

Fluorinated greenhouse gases 2023

Data reported by companies on the production, import, export and destruction of fluorinated greenhouse gases in the European Union, 2007-2022



Authors:

Sylvie Ludig, Wolfram Jörß and Victoria Liste (Öko-Institut)



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Briefing

Introduction

Fluorinated greenhouse gases (F-gases) contribute to climate change; in 2021, they made up 2.2 % of total greenhouse gas emissions in the EU-27 (EEA, 2023a). F-gases have a range of applications, particularly in the refrigeration, air conditioning and heat pump sector. Most F-gases have much higher global warming potentials than other greenhouse gases. Even small amounts of F-gases negatively impact our climate; thus, it is important to reduce and eventually replace their use. This briefing outlines the important trends in the EU supply¹ of F-gases for the period 2007-2022 and monitors EU progress under the HFC (hydrofluorocarbons) phase-down schemes of the EU F-gas Regulation and the Montreal Protocol.

Key messages

- The EU remains on track under the HFC phase-down of the EU F-gas Regulation. Despite a 1 % increase compared to 2021, the EU-wide placing on the market of HFCs in 2022 was 3 % below the maximum quantity allowed to be placed on the EU market.
- The total supply of F-gases to the EU in 2022, measured in CO₂ equivalents, was 13 % higher than in 2021. 2022 EU-27 F-gases supply is thus at roughly the same level as observed 2019-2020 for the EU including the United Kingdom. About two thirds of this increase in F-gas supply was due to a 50 % increase in SF₆ supply, while HFCs account for roughly one third. The increase in supply is mostly due to higher imports of both HFCs and SF₆ and higher SF₆ production in the EU. Production of HFCs in the EU, on the other hand, continues to decrease.
- Refrigeration, air conditioning and heat pumps continue to be key applications for these gases, in particular for HFCs that contribute about 70 % to 2022 EU F-gases supply, measured in CO₂ equivalents. SF₆ is mainly used in electrical equipment and makes up about 20 % of 2022 EU F-gases supply.
- Import of HFCs in RACHP equipment have been rising by 40 % since 2020. The main drivers of this increase are imports of split and multi-split air conditioning equipment. This may possibly be linked to an anticipation of bans for certain gases in such equipment in the upcoming revision of the EU F-Gas Regulation.
- In 2022, the use of quota authorisations needed to cover imports of refrigeration, air conditioning and heat pump equipment under the HFC phase-down exceeded the amount of quota authorisations newly issued in that year. This led to a 9 % decrease of the amount of unused quota authorisations banked by equipment importers. However, the current size of this reserve still accounts for four times the amount of such equipment imported in 2022.
- Under the Kigali Amendment to the Montreal Protocol, the EU is subjected to an international HFC phase-down. In 2022, EU consumption of HFCs was at 45 % of the maximum imposed by the Montreal Protocol.

Hydrofluorocarbons (HFCs) account for the majority of fluorinated gas (F-gas) emissions. To reduce these, the F-gas Regulation (EU) No 517/2014 introduced an EU HFC phase-down scheme and a quota system for companies. Since 2019, the EU has also been bound by an obligation to reduce HFC use, agreed internationally under the Kigali Amendment to the Montreal Protocol.

¹ Supply of fluorinated gases is a metric used by the EEA that provides information on the actual use of fluorinated gases by EU industries. It is calculated primarily from reported production, imports and exports. For methodological details on the calculation of EU supply, please refer to Table 30 in section 10 of the Annex to this briefing, which explains the difference between the metrics of 'EU supply', 'placing on the market', and 'consumption', which are relevant for different aspects of the legal framework.

Between the years 2020 to 2022, several important events with a possible influence on F-gas supply to the EU market have taken place. The Covid pandemic, the end of the Brexit transition period, the 2021 reduction in maximum quantity under the HFC phase-down in the EU and anticipation of changes to the F-Gas Regulation in the upcoming revision are all concurrent events with a possible influence on F-Gas supply to the EU. The dataset used in the preparation of this report (EEA, 2023b) does not allow to discern the different effects with sufficient certainty.

Please consult the annex to this briefing for more graphs and data tables.

Policy context

The Montreal Protocol was established in 1987 to cut the consumption and production of synthetic substances that destroy the protective ozone layer (ozone-depleting substances, ODS). In the EU, ODS are regulated separately under Regulation (EC) No 1005/2009 (Ozone Regulation). Phasing out ODS has led to the increased use of certain F-gases, most prominently in refrigeration and air conditioning, since the early 1990s, as these chemicals have similar properties to ODS but do not affect the ozone layer. Consequently, emissions of F-gases in the EU, of which about 90 % are HFCs, increased by about 70 % between 1990 and 2014.

Because F-gases are potent greenhouse gases, they have been regulated in the EU since 2006. Total emissions have started to decline since peaking in 2014 and were about 25 % lower in 2021 in the EU-27 compared with 2014 (EEA, 2023a).

The EU F-gas Regulation (EU, 2014) implements an EU-wide phase-down of HFCs, which started in 2015. Its aim is to cut EU emissions of F-gases by two thirds by 2030 compared with 2014 levels. It mandates companies to report their annual production, imports, exports and other activities involving HFCs and other F-gases and includes all the F-gases covered by the Kyoto Protocol: HFCs, perfluorocarbons (PFCs), sulphur hexafluoride (SF₆) and nitrogen trifluoride (NF₃) and others such as unsaturated HFCs and HCFCs (hydrochlorofluorocarbons), often referred to as HFOs (hydrofluoroolefins). The European Commission has published a proposal for a revised Regulation in April 2022; the co-decision process with the Council and the European Parliament is ongoing at the time of drafting of this briefing (summer 2023).

The EU's key climate objective is to achieve climate neutrality by 2050, with a net GHG emission reduction target of 55 % by 2030 compared with 1990. This has already been adopted as the European Climate Law. Saving F-gases emissions contributes to reaching these objectives.

Key trends for HFCs

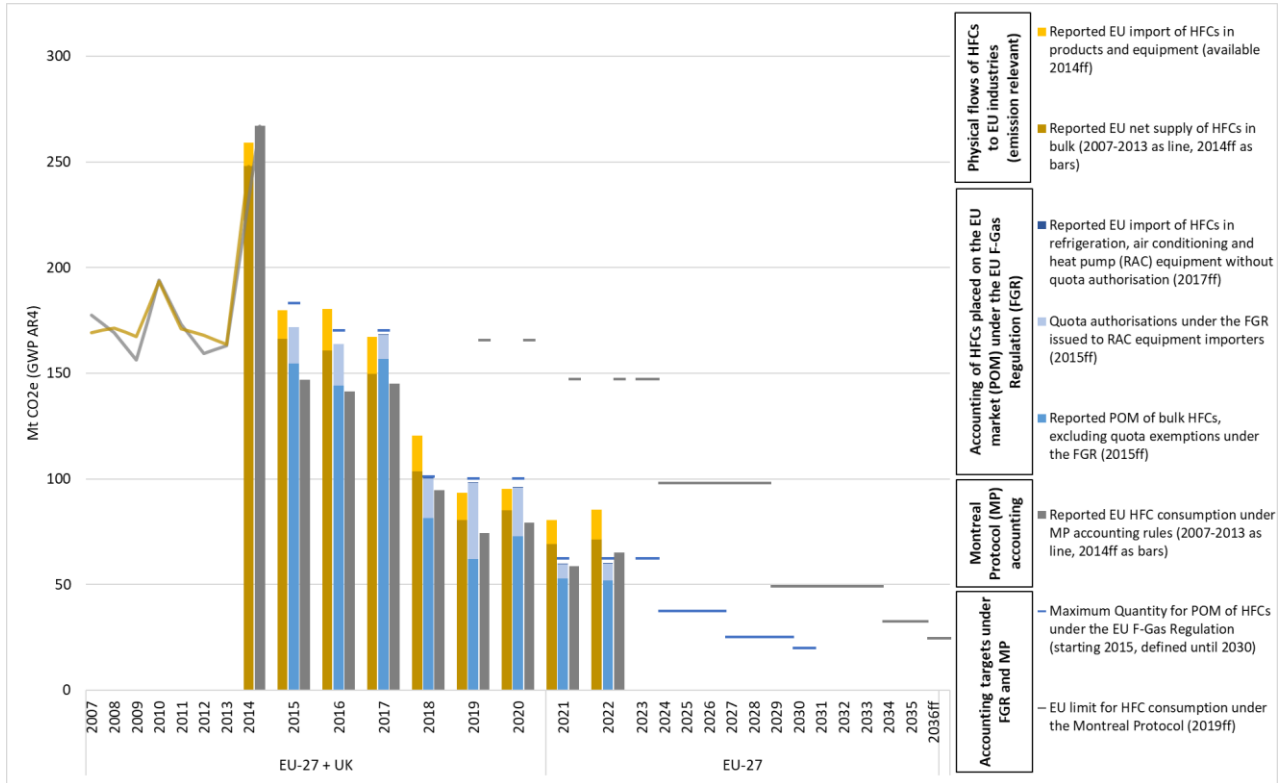
Development related to the EU use of HFCs is measured in three different metrics:

- 1) **supply**, focusing on the physical use of HFCs by EU industries,
- 2) **placing on the EU market (POM)** measuring compliance with the EU HFC phase-down, and
- 3) **consumption** as defined under the Montreal Protocol HFC phase-down.

Due to differing definitions how imports, exports, stocks, destruction, exemptions etc. are accounted for, these metrics (all expressed in units of CO₂ equivalents) can deviate more than 20 % for a given year. Please see Table 30 in the annex for detailed definitions.

Figure B-1 shows the EU HFC trends in the supply (yellow), POM (blue) and consumption (grey) metrics as well as the respective EU-internal and MP HFC phase-down limits and schedules.

Figure B-1 EU HFC supply and progress of the HFC phase-downs under the EU F-gas Regulation and the Montreal Protocol



Notes: The geographical scope of the data presented (both reported data and phase-down limits) is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27 + UK for 2020 and EU-27 for 2021 and subsequent years. Due to differing definitions, POM data (blue) as defined under the EU F-Gas Regulation are not directly comparable with consumption data (grey) as defined under the Montreal protocol.

Sources: EC, 2023; EEA, 2022a and 2023b.

EU-27 HFC supply in 2022 was about 6 % above 2021. However, EU-27 quota-relevant POM of HFCs as accounted under the EU F-Gas Regulation increased only 1.5 % compared to 2021, but remained 3 % below the limit for 2022. EU-27 HFC consumption as accounted under the Montreal Protocol increased by about 12 % compared to 2021 but was in 2022 55 % below the limit set for the EU-27 under the MP.

More detailed information on the progress under the EU and MP reduction schemes as well as on supply of HFCs and other F-gases is given in the subsequent sections.

Phase-down of HFCs under the EU F-gas Regulation

The HFC phase-down under the F-gas Regulation is implemented by imposing annual quantitative limits (quotas) on the placing of HFCs on the EU market by producers and importers. The EU-wide maximum quantity for HFCs has been subject to a stepwise reduction since 2015, shown as blue lines in Figure B-1. In 2022, EU-wide placing of HFCs on the market was 3 % below the 2022 overall market limit set by the quota system. The companies that did not fully use their quota counterbalanced the few cases of quota exceedance by importers of bulk HFCs and equipment importers.

