F-Gas Regulation in Great Britain

A summary of the legislation and regulations surrounding the supply and manufacture of F-Gas in Great Britain

Produced by Valpak for B2B Compliance

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Overview

What are F-gases?

Fluorinated greenhouse gases (F-gases) are a group of human-made chemicals that include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and other fluorinated compounds. HFCs represent ~90% of all F-gases.[1] F-gases were initially developed as substitutes for ozone-depleting substances like chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), which were phased out under the Montreal Protocol. Unlike CFCs and HCFCs, F-gases do not harm the ozone layer. However, they have a high global warming potential (GWP)—in some cases, thousands of times greater than carbon dioxide (CO_2). This makes them significant contributors to climate change, even though they account for a smaller percentage of total greenhouse gas emissions compared to CO_2 and methane.

F-gases are highly persistent, remaining in the atmosphere for decades to thousands of years, depending on the specific gas. This long atmospheric lifetime amplifies their warming effect over time, prompting the need for stringent regulatory control.

F-gases play a crucial role in many modern technologies but pose significant environmental challenges due to their high GWPs and long atmospheric lifetimes. Regulations and technological innovations are critical to managing their impact, ensuring industries can transition to more sustainable practices while maintaining essential services like refrigeration and air conditioning.

Where are F-gases found?

F-gases are used in common products, equipment, and processes such as refrigeration, air conditioning, foam blowing, heat pumps, insulation, fire protection, power lines, and aerosol propellants as well as in industrial processes due to their chemical stability, non-flammability, and low toxicity. F-gases, while valuable in modern applications, pose long-term environmental risks if not managed properly. Therefore, international, and national strategies focus on reducing their impact through regulation, technological shifts, and improved handling practices.

In the UK, F-gases are typically used in refrigeration, air-conditioning and heat pumps (79.5% of emissions in 2020), medical inhalers and aerosols (9.8%), electrical switchgear (4.1%), closed-cell insulation foams (3.3%), fire protection systems (2.5%) and other specialist applications (0.8%), such as semi-conductor manufacture, solvents, and tracer gases.[2]



Why is there a need for regulation?

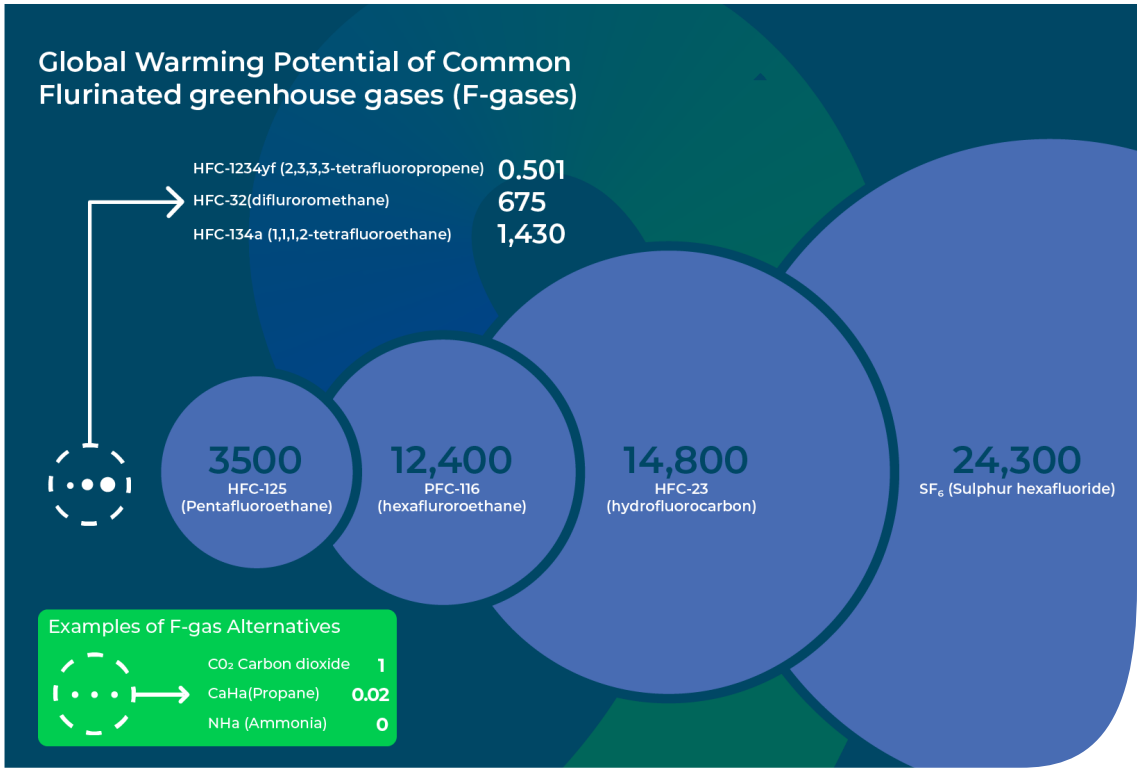
The need for F-gas regulations stems from the high environmental impact of fluorinated gases, primarily due to their significant global warming potential (GWP). Unlike CO_2, which is often referenced in climate discussions, F-gases can trap thousands of times more heat per molecule in the atmosphere, making their long-term environmental effects severe. The scientific community and regulatory bodies recognize that without intervention, F-gas emissions could severely hinder global efforts to mitigate climate change.

