

Ending the Reign of Fluorinated Greenhouse Gases

The world's first phase-out of hydrofluorocarbons (HFCs)
under the EU F-Gas Regulation

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Convention on Climate Change (CoP28)

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Background

Fluorinated greenhouse gases (F-gases) are fluorine-containing synthetic compounds with high Global Warming Potentials (GWP). They are the fastest growing group of greenhouse gases (GHGs) and have been regulated in the European Union (EU) since 2006.

The central measure of the current EU F-Gas Regulation is a phase-down in the consumption of hydrofluorocarbons (HFCs), which are used primarily as refrigerants in the cooling sector but also as foam-blowing agents, in aerosols and in fire-fighting equipment.

In April 2022, the European Commission proposed revisions to the EU F-Gas Regulation to accelerate the HFC phase-down and adopt additional measures to reduce emissions of HFCs and other F-gases. In October 2023, the European Parliament and the Council of the EU reached provisional agreement on a final set of revisions that, when adopted in the coming months, will significantly strengthen the EU F-Gas Regulation and reflect world-leading legislation to reduce climate-damaging emissions of F-gases.

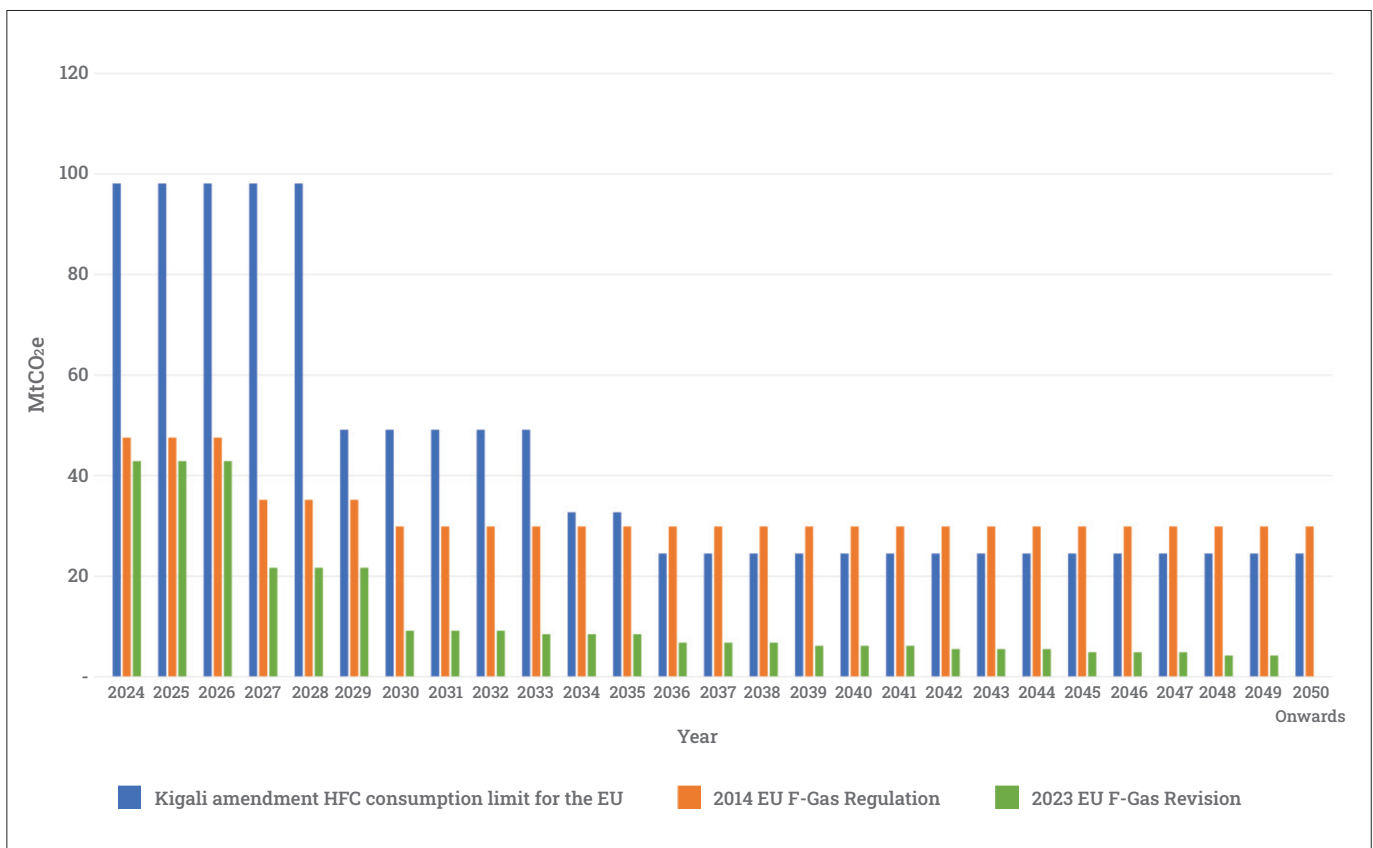
Overview of new measures

I. Accelerated EU HFC phase-out

Under the current (2014) EU F-Gas Regulation, the EU HFC phase-down was already the most ambitious schedule for reducing HFC consumption in the world, outpacing the consumption phase-down schedule for developed countries that was agreed in 2016 with the adoption of the Kigali Amendment to the Montreal Protocol.

The revision significantly accelerates the reduction in consumption under the EU HFC phase-down from 2024 onwards, ending with a total HFC phase-out of consumption in 2050 (the first HFC phase-out). In addition, HFC quotas will cost €3 per carbon-dioxide equivalent (CO₂e) tonne, as opposed to being allocated for free. A preliminary analysis by EIA of the new phase-out schedule suggests it will avoid an estimated 550 million CO₂e tonnes cumulative HFC consumption by 2050 (see Fig 1).