As EU industries have been moving to alternatives with low global warming potential (GWP), the demand for HFCs has been decreasing. While the demand for refrigerants remains high, there has been a shift to non-HFC alternatives with lower GWPs. Between 2015 and 2022, the placing on the market of bulk HFCs (dark blue bars in Figure B-1) was continuously below the maximum quantity imposed by the phase-down. The balance has largely been converted into quota authorisations (light blue bars in Figure B-1), which can be stored over the years and which have been needed by importers of refrigeration, air conditioning and heat pump (RACHP) equipment containing HFCs since 2017.

Until 2020, the supply of quota authorisations has exceeded quota-relevant RACHP equipment imports, and as a consequence, the 'bank' of unused quota authorisations, held by equipment importers, continued to grow. In 2021, the use of quota authorisations for the first time exceeded the amount of freshly issued quota authorisations. In 2022, this trend continued with the amount of quota authorisation issued being at 59 % of authorisation use. By the end of 2022, this led to a decrease in the bank of quota authorisations by 9 % compared to 2021, or by 20 % compared to 2020. However, the reserve of unused quota authorisations available by the end of 2022 was still at about four times the amount needed for EU-27 equipment imports in 2022. Nonetheless, the continuing decrease of the authorisation bank indicates that the reduction of available quota under the EU phase-down has lately been quicker than the industry's response in demand reduction.

Illegal HFC imports outside the reporting and compliance system under the F-gas Regulation continue to be alleged, and as in previous EEA reports these cannot be quantitatively accounted for in this briefing.

After significant increases in the number of companies applying for quota until 2019, the European Commission's increased scrutiny of their legitimacy has reduced the viability of mass registrations (EU, 2019). Therefore, the number of quota-holding companies has been declining since 2020. As a consequence, the number of companies reporting on bulk HFC imports and quota authorisations decreased in between 2020 and 2022 and reached more or less 2018 levels again after more than doubling in 2019. Around 850 companies reported on bulk HFC imports in 2022, while the number of companies reporting on RACHP imports has been at around 1000 since 2017.

More graphs and data tables relating to compliance with the EU HFC phase-down are provided in the annex to this briefing.

EU contribution to the global phase-down of HFCs under the Kigali Amendment to the Montreal Protocol

The global HFC phase-down under the Montreal Protocol's Kigali Amendment introduced limits for the EU consumption of HFCs, starting in 2019 (grey lines in Figure B-1). 2022 HFC consumption (grey bars in Figure B-1) in the EU-27 was 12 % above 2021 values. EU HFC consumption was thus at approximately 45 % of the 2022 limit for the EU-27 under the Montreal Protocol's Kigali Amendment.

As visualised in Figure B-1, the ratio between HFC consumption (grey bars) and the quota limit under the EU F-gas Regulation (blue lines) has been strongly fluctuating over many years. The most important differences between definitions of consumption and POM in this context are the accounting of the quota exemption for metered dose inhalers (MDIs) and of HFCs in imports of precharged equipment. Furthermore, variations in end-of-year stocks of HFCs not yet placed on the market can play a role. In the Impact Assessment accompanying the European Commission's proposal for a revised F-gas Regulation, it was demonstrated that EU compliance with the Montreal Protocol beyond 2030 is not assured in all cases by the present HFC POM phase-down schedule of the EU F-gas Regulation, as consumption can possibly grow larger than total POM in future years (EC, 2022).

More graphs and data tables relating to the EU HFC phase-down under the Kigali Amendment to the Montreal Protocol are provided in the annex to this briefing.

Supply of F-gases in the EU

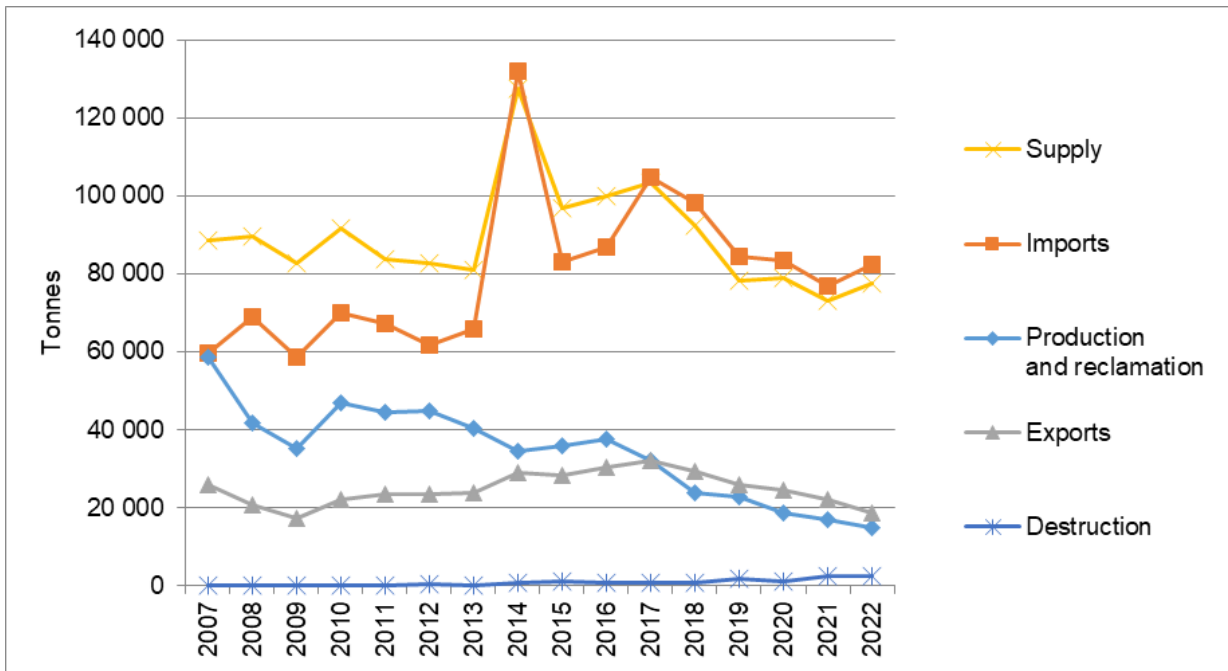
The total supply of F-gases⁽²⁾ was reasonably stable from 2007 until it peaked in 2014, just before the HFC quota system entered into force. After 2015, a downwards trend reflected the effect of the EU HFC phase-down under the F-gas Regulation. The volume of EU-27 total F-gases supply (i.e. both HFCs and other F-gases) in physical tonnes in 2022 was about 6 % higher than supply in the previous year (Figure B-2), with an about 13 % higher GWP in 2022 than in 2021 (Figure B-3). Refrigeration and air conditioning (including heat pumps) continue to be key applications. An important detail is that statistics in physical tonnes reflect the use patterns of F-gases in EU industries (Figure B-2), while the amount of F-gases expressed in carbon dioxide equivalents (CO₂e) reflects their potential relevance for climate change policy and the HFC phase-down (Figure B-3).

A key driver for the F-gases supply was the supply of SF₆, which increased by almost 50 % in and in CO₂e compared with 2021. Supply of HFCs increased by 8 % in mass or 6 % in GWP. The increase in supply is mostly due to by higher imports and higher SF₆ production, while production of HFCs in the EU continues to decrease.

The supply of unsaturated HFCs and HCFCs with very low GWPs, replacing HFCs with significantly higher GWPs, has decreased by 3 % and makes up about 22 % of the EU-27 total supply of fluorinated gases in 2022. When comparing the gases with the highest GWPs for the years 2021 and 2022, there was a 49 % increase for SF₆, and, less relevant for overall F-gas supply in CO₂e, a 6 % increase for NF₃ and a 3 % increase for PFCs.

⁽²⁾ While the previous subsections only discuss HFCs, this section includes trends for supply of *all F-gases* to the EU. Where supply is measured in units of tonnes, the major difference to HFC statistics is due to low-GWP unsaturated H(C)FCs. When measured in CO₂ equivalents, the difference is primarily due to very-high-GWPs gases SF₆, PFCs and NF₃.

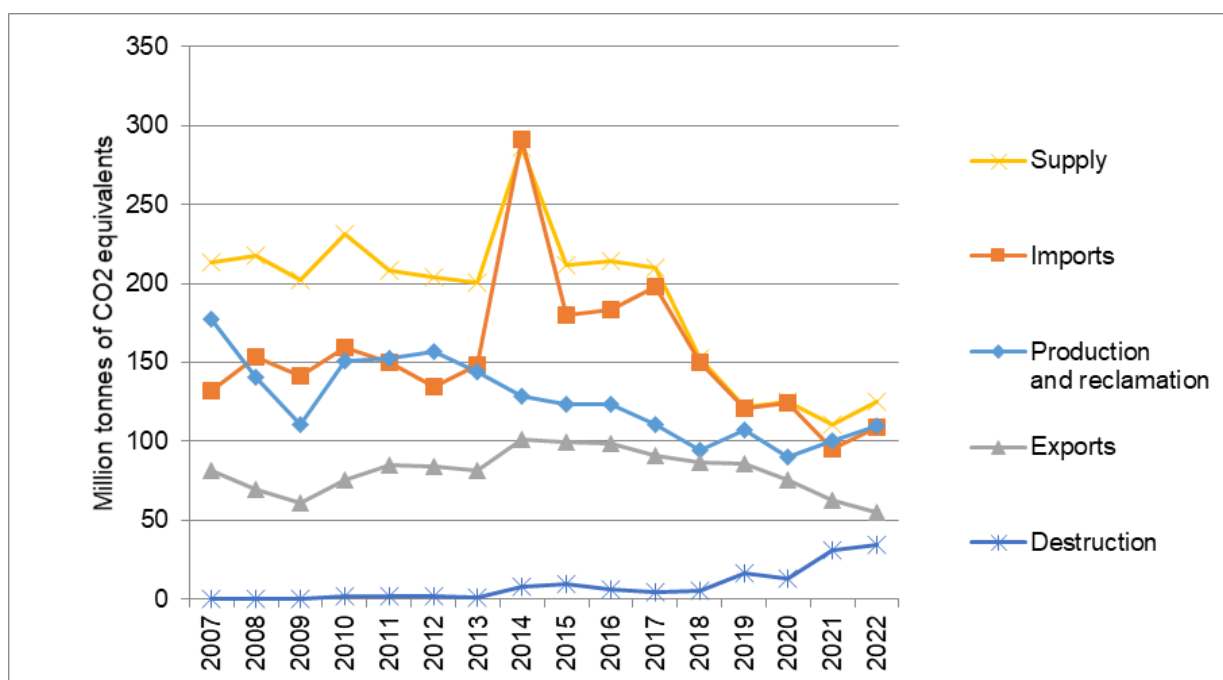
Figure B-2 Supply, production, import, export and destruction of F-gases (tonnes)



Notes: The geographical scope of the data presented is EU-27 and the UK (except Croatia) for 2007-2008, EU-27 and the UK for 2009-2020 and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, hydrofluoroethers (HFEs), alcohols and ‘other’ perfluorinated compounds) and HFCs, PFCs and SF6 in products and equipment were not subject to reporting for the period 2007-2013. Data presented for import and supply between 2007 and 2013 are thus limited to bulk import and bulk supply. Export is limited to bulk export for the whole time series. Data available for Croatia for the period 2009-2012 are limited to HFCs and do not cover PFCs and SF6. Starting in 2019, produced amounts include non-captured by-production and destroyed amounts cover destruction of these amounts.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Figure B-3 Supply, production, import, export and destruction of F-gases (CO₂e)



Notes: The geographical scope of the data presented is EU-27 and the UK (except Croatia) for 2007-2008, EU-27 and the UK for 2009-2020 and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, hydrofluoroethers (HFEs), alcohols and 'other' perfluorinated compounds) and HFCs, PFCs and SF₆ in products and equipment were not subject to reporting for the period 2007-2013. Data presented for import and supply between 2007 and 2013 are thus limited to bulk import and bulk supply. Export is limited to bulk export for the whole time series. Data available for Croatia for the period 2009-2012 are limited to HFCs and do not cover PFCs and SF₆. Starting in 2019, produced amounts include non-captured by-production and destroyed amounts cover destruction of these amounts.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

The trend in F-gas supply in the EU reflects trends in physical flows of F-gases: production, reclamation, imports, exports and destruction in the EU.