F-gases accounted for 3.02% of UK greenhouse gas emissions in 2020 and fall into four groups: HFCs, which form 95.1% of UK 2020 F gas emissions; Sulphur hexafluoride (SF6) – 3.25%; perfluorocarbons (PFCs) – 1.63%; and nitrogen trifluoride (NF3) – negligible quantities. F-gases (HFCs, SF6, PFCs and NF3), alongside CO_2, methane, and nitrous oxide, are the seven direct greenhouse gases under the Kyoto Protocol and are monitored and reported on under the UK Greenhouse Gas Inventory.

Certain forms of F-gases can persist in the atmosphere for a long period of time, ranging from several years to even centuries, and therefore contribute to the greenhouse effect over an extended period. Even in smaller quantities, F-gases can have a significant warming impact, whose consequences include altered weather patterns, rising sea levels, and disruptions to ecosystems worldwide.

The climate impact of greenhouse gases can be determined by assessing their Global Warming Potential (GWP), which measures their impact relative to one tonne of carbon dioxide (CO2) over a certain period (usually 100 years). The higher the GWP, the worse it is for the climate.

More specifically, the GWP quantifies how much heat a gas can trap in the atmosphere compared to carbon dioxide (CO_2), which is used as the baseline with a GWP of 1. For example, Sulphur hexafluoride (SF6) has a GWP of around 24,300 over 100 years, meaning it is 24,300 times more effective at trapping heat in the atmosphere compared to CO_2 during that period. This makes SF_6 the greenhouse gas with the worst climate impact. Each F-gas or mixture of F-gases has a different GWP and therefore impacts global warming to a different degree. It is preferable to use F-gases with a low GWP or avoid F-gases altogether, if feasible.



Without strict controls, F-gas emissions could increase significantly, driven by the growing demand for cooling systems, especially in developing countries. Unchecked emissions would exacerbate climate change, leading to more severe weather events, rising sea levels, and other environmental consequences. Therefore, F-Gas regulations are critical in balancing industrial needs with environmental protection. The success of such measures can be seen firsthand with F-gas emissions in the EU having consistently decreased each year since 2015, thanks to the implementation of the 2014 F-Gas Regulation.