Figure 1: A comparison of HFC phase-down schedules under the revised (2023) EU F-Gas Regulation, compared to the current F-Gas Regulation and the requirements of the Kigali Amendment to the Montreal Protocol.



II. Prohibitions on New HFC-based products and equipment

In preparation for the review, the European Commission carried out extensive studies analysing which sectors could transition to available, energy-efficient, F-gas-free equipment and technologies. EU policymakers included several new prohibitions on placing new F-gas-based products and equipment on the market to complement existing prohibitions under the current EU F-Gas Regulation. These include new prohibitions in the following sectors:

- Self-contained air-conditioning and heat pump equipment: prohibitions on F-gases with a GWP more than or equal to 150 in smaller (up to and including 12 kW) self-contained air-conditioning and heat pump equipment in 2027 and on all F-gases in 2032; prohibition on F-gases GWP ≥150 in medium (>12 to 50 kW) self-contained air-conditioning and heat pump equipment in 2027; prohibition on F-gases GWP ≥150 in all other self-contained air-conditioning and heat pump equipment in 2030.

- Split air-conditioning and heat pump equipment: prohibition on F-gases GWP ≥ 150 in smaller (up to and including 12 kW) split air-to-water systems in 2027, on smaller split air-to-air systems in 2029 and on all F-gases in smaller split systems in 2035; prohibitions on F-gases GWP ≥ 750 in larger (above 12 kW) split systems in 2029 and on F-gases GWP ≥ 150 in larger systems in 2033.
- Refrigeration and chillers: prohibition on all F-gases in domestic refrigerators and freezers in 2026; prohibitions on HFCs GWP ≥ 150 in 2022 and F-gases GWP ≥ 150 in self-contained refrigerators and freezers in 2025 and in all other refrigeration equipment in 2030; prohibition on F-gases GWP ≥ 150 in smaller (up to 12 kW) chillers in 2027 and on all F-gases in 2032; and prohibition on F-gases GWP ≥ 750 in larger (above 12 kW) chillers in 2027. These new bans complement prohibitions already in place, such as on F-gases GWP ≥ 150 in domestic refrigerators and freezers in 2015 and in multipack centralised refrigeration systems in 2022.

Other sectors where all F-gases will now be prohibited include fire protection and personal care products in 2024, foams in 2033 and technical aerosols in 2030.