- **Production** of F-gases has seen a steady decline since 2012. In 2022, EU-27 production of F-gases decreased again in production volume (-13 %) compared with 2021. However, mainly due to an increase of 18 % in production of SF₆, which has a very high GWP, the production of F-gases in CO₂e increased by 10 %. As can be seen in Figure B-3, this trend was also already visible in 2021.
- The quantities reported as **reclaimed** F-gases decreased by about 8 %. While EU-27 HFC reclamation in 2022 decreased by 12 %, reclamation of SF₆ increased by 14% and that of unsaturated HFCs and HCFCs doubled, albeit from a very low level.
- **Reclaimed** HFCs account for about 8 % of EU production of virgin HFCs in 2022, or less than 2 % of total EU HFC supply (or 4 % and 2 %, respectively, as CO₂e). While 89 % of reclaimed amounts are HFCs, SF₆ contributes to 36 % of the GWP of reclaimed gas.
- Total F-gas **imports** in 2022 increased by 7 % compared with 2021, while there was an increase of 13 % in CO₂e. The main driver was an increase of HFC imports (12 % in tonnes /11 % in GWP), amended by a 18 % increase in SF₆ imports. The increase in HFC imports is linked to the decrease in EU HFC production, shifting the latter outside of the EU.
- While the increase in total imports was quantitatively mainly driven by bulk imports, an even steeper increasing trend can be seen for imports of F-gases contained in products and equipment roughly 95 % HFCs, 5 % unsaturated HFCs and HCFCs). Such equipment imports into EU-27 in 2022 were about 20 % higher than in 2021. The main drivers of the increase in equipment imports are imports of split and multi-split air conditioning equipment. This may possibly be linked to an

anticipation of bans for certain gases in such equipment in the upcoming revision of the EU F-Gas Regulation.

- In 2022, overall **bulk exports** of F-gases from the EU continued their strong decrease since 2017 and decreased by about 16 % compared with 2021; a decrease of 12 % is visible in CO₂e. While trends are different depending on the gas (mostly HFCs, SF₆ and unsaturated HFCs/HCFs), they all show a decrease. Exports of **F-gases contained in products and equipment** are not subject to obligatory reporting.
- **Destruction and feedstock use** of F-gases is mainly reported for HFCs. The amounts destroyed increased by about 5 % in 2022. Destruction of non-HFCs also increased significantly but remains at a low level (about 4 % of gases destroyed in 2022 were non-HFCs). The steep increase in 2019 had been due to the systematic inclusion of unwanted or off-grade gases destroyed after production before sale in the reporting scope. HFC amounts used as feedstock for chemical production processes have been rising since 2020, feedstock levels in 2022 were approximately 40 % above average 2015-2019 levels.

More graphs and tables summarising data reported by companies on the production, import, export and destruction of F-gases in the EU, for the period 2007-2022, are contained in the annex to this briefing. The annex also documents the methodology used, in particular for the calculation of the supply, placing on the market and consumption metrics, and institutional arrangements.

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Fluorinated greenhouse gases 2023

Data reported by companies on the production, import, export and destruction of fluorinated greenhouse gases in the European Union, 2007-2022

ANNEX TO PUBLIC BRIEFING



1 Introduction to the Annex

1.1 Annex structure

This annex includes the following sections:

This introductory Section 1 outlines legal arrangements and their implementation.

Figures

Section 2 contains figures on reporting companies.

Section 3 presents figures on production, imports, exports and destruction of fluorinated greenhouse gases as reported by companies. Section 4 presents key indicators for the EU, based on reported data about the supply of F-gases to the EU market and their intended applications.

Section 5 shows figures on progress under the EU HFC phase-down, while section 6 shows figures on progress under the global HFC phase-down under the Montreal Protocol.

Data Tables

Section 7 provides detailed data tables for the figures presented in sections 2 to 6.

Additional Information

Section 8 briefly explains the terminology used throughout the document, section 9 details the gases covered by the EU F-gas Regulation and thus this document and section 10 outlines the calculation methods used.

1.2 Scope

The data contained in this annex is based on submissions for the year 2022 as received by 25 July 2023 (which includes some late reports and corrections received after the legal deadline on 31 March 2023). Data for previous years were changed slightly after some corrections were submitted.

Data for 2007-2013 are covered by the old 2006 F-gas Regulation, while data for 2014 and onwards are covered by the new 2014 Regulation. Due to the different reporting frameworks, data from the two periods are not always directly comparable.

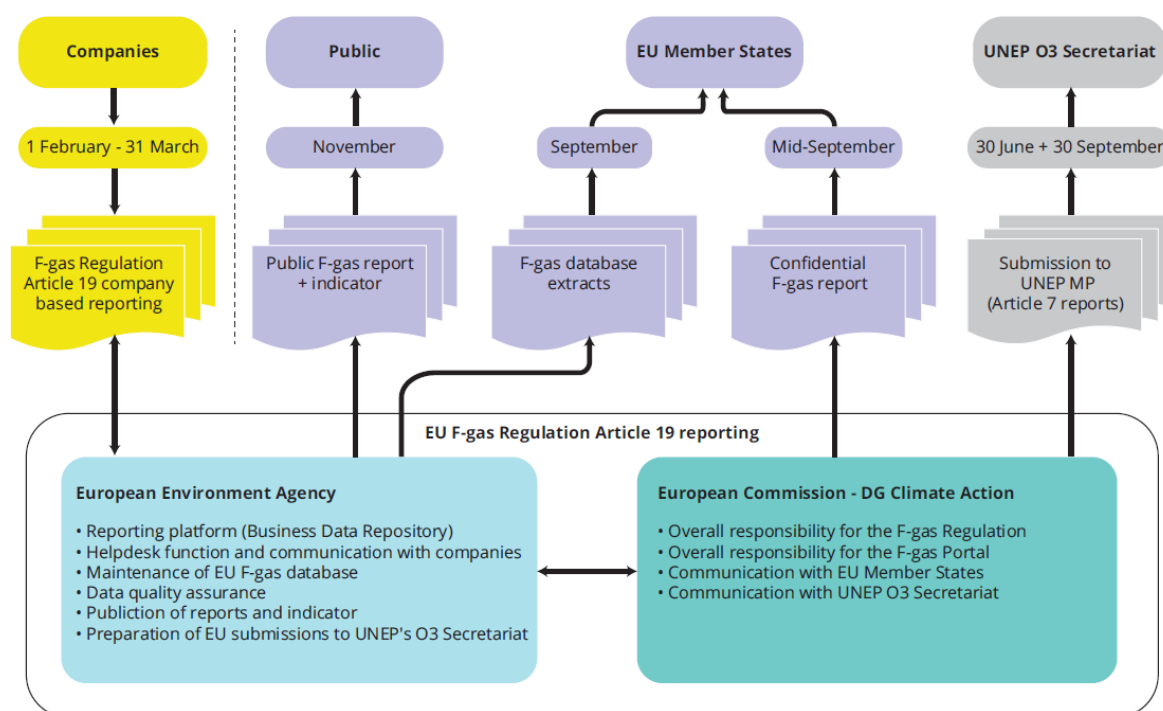
The geographical scope for data presented for the years until 2019 is the EU-28. Data for 2020 relates to the EU-27 and the United Kingdom and data for 2021 and subsequent years relates to the EU-27.

1.3 Institutional arrangements

Companies that need to report are obliged to register with the European Commission's F-gas portal ⁽³⁾, which also hosts the HFC registry pursuant to Article 17 of the 2014 F-gas Regulation.

⁽³⁾ <https://webgate.ec.europa.eu/fgas>

Figure 1-1 Institutional arrangements



Source: EEA, 2022a.

Since 2012, the European Commission has given the responsibility for collecting, archiving and evaluating the data reported by companies to the European Environment Agency (EEA). The reporting process is executed through the EEA's online platform, the Business Data Repository (BDR), while technical support for the F-gas reporting process is provided by the EEA's European Topic Centre on Climate Change Mitigation (ETC CM) ⁽⁴⁾.

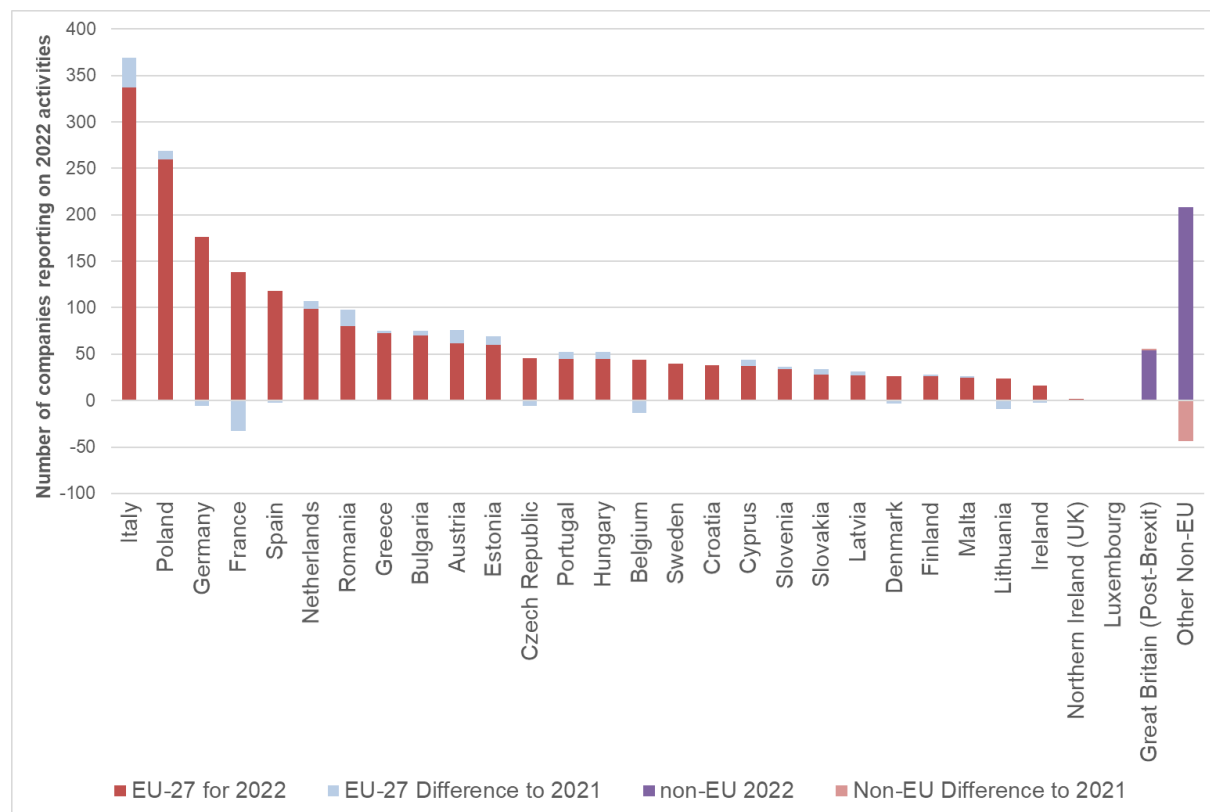
1.4 Confidentiality

The F-gas Regulation requires that the confidentiality of the information submitted by companies is protected (Article 19(8)). The EEA takes appropriate measures to protect confidentiality and prevent publication of commercially sensitive information. These measures include public reporting of F-gases data only at higher levels of aggregation, to protect data that are the result of reports from fewer than three corporate groups, and additional steps to prevent deduction of sensitive information. It is for confidentiality reasons that some of the statements about F-gas activity in this report are of a general nature and do not refer to exact figures or percentages. A summary of the confidentiality measures applied to the data published in this report is included at the beginning of Section 7.