Implemented legislation within Great Britain

The 2014 EU F-Gas Regulation

Since 2015, the EU has been very efficient in reducing F-gas emissions. Without the 2014 F-Gas Regulation, the high level of emissions of HFCs and other F-gases would have remained high. The 2014 F-Gas Regulation introduced a quota system to phase down the most common F-gases, hydrofluorocarbons (HFCs), with success. In 2024, only one-third of the 2015 amount of HFCs will be placed on the EU market. In addition to this quota system, the EU has implemented complementary measures to lower the leakage of F-gases, encourage the switch to climate-friendly alternative substances, and stimulate innovation along with the development of green technologies. With the rules established by the new F-Gas Regulation, HFCs sold on the EU market should be zero by 2050. This goal serves the EU's objective of achieving climate neutrality by that year. We are also committed to a global agreement to reduce HFC consumption and production, the Kigali Amendment to the Montreal Protocol. Notably, in 2022, the EU stayed 55% below its limit specified in the agreement.[3]

The UK's adoption of the F-Gas Regulation

The F-Gas Regulation came into force on the 1 January 2015. Up until the 31 December 2020, the F-Gas Regulation applied in the UK as directly applicable EU law. Following Britain's exit of the EU, the F-Gas Regulation applies in Great Britain as 'retained EU law' and the requirements remain the same as under EU legislation.[4][5]
The main objective of the F-Gas Regulation is to reduce F-gas emissions by:

- Establishing rules on containment, use, recovery, and destruction of F-gases
- Imposing conditions on the placing on the market of specific products and equipment containing F-gases
- Imposing conditions on the specific uses of F-gases
- Establishing quantitative limits for the placing on the market of hydrofluorocarbons (HFCs)[6][7]

The F-Gas Regulation requires a 79% cut in the use of HFCs between 2015 and 2030

The F-Gas Regulation has succeeded in its objective to reduce estimated cumulative emissions in Great Britain by 13.6-24.3 $MtCO_2e$ (million tonnes of carbon dioxide (CO_2) equivalent). Monetised gross benefits were measured at £1.9-8.5 billion and total costs at approximately £118 million. This success is mainly the result of the HFC phasedown, by curbing low value uses and helping to drive the transition from high global warming potential (GWP) HFCs to lower GWP alternatives.

Regulation (EU) No 517/2014[8] (F-Gas Regulation) replaced Regulation (EC) No 842/2006[9] (2006 F-Gas Regulation), which aimed to contain, prevent, and reduce emissions of F-gases. The current F-Gas Regulation built on the foundation set out in the 2006 F-Gas Regulation and aims to protect the environment by reducing F-gas emissions through establishing rules on containment, use, imposing conditions on the placing on the market of specific products and equipment and on the specific uses of F-gases, as well as establishing quantitative limits for placing on the market of HFCs.[10]

The F-Gas Regulation requires a 79% cut in the use of HFCs between 2015 and 2030. This is achieved by phasing down the amount of HFCs that can be placed on the market, for the first time, by allocating steadily reducing quotas to HFC producers and importers. The reduction in F-gas emissions, resulting from the HFC phasedown is a key commitment for meeting UK climate change goals under the Climate Change Act 2008[11] and contributing to future carbon budgets. The F-Gas Regulation bans the use of F-gases in certain applications and sets requirements for leak checks, leakage repairs and recovery of used gas. In addition, the F-Gas Regulation requires that all technicians handling F-gases must be trained in their safe use and certified. Any company, including sole traders, must be certified by an approved body to service stationary equipment containing F-gas operated by others. This includes air conditioning, refrigeration, and fire protection.[12]

Is Northern Ireland covered by the UK's F-Gas Regulation?

This is a question we believe will be important to have answered and therefore intend to research it further.

Who is obligated?

What organisations are obligated?

The UK's F-Gas Regulation applies to various organisations across multiple sectors. These include:

1. **Manufacturers:** Companies producing F-gases or equipment containing them
2. **Importers and exporters:** Businesses importing or exporting F-gases or related equipment
3. **Operators of equipment:** Firms using F-gas-containing systems like refrigeration, air conditioning, or fire suppression. This could include office buildings, hospitals, leisure centres, and universities
4. **Maintenance and service providers:** Those responsible for installing, maintaining, and decommissioning F-gas systems
5. **Waste management:** Companies handling recovery and disposal of F-gases

These organisations must comply with the regulations' requirements including:

1. Requiring that all technicians handling F-gases must be trained in their safe use and certified
2. Perform regular leak checks, including automatic leak detection on large systems
3. Obtain a company certification if necessary
4. Completing all relevant forms of reporting



Timeline

Pre 2014 – Early development:

- Before the formal regulation of F-gases, concerns over their environmental impact grew in response to their high global warming potential (GWP). F-gases were mainly used as substitutes for ozone-depleting substances, but their contribution to climate change became more apparent, especially as their use expanded in refrigeration and air conditioning industries.