III. Anti-dumping measures

The revised EU F-Gas Regulation will prohibit the export of products and equipment with F-gases GWP > 1000 to non-EU countries, thereby extending the benefit of the new rules outside the EU and mitigating against the dumping of high-GWP obsolete technologies on developing countries.

IV. Mandatory extended producer responsibility

In 2028, EU Member States shall require extended producer responsibility for financing the recovery, recycling, reclamation or destruction of F-gases contained in waste electrical and electronic equipment.

V. Proof of HFC-23 by-product destruction

HFC-23 is one of the most potent F-gases, with a GWP of 14,600, and is produced as a by-product in the production of HCFC-22. HFC-23 emissions have increased in recent years and represent almost 20 per cent of global HFC emissions. This is despite the requirement under the Kigali Amendment that any HFC-23 produced through the production of ODS or HFCs should be destroyed to the extent practicable. The EU F-Gas Regulation prohibits producers and importers from placing F-gases on the EU market unless evidence is provided to show that any HFC-23 by-product during the manufacturing process has been recovered or destroyed using best available techniques. The evidence shall include: (i) origin of the F-gases; (ii) production facility of origin, including identification of any precursor substances which involve generation of HCFC-22; and (iii) proof of availability and operation of approved HFC-23 incineration methods.

VI. Servicing ban

A prohibition on the use of virgin HFCs for servicing equipment with GWP > 2500 in 2025 (refrigeration equipment) and 2026 (air-conditioning and heat pump equipment) will be put in place. A further prohibition on the use of HFCs with GWP > 750 to service stationary refrigeration equipment begins in 2032.

VII. Mandatory certification and training for natural refrigerants

The F-Gas Regulation will require mandatory certification and training on the installation, servicing, maintenance, repair, decommissioning, leak checks and recovery of F-gas alternatives including natural refrigerants. Certification programmes are also to include maintaining energy efficiency during installation and maintenance. The lack of installation and service technicians trained in climate-friendly alternatives to HFCs has been a key barrier to their uptake.

VIII. Measures to prevent illegal trade and support compliance

Several new measures will help prevent illegal trade of HFCs into the EU, including: (i) real-time HFC quota licensing system; (ii) mandatory registration for importers; (iii) prohibition on the use of non-refillable containers; (iv) mandatory confiscation of illegal imports; (v) enhanced reporting obligations on importers; (vi) mandatory checks for non-compliance, including for substantiated concerns by third parties; and (vii) enhanced penalties for violations. In addition, the Commission is empowered to adopt supply chain tracing methodologies to further reduce illegal trade.

IX. Measures to address emissions of SF₆

Sulphur hexafluoride (SF₆), used as insulation gas in switchgear, is the most potent greenhouse gas in the world, with a GWP of 25,200. Given the availability of F-gas-free alternatives, new bans in this sector have been included in the revised F-Gas Regulation. The EU will prohibit the putting into operation of medium voltage electrical switchgear relying on F-gases from 2026 (up to and including 24kV) and 2030 (from more than 24kV and up to and including 52kV). Putting into operation high voltage switchgear using F-gases with a GWP of 1 or more is banned from 2028 (from 52kV up to and including 145kV) and 2032 (more than 145kV).

X. Measures to address other F-Gases

A new measure has been introduced which requires operators using sulfur hexafluoride (GWP 4630) in fumigation to document the capture and collection of the gas to avoid its release to the atmosphere. The revised F-Gas Regulation also prohibits the use of desflurane (GWP 2,540) as an inhalation anaesthetic from 2026, unless no alternatives are available, and extends recovery and destruction practices to all F-gases.

Conclusion

The revised EU F-Gas Regulation is taking important steps to address the entire class of synthetic fluorinated greenhouse gases, which represents more than two per cent of global greenhouse gas emissions.

In the coming years, the EU will spearhead the transition away from HFCs to natural refrigerants, paving the way for the global transition in other countries and setting the stage for more ambitious action at the Montreal Protocol to accelerate the global phase-down of HFCs.



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