⁽⁴⁾ <https://www.eionet.europa.eu/etcs/etc-cm>

2 Figures on companies reporting in 2022

Figure 2-1 Reporting companies by Member State



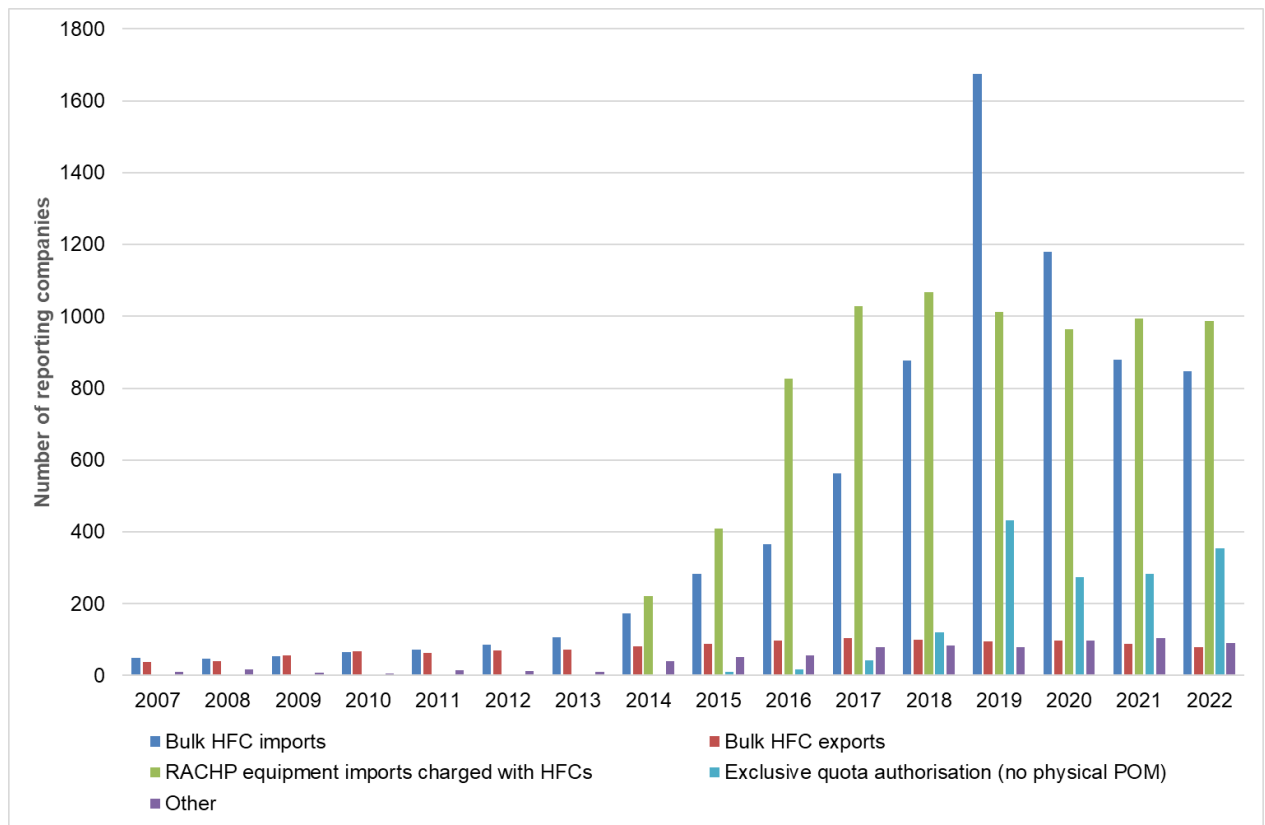
Note: Nil reports not included.

Other Non-EU countries: Brazil, British Virgin Islands, Canada, China, Egypt, Gibraltar, Hong Kong, India, Japan, Korea, Malaysia, Marshall Islands, Mexico, Monaco, Norway, Russia, Saudi Arabia, Serbia, Singapore, Switzerland, South Africa, Taiwan, Turkey, United States, United Arab Emirates.

Source: EEA, 2023b.

Table 23 in Section 7 (Data tables, page 69) presents a breakdown of reporting companies by countries and reported activities for 2022.

Figure 2-2 Reported activities, 2007-2022



Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

For a more detailed breakdown of reported activities over time, please refer to Table 25 in Section 7 (Data tables, page 71).

3 Figures on F-gas activity in the European Union

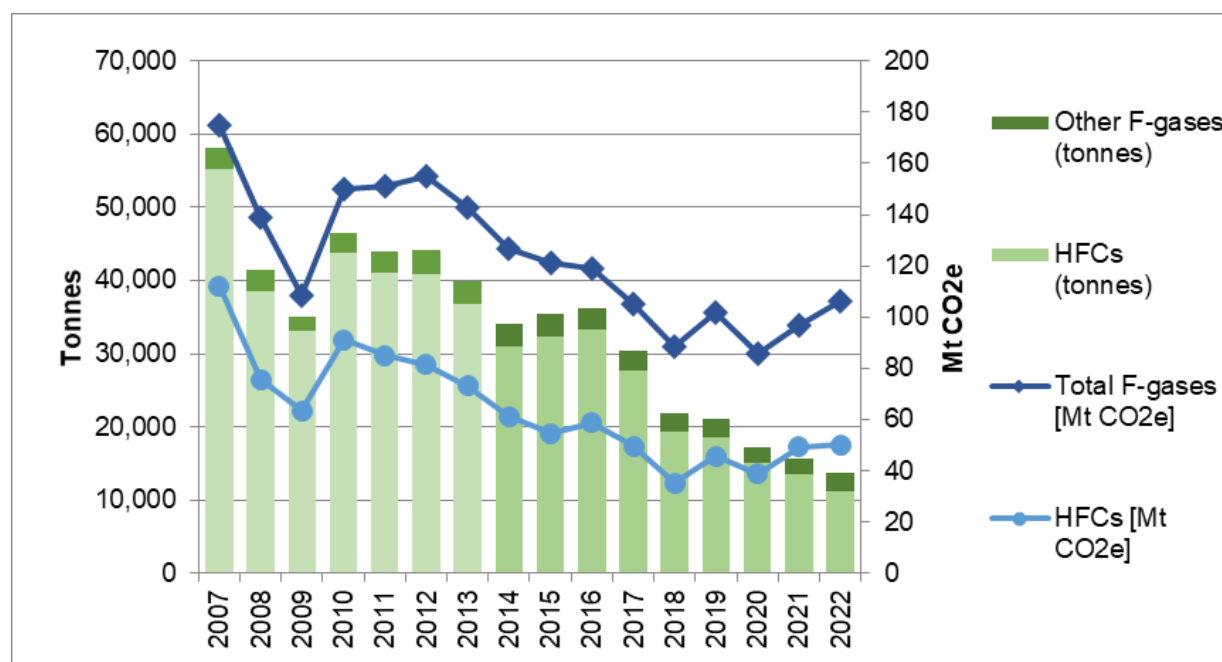
This chapter presents data reported by companies on:

- production and reclamation (Section 3.1);
- imports, both bulk and in products/equipment, and bulk exports (Section 3.2);
- destruction (Section 3.3).

3.1 Production and reclamation

‘Production’ refers to the production of virgin F-gases. The F-gas Regulation defines ‘reclamation’ as ‘the reprocessing of a recovered fluorinated greenhouse gas in order to match the equivalent performance of a virgin substance, taking into account its intended use’. Note that reclaimed HFCs do not count as ‘placed on the market’ and are not subject to the limits of the HFC phase-down.

Figure 3-1 EU production of fluorinated gases

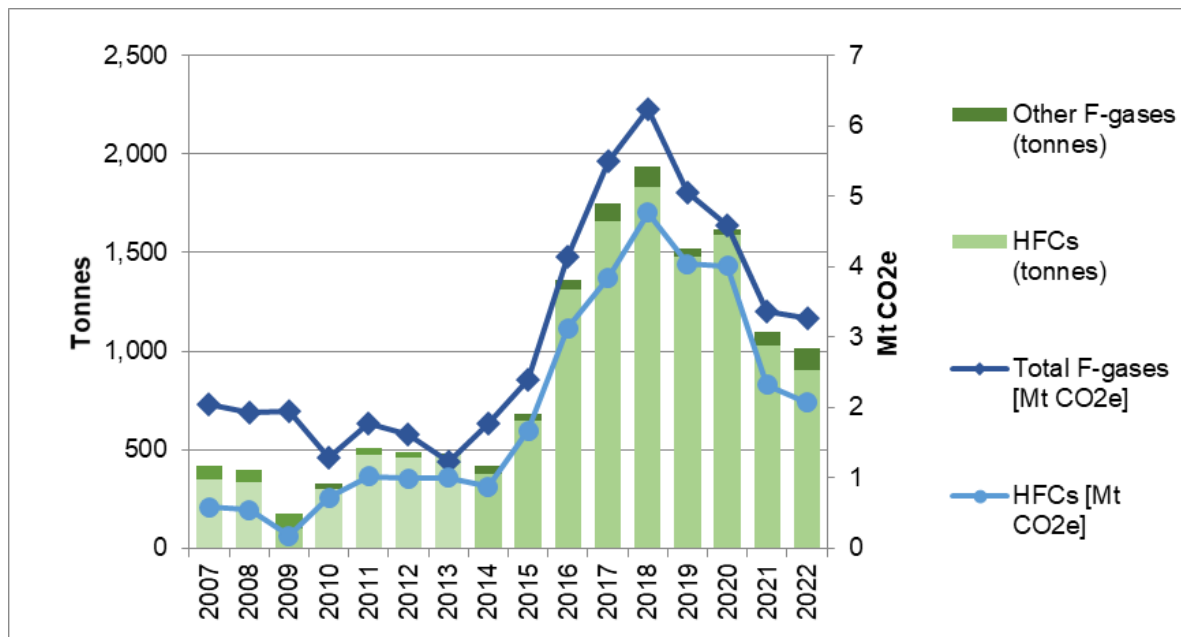


Note: The geographical scope of presented data is the EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

A tabular overview on F-gases produced in the EU since 2007 in tonnes and CO₂e is given in Table 1 and Table 2 in section 7 (Data tables, page 46f.).

Figure 3-2 EU reclamation of fluorinated gases



Note: The geographical scope of presented data is the EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013.