2014 – EU F-Gas Regulation (EU 517/2014):

- The European Union passed the F-Gas Regulation, which introduced several critical measures, including:

  a. A phasedown of hydrofluorocarbons (HFCs) to reduce their use in refrigeration, air conditioning, and other sectors.
  b. Leakage checks, maintenance, and servicing of equipment containing F-gases.
  c. Bans on the use of high-GWP HFCs in certain applications, such as in new refrigeration systems.
  d. Introduced a cap on the production and import of HFCs, with a system for allocating quotas to businesses.

January 2021 – Post Brexit changes

- Since 1 January 2021, the Environment Agency has had responsibility for administering and operating the Great Britain F-gas system on behalf of the UK, Scottish and Welsh governments, with oversight through the governance arrangements defined in the Common Framework. Prior to this, the UK was part of the EU F-gas system administered by the European Commission and European Environment Agency. By way of the Fluorinated Greenhouse Gases Regulations 2015, compliance, and enforcement throughout the implementation of the F-Gas Regulation has been the responsibility of the Environment Agency, Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW), Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) and local authorities.[13]

2022 – F-Gas Regulation enforcement

- The UK government introduced stricter penalties and enforcement measures to ensure compliance with the F-Gas Regulations. These measures focused on the accurate reporting of F-gas use, the proper management of quotas, and the recovery and disposal of F-gas-containing equipment.
- 2023 – Continued phasedown of F-gases and transition to alternatives
- As part of the UK's long-term strategy, the country continues to phase down the use of high-GWP F-gases, with the goal of eliminating their use in new systems by 2030.
- The UK is continuing to incentivise the development of low-GWP alternatives (e.g., ammonia, CO2) and is promoting the recovery and recycling of F-gases to reduce emissions. Additionally, the UK is aligning its F-Gas Regulation with broader climate targets and focusing on industries like refrigeration, air conditioning, and fire suppression, which remain the primary sectors for F-gas use.



How are declarations made/ monitored

Under the UK's F-Gas Regulations, businesses involved in handling fluorinated greenhouse gases (F-gases) must submit certain declarations to ensure compliance with environmental rules. These declarations are primarily linked to quota management and reporting activities. Specifically:

1. **Declaration of conformity:** This declaration is required if you import or manufacture equipment pre-charged with F-gases like HFCs. It certifies that you hold sufficient quota or have authorizations from a quota holder for the HFCs in your equipment. The declaration must accompany the import documentation and demonstrate compliance with the quota allocation system.[14]
2. **Annual reporting requirements:** Businesses must report the volume of F-gases they produce, import, export, or destroy annually. Declarations and supporting documents, such as customs records and delivery notes, must be maintained and submitted to the Environment Agency by 31 March each year for the previous calendar year
3. **Verification documents:** For larger operations, particularly those placing significant amounts of F-gases on the market (e.g., equivalent to 10,000 tonnes or more of CO2), independent verification of these declarations is required. Verifiers must be accredited to confirm the accuracy of reported data.[15]



Upcoming legislation within Great Britain

The UK is working towards enhancing its F-Gas Regulations to meet its climate commitments, especially in reducing the use of hydrofluorocarbons (HFCs), which are potent greenhouse gases. The focus of future regulatory developments is to align with international commitments, particularly the Kigali Amendment to the Montreal Protocol, which sets a global target for an 85% reduction in HFCs by 2036. This objective goes beyond the current UK regulations, positioning the country ahead of this global phasedown schedule. Although the Regulation has been an overall success, there are certain aspects which could be strengthened, revised, or amended. This includes, extending the HFC phasedown to ensure continued compliance with the Kigali Amendment to the UN Montreal Protocol. Further measures could be considered to strengthen containment, including more transparent record keeping of leak checking and recovery to better inform emissions estimates.[16]

From the 1 January 2025 the EU and therefore Great Britain will be implementing a new regulation on the format of F-gas labels that are required o F-gas containers as well as on certain products and equipment with F-gases.[17][18]

What happens when a UK-based manufacturer sells to company based in Europe?

