article 35 of the EU F-Gas Regulation*

EXPORT BAN

- AIR-CONDITIONERS AND HEAT PUMPS
- FOAMS
- TECHNICAL AEROSOLS
- STATIONARY REFRIGERATION

NO EXPORT BAN

- MOBILE AC AND REFRIGERATION EQUIPMENT
- MILITARY
- Goods that can be placed on the market within the EU in accordance with Annex IV (e.g., with respect to safety exemptions).

MEASURES TO PREVENT ILLEGAL TRADE AND SUPPORT COMPLIANCE

The illegal trade in HFCs increases emissions and slows the uptake of greener alternatives by perpetuating HFC demand. The revised regulation includes new measures to tackle illegal trade, with key aspects including:

ENHANCED BORDER CONTROL

- a single customs window for real time quota monitoring
- designated customs offices for the import/export of HFCs [21]
- F-gas portal registration required for both for import and export [22]
- additional restrictions on new entrants to the quota system [23]
- banning the re-export of non-compliant products.[24]

ENHANCED MONITORING AND TRACKING

- requirements for better co-operation nationally and internationally between customs, market surveillance and competent authorities [25]
- banning use of non-refillable cylinders and requiring cylinder take back [26]
- Commission can introduce further supply chain tracking measures, if needed.[27]

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INCREASED PENALTIES

- member states must set effective, proportionate and dissuasive administrative or criminal penalties – maximum amount of at least five times the market value of the gases or products and equipment concerned [28]
- exceeding quota leads to reduced future allocation.[29]

STANDARDS

Outdated safety standards remain a barrier to the uptake of climate-friendly alternatives to HFCs, which are often flammable.

UPDATING STANDARDS TO SUPPORT ALTERNATIVES

The F-Gas Regulation requires member states to ensure that national safety standards and building codes are updated in line with relevant international and European standards.[30]

FUTURE COMMISSION REVIEWS

The Regulation sets several deadlines for reports and reviews to be published by the European Commission on the impacts of the Regulation and where restrictions in additional sectors have become technologicaly feasible.[31]

JULY 2027

Report on the availability of alternatives in mobile refrigeration and air-conditioning, with proposal for additional equipment bans where relevant.

JULY 2028

Report assessing the impact of the Regulation on the health sector, particularly the availability of metered dose inhalers

JANUARY 2030

Comprehensive report on the effects of the Regulation, and if appropriate, a legislative proposal which may include amendments to the bans in Annex IV.

JANUARY 2040

Review the requirement for HFCs in the sectors in which they are still used and the phase-out of HFC quota in 2050.

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4. European Commission (5 Oct 2023). Press Release. Commission welcomes agreement on new legislation to prevent 500 million tonnes of emissions from fluorinated gases and ozone depleting substances. Available at: https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_23_4781/IP_23_4781_EN.pdf

5. Regulation (EU) No 2024/573, Annex IV

6. Regulation (EU) No 2024/573, Article 13 (3-5)

7. Regulation (EU) No 2024/573, Article 4(4).

8. Regulation (EU) No 2024/573, Article 4(6).

9. Regulation (EU) No 2024/573, Article 4(5).

10. Regulation (EU) No 2024/573, Article 5 – Leak checks.

11. Regulation (EU) No 2024/573, Article 5 and Article 6 – Leakage detection systems.

12. Regulation (EU) No 2024/573, Article 8(1-2).

13. Regulation (EU) No 2024/573, Article 8(3 & 5 &9).

14. Regulation (EU) No 2024/573, Article 8(8-9).

15. Regulation (EU) No 2024/573, Article 8(10-11).

16. Regulation (EU) No 2024/573, Article 9.

17. Regulation (EU) No 2024/573, Article 10(8).

18. Regulation (EU) No 2024/573, Article 10(5) and Recital 16.

19. Regulation (EU) No 2024/573, Article 12 (3, 7-14)

20. Regulation (EU) No 2024/573, Article 22

21. Regulation (EU) No 2024/573, Article 23(13).

22. Regulation (EU) No 2024/573, Article 20(5).

23. Regulation (EU) No 2024/573, Article 18(2-3).

24. Regulation (EU) No 2024/573, Article 23(12).

25. Regulation (EU) No 2024/573, Article 28(1).

26. Regulation (EU) No 2024/573, Article 23(6).

27. Regulation (EU) No 2024/573, Article 24(1).

28. Regulation (EU) No 2024/573, Article 31(2) and (4).

29. Regulation (EU) No 2024/573, Article 31(5).

30. Regulation (EU) No 2024/573, Recital 19.

31. Regulation (EU) No 2024/573, Article 35 (3-6).

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