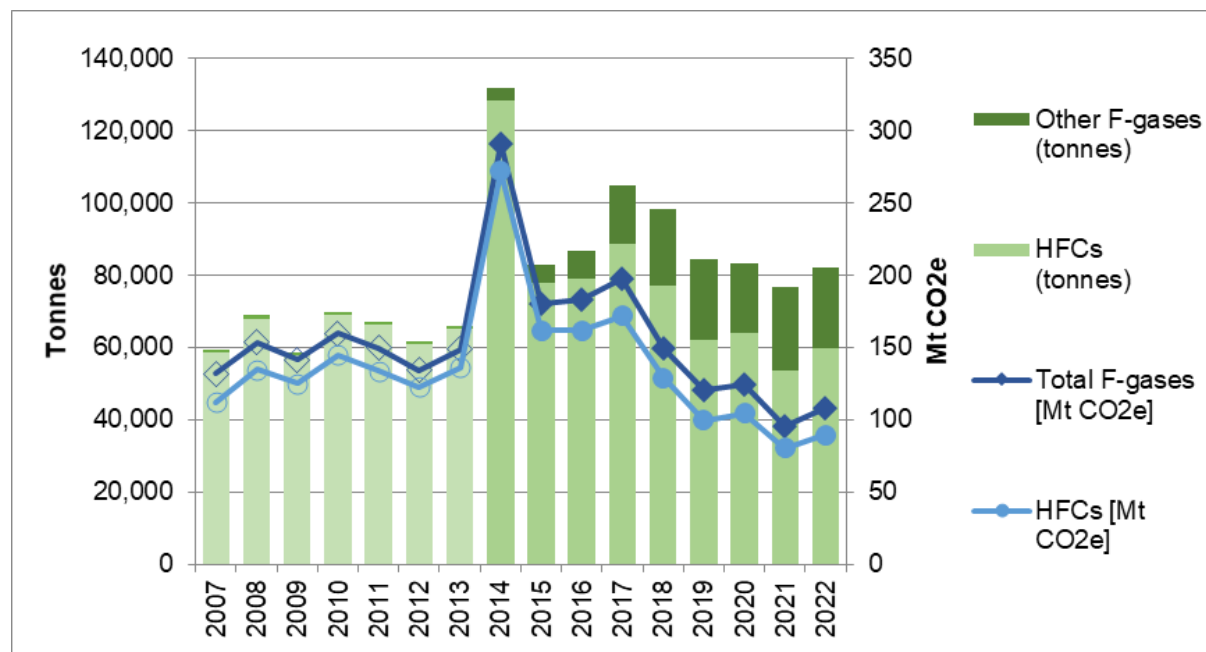
Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

3.2 Imports and exports

3.2.1 Imports

Detailed data on total imports can be found in Table 5 and Table 6 in section 7 (Data tables, page 50f.).

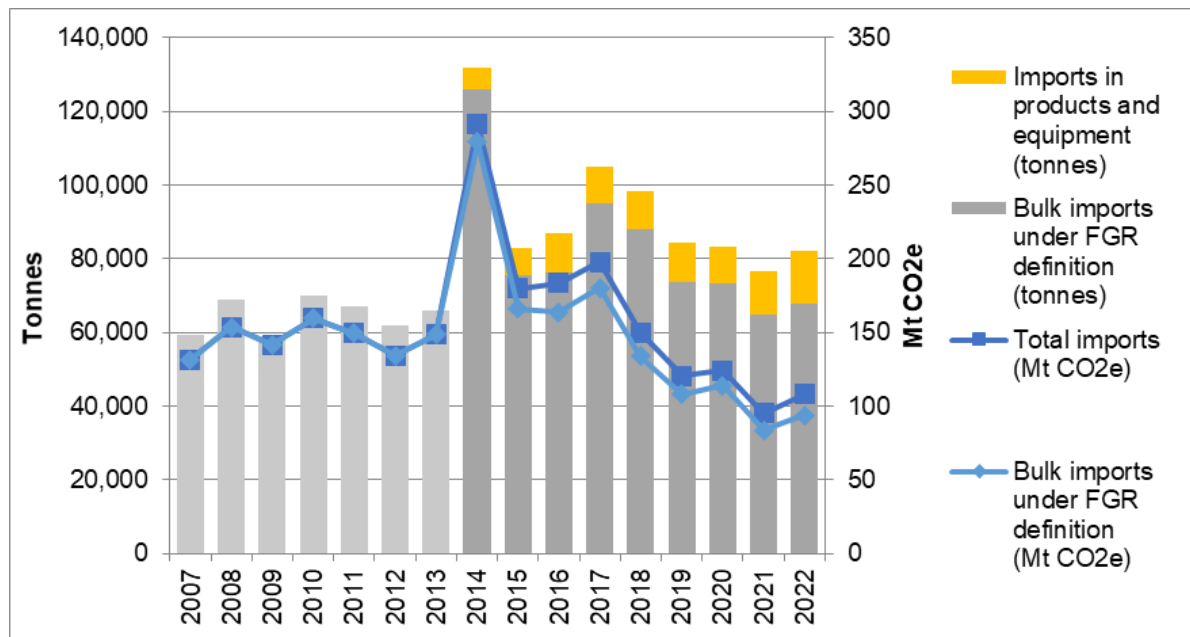
Figure 3-3 EU imports of fluorinated gases



Note: The geographical scope of presented data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF_3 and other perfluorinated compounds) and HFCs, PFCs and SF_6 imported in products and equipment were not subject to reporting for the years 2007-2013. Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF_6 .

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Figure 3-4 EU imports by type

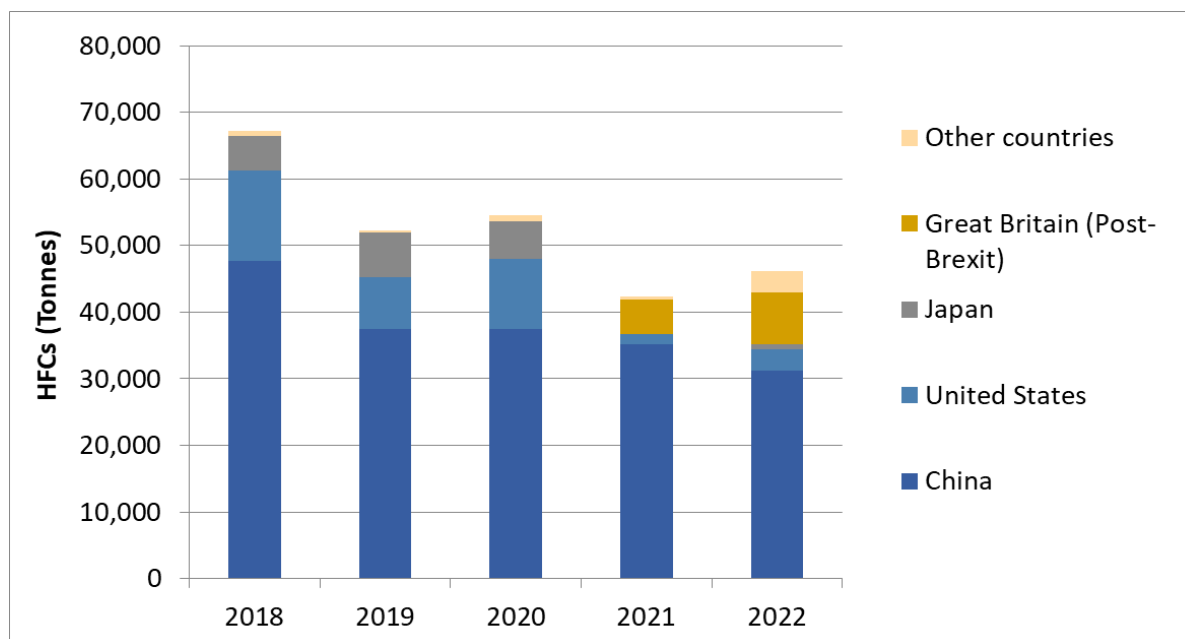


Note: The geographical scope of presented data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF_3 and other perfluorinated compounds) and HFCs, PFCs and SF_6 imported in products and equipment were not subject to reporting for the years 2007-2013. Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF_6 . Bulk imports under FGR definition starting 2014 do include imports of pre-blended polyols which are thus not included in the amounts shown for imports in products and equipment.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

3.2.2 Bulk Imports

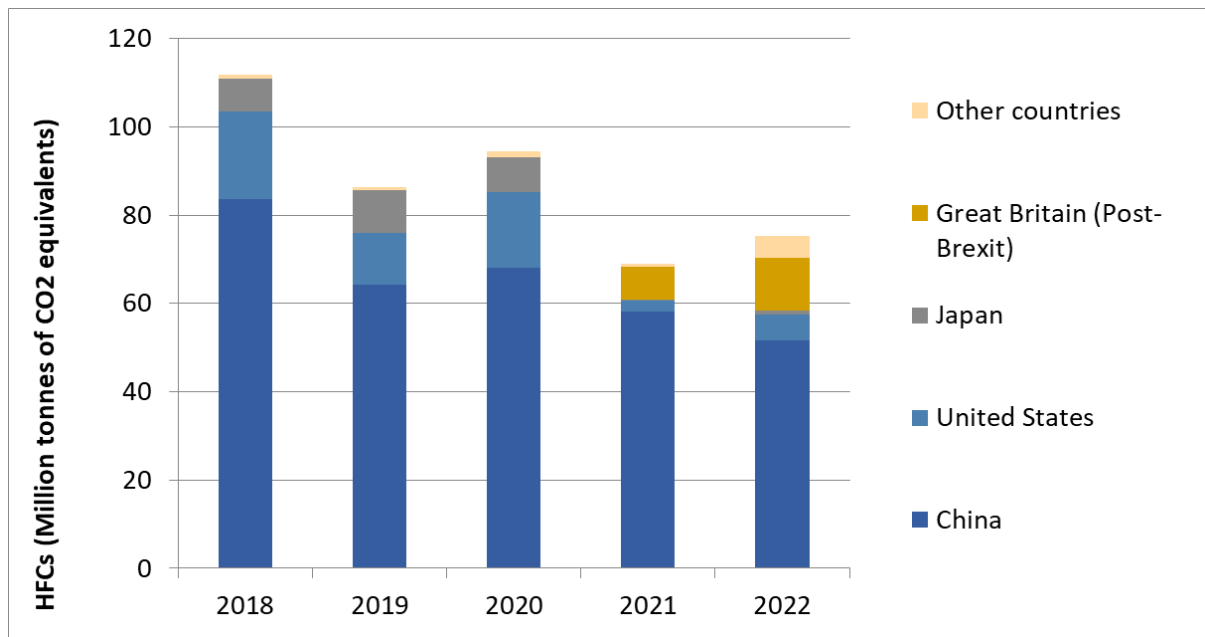
Figure 3-5 Origin of bulk HFC imports (tonnes)



Note: The geographical scope of presented data is EU-28 for 2018-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Bulk imports presented here are cleared of imports of pre-blended polyols and thus compatible with the MP definition.

Sources: EEA, 2022a and 2023b.