This is a question we believe will be important to have answered and therefore intend to research it further.

Size of the market affected.

What is the size of the market that will be affected?

Three sector-specific groups were established covering the main F-gas sectors and priority areas for Defra's F-Gas Regulation in Great Britain assessment report. These sectors were: refrigeration, air-conditioning and heat pumps (RACHP), metered dose inhalers (MDIs) and power (for example, electric power transmission and distribution grids). RACHP and MDIs both use HFCs, while the power sector relies on sulphur hexafluoride (SF_6)

The market size includes thousands of businesses that are either directly or indirectly involved in the production, importation, servicing, or disposal of F-gas containing equipment. Given the wide scope of these regulations, this includes refrigeration companies, HVAC service firms, manufacturers of cooling equipment, and importers of F-gas-containing products. With stringent certification requirements for personnel and companies working with F-gases, businesses in these fields are required to comply with regular leak checks, recovery, and reporting measures. This creates a significant regulatory framework covering not only large corporations but also SMEs involved in these sectors.[19][20]

UK RCHP total market size = £2.4 billion in 2013.
Global MDI total market size = $17.1 billion in 2024.
UK Power total market size (revenue) = £60.5 billion in 2023

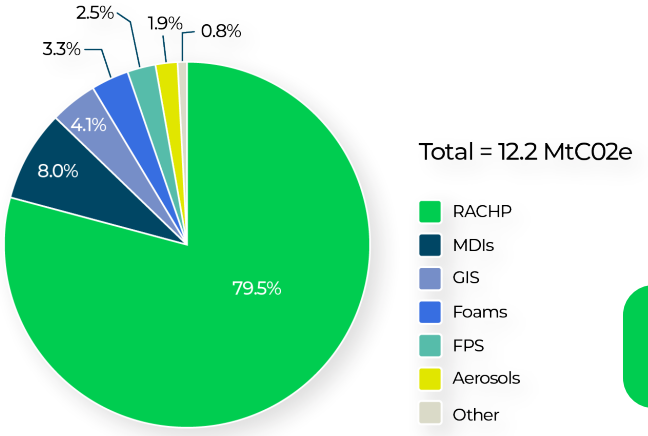


Figure 1: UK F-Gas emissions in 2020, split by main sectors (% tCO2e).[24]

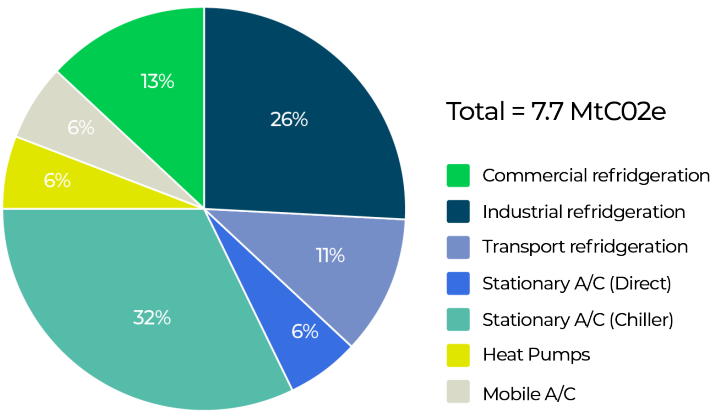


Figure 2: UK RACHP emissions in 2021, split by main sub-sectors (% tCO2e).[25]

What happens when a UK-based manufacturer sells to company based in Europe?

This is a question we believe will be important to have answered and therefore intend to research it further.

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