Figure 3-6 Origin of bulk HFC imports (GWP)



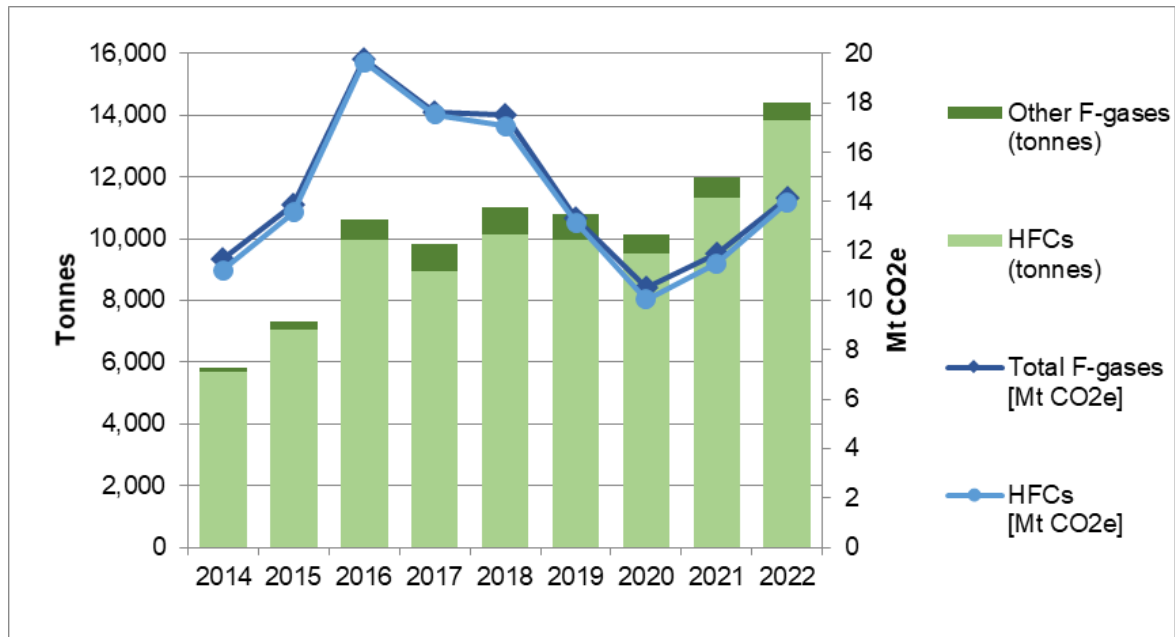
Note: The geographical scope of presented data is EU-28 for 2018-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Bulk imports presented here are cleared of imports of pre-blended polyols and thus compatible with the MP definition.

Sources: EEA, 2022a and 2023b.

Detailed data on bulk F-gas imports is contained in Table 7 and Table 8 in section 7 (Data tables, page 52f.).

3.2.3 Imports contained in products and equipment

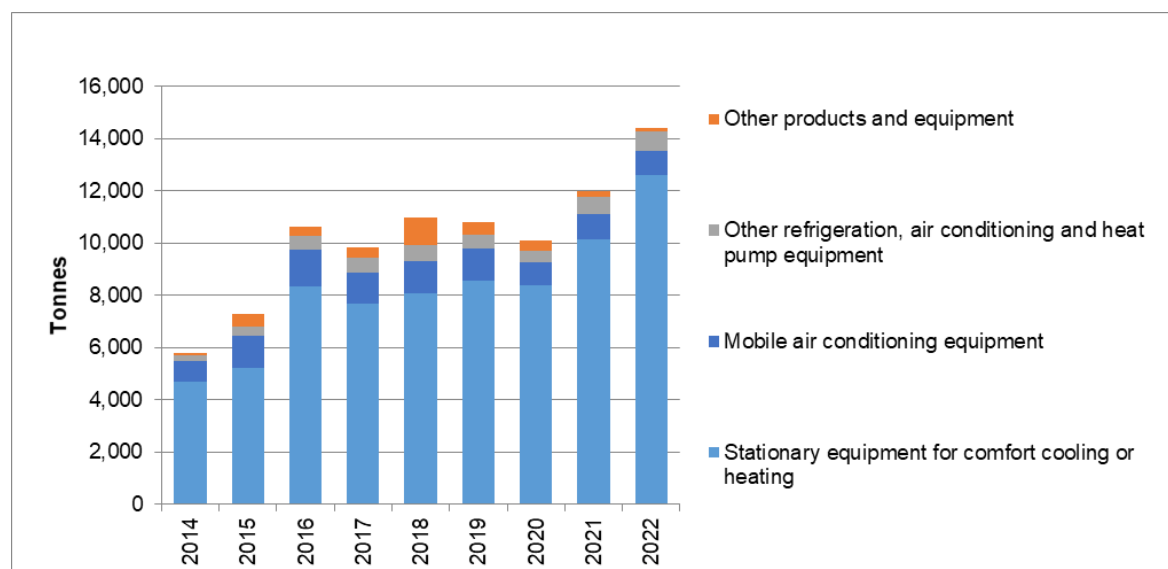
Figure 3-7 EU imports of fluorinated gases within products and equipment



Note: The geographical scope of presented data is EU-28 for 2014-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Imports of pre-blended polyols are not included in the data shown.

Sources: EEA, 2022a and 2023b.

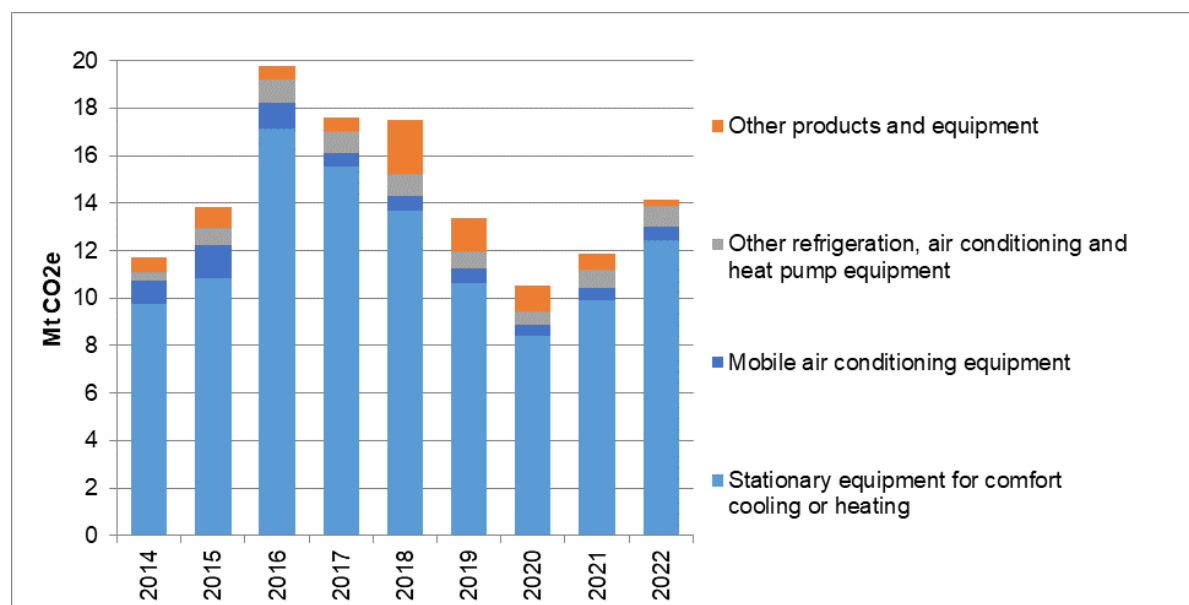
Figure 3-8 Categories of EU supply in products and equipment of fluorinated gases (tonnes)



Note: The geographical scope of presented data is EU-28 for 2014-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Imports of pre-blended polyols are included since 2018.

Sources: EEA, 2022a and 2023b.

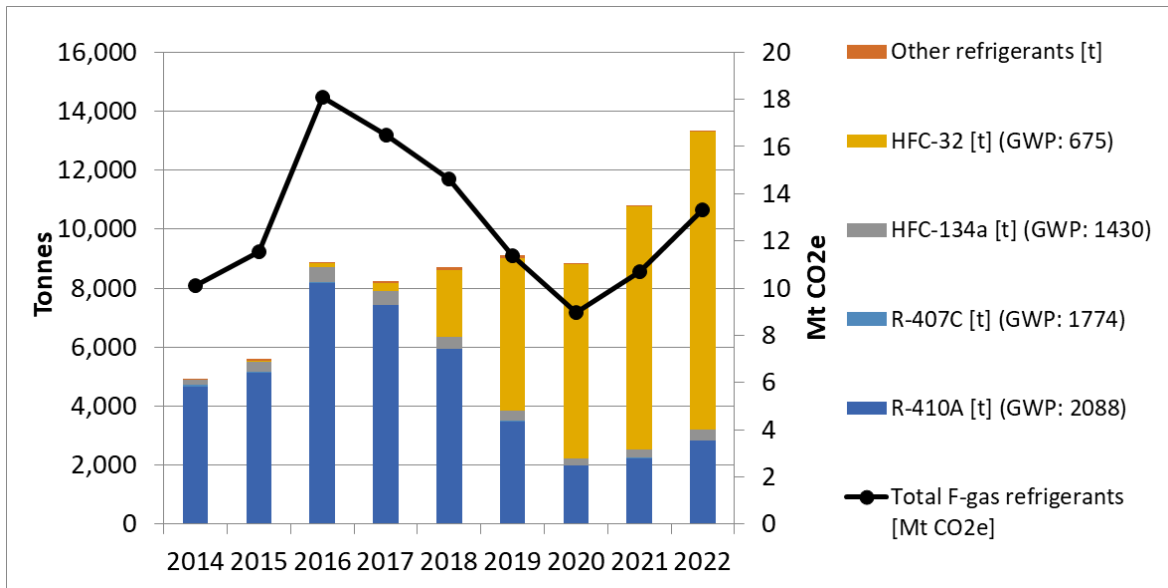
Figure 3-9 Categories of EU supply in products and equipment of fluorinated gases (CO₂e)



Note: The geographical scope of presented data is EU-28 for 2014-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Imports of pre-blended polyols are included since 2018.

Sources: EEA, 2022a and 2023b.

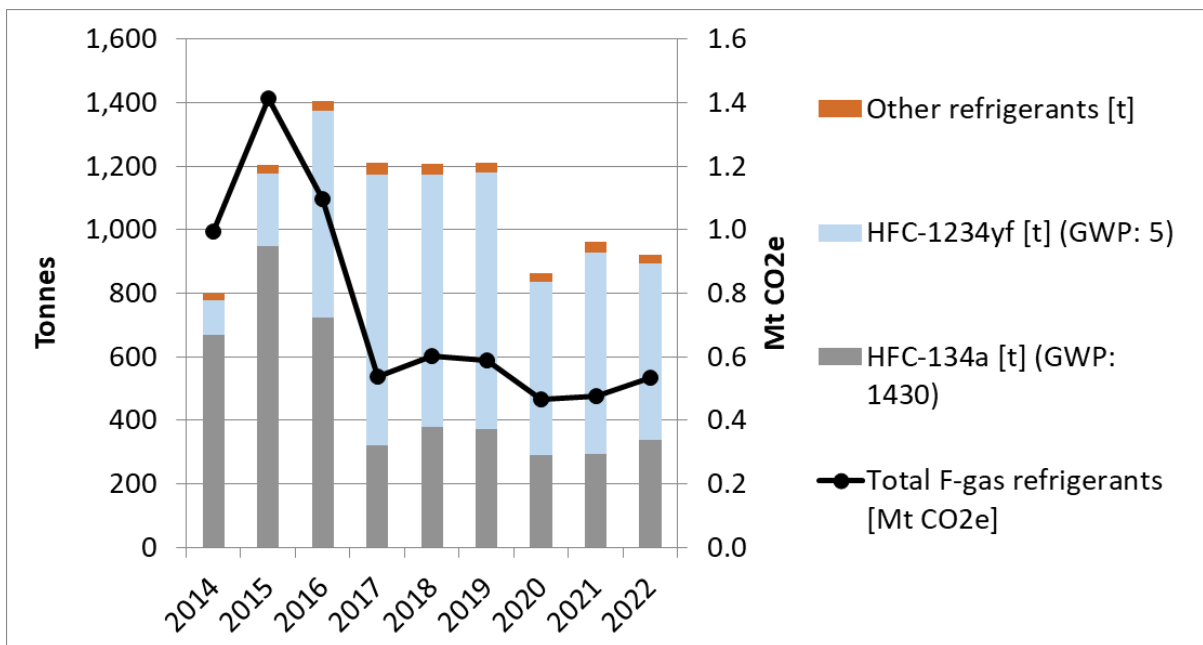
Figure 3-10 Refrigerants in imported stationary RACHP equipment



Note: The geographical scope of presented data is EU-28 for 2014-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years.

Sources: EEA, 2022a and 2023b.

Figure 3-11 EU imports of fluorinated gases within air conditioning equipment for vehicles



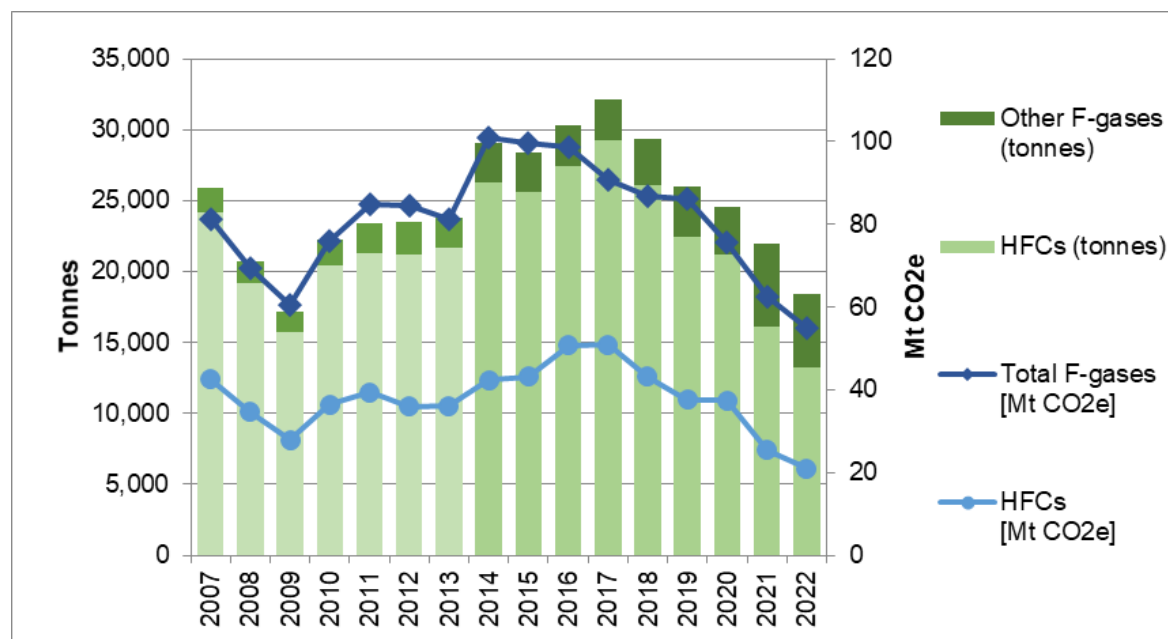
Note: The geographical scope of presented data is EU-28 for 2014-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years.

Sources: EEA, 2022a and 2023b.

Detailed data on F-gases in imported products and equipment are listed in Table 9 and in Table 10 in section 7 (Data tables, page 54f.). Equipment imports by equipment category are given in Table 11 and Table 12 (page 56f.).

3.2.4 Exports

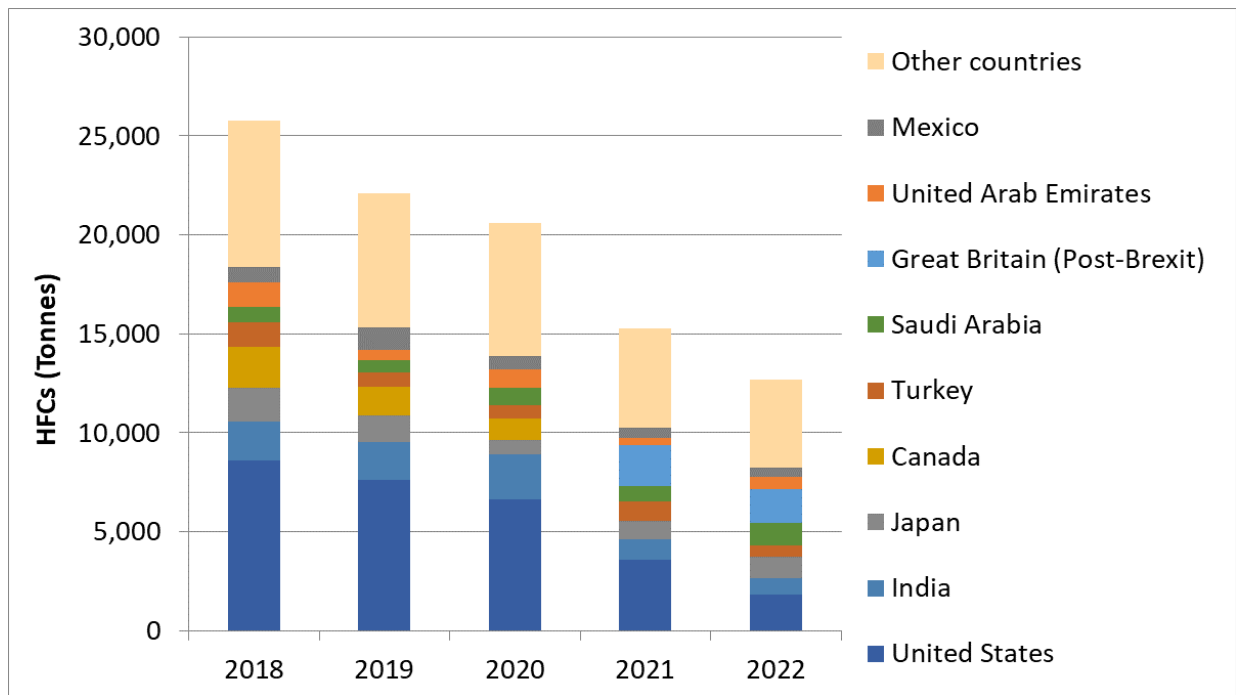
Figure 3-12 EU bulk exports of fluorinated gases



Note: The geographical scope of presented data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. Bulk exports shown for 2014-2017 include gases exported in pre-blended polyols. Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

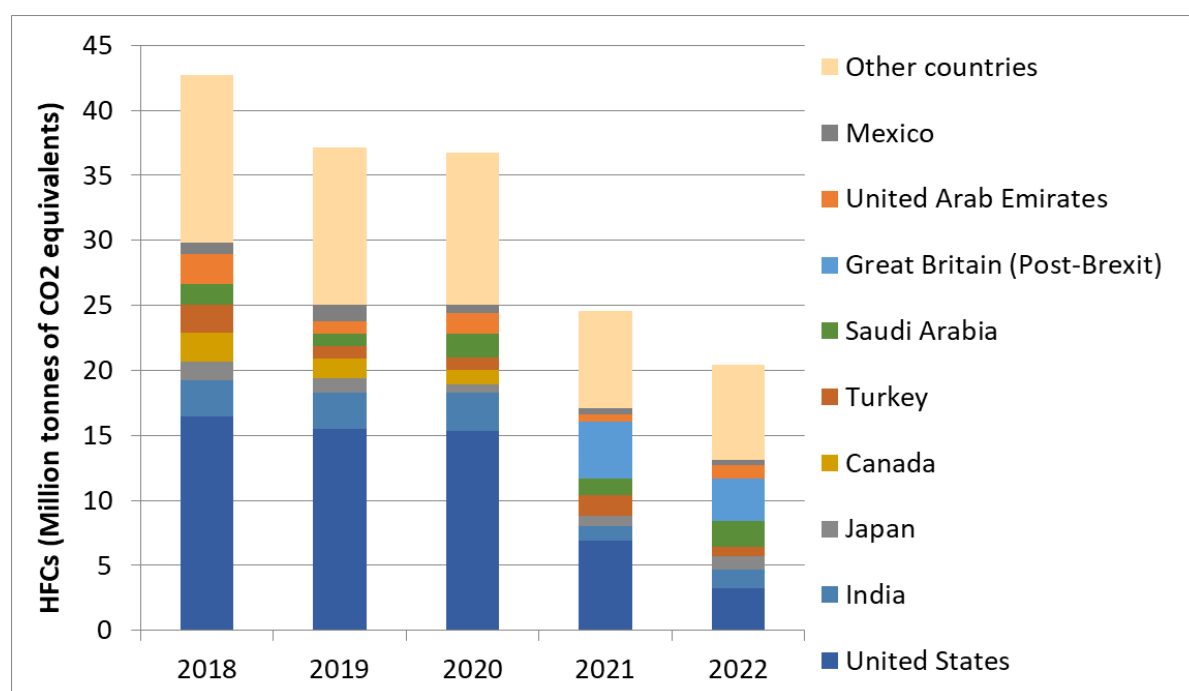
Figure 3-13 Destination of bulk HFC exports (tonnes)



Note: The geographical scope of presented data is EU-28 for 2018-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Bulk imports presented here are cleared of imports of pre-blended polyols and thus compatible with the MP definition.

Sources: EEA, 2022a and 2023b.

Figure 3-14 Destination of bulk HFC exports (GWP)



Note: The geographical scope of presented data is EU-28 for 2018-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Bulk imports presented here are cleared of imports of pre-blended polyols and thus compatible with the MP definition.

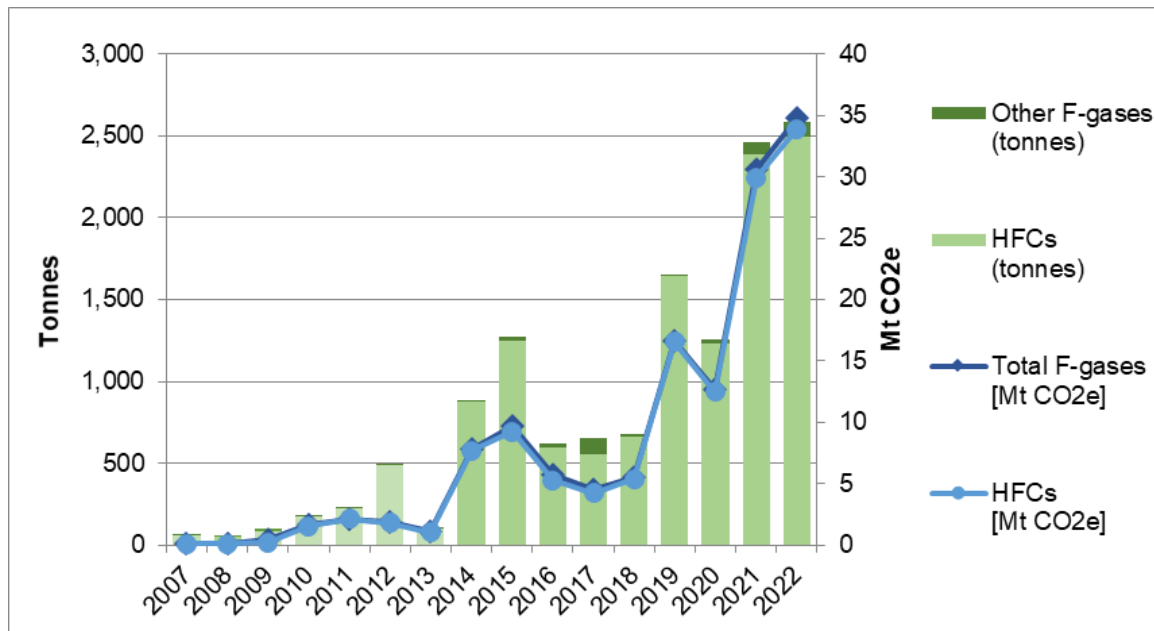
Sources: EEA, 2022a and 2023b.

Detailed data on exports can be found in in Table 13 and Table 14 in section 7 (Data tables, page 57f.).

3.3 Destruction of fluorinated gases

This section presents the amounts of F-gases reported as destroyed.

Figure 3-15 EU destruction of fluorinated gases



Note: The geographical scope of presented data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF_3 and other perfluorinated compounds) were not subject to reporting for the years 2007-2013.

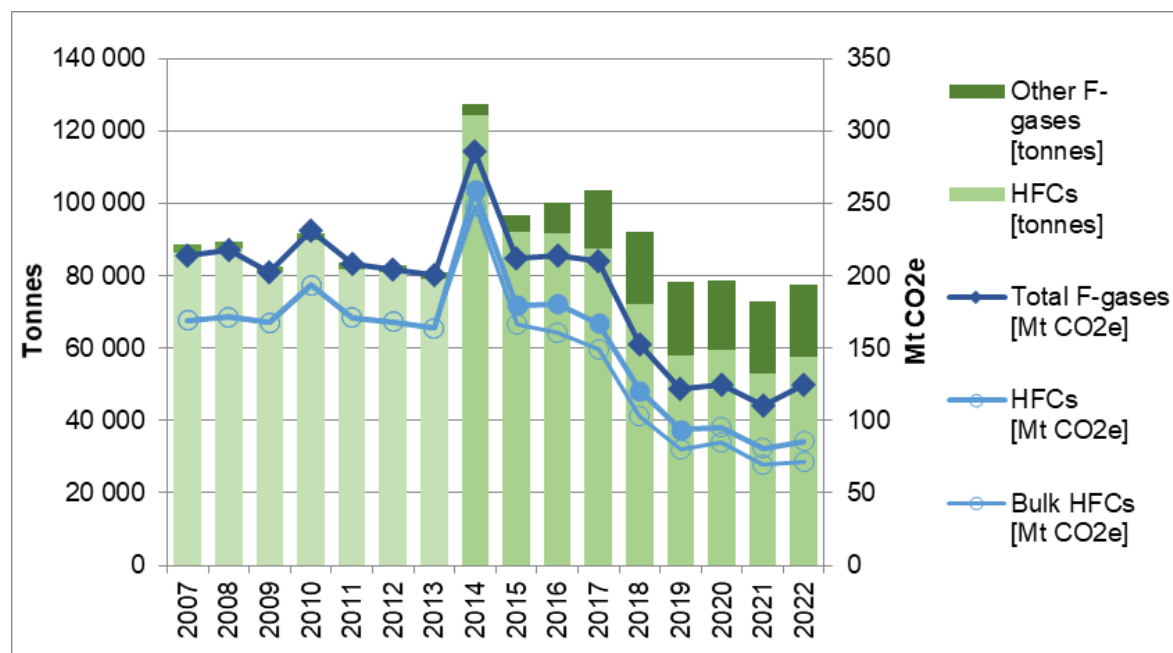
Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

4 Figures on the supply of fluorinated gases to the EU

Supply of fluorinated gases is a metric used by the EEA that provides information on the actual use of fluorinated gases by EU industries. It is calculated primarily from reported production, imports and exports ⁽⁵⁾.

4.1 Trends in the EU supply by gas

Figure 4-1 EU supply of fluorinated gases

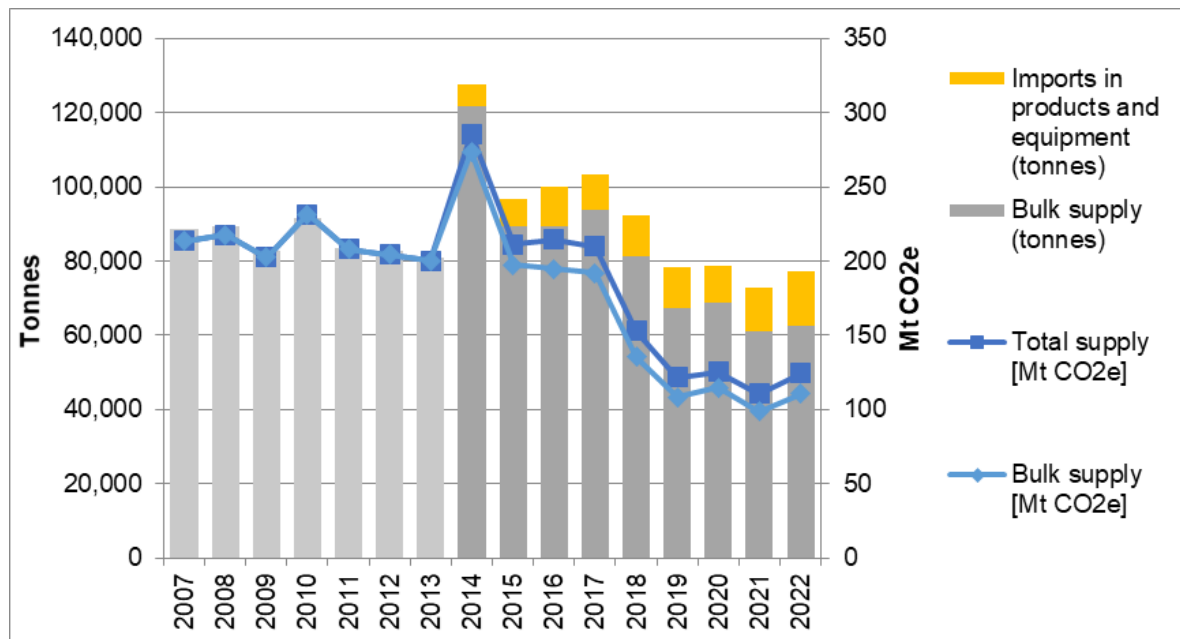


Note: The geographical scope of presented data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF_3 and other perfluorinated compounds) and HFCs, PFCs and SF_6 imported in products and equipment were not subject to reporting for the years 2007-2013. Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF_6 .

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

⁽⁵⁾ For methodological details on the calculation of EU supply, please refer to section 10, which explains the difference between the metrics of 'EU supply', 'placing on the market', and 'consumption', which are relevant for different aspects of the legal framework.

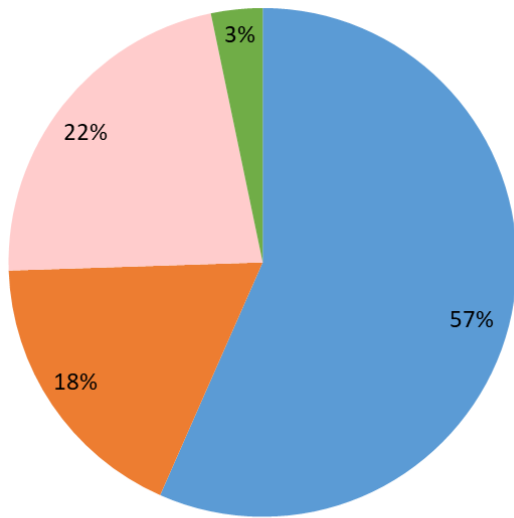
Figure 4-2 EU supply of fluorinated gases by types



Note: The geographical scope of presented data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) and HFCs, PFCs and SF₆ imported in products and equipment were not subject to reporting for the years 2007-2013. Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆. Imports of pre-blended polyols, available since 2018, were assigned to the supply in products and equipment.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Figure 4-3 2022 total supply by types and groups of fluorinated gases (% tonnes)

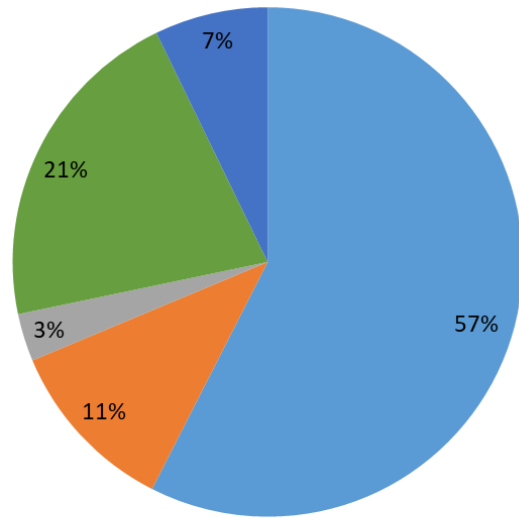


■ HFCs (bulk) ■ HFCs (equipment)
■ Unsaturated H(C)FCs ■ Other F-gases

Note: The geographical scope of presented data is EU-27.

Source: EEA, 2023b.

Figure 4-4 2022 total supply by types and groups of fluorinated gases (% CO₂e)



■ HFCs (bulk) ■ HFCs (equipment)
■ PFCs ■ SF6
■ Other F-gases

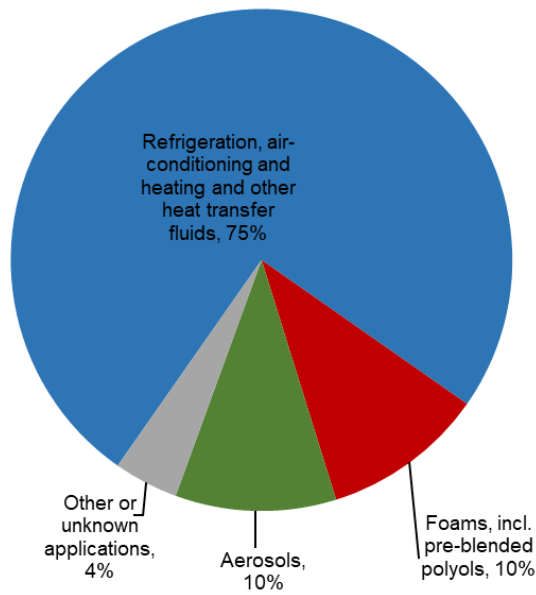
Note: The geographical scope of presented data is EU-27.

Source: EEA, 2023b.

Detailed data on total supply and bulk supply are given in Table 15 and Table 18 in section 7 (Data tables, page 59f.). For supply in imports and equipment, please refer to Table 9 and Table 10 (page 54f).

4.2 Intended applications of EU supply of F-gases

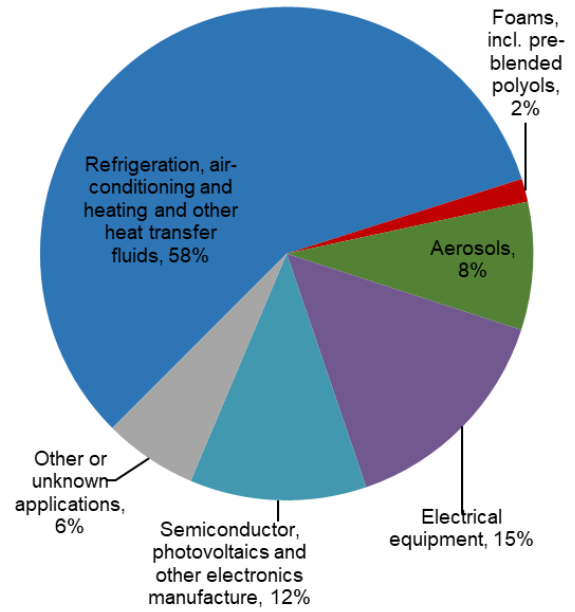
Figure 4-5 2021 EU F-gases supply by intended applications (% tonnes)



Note: The geographical scope of presented data is EU-27.

Source: EEA, 2023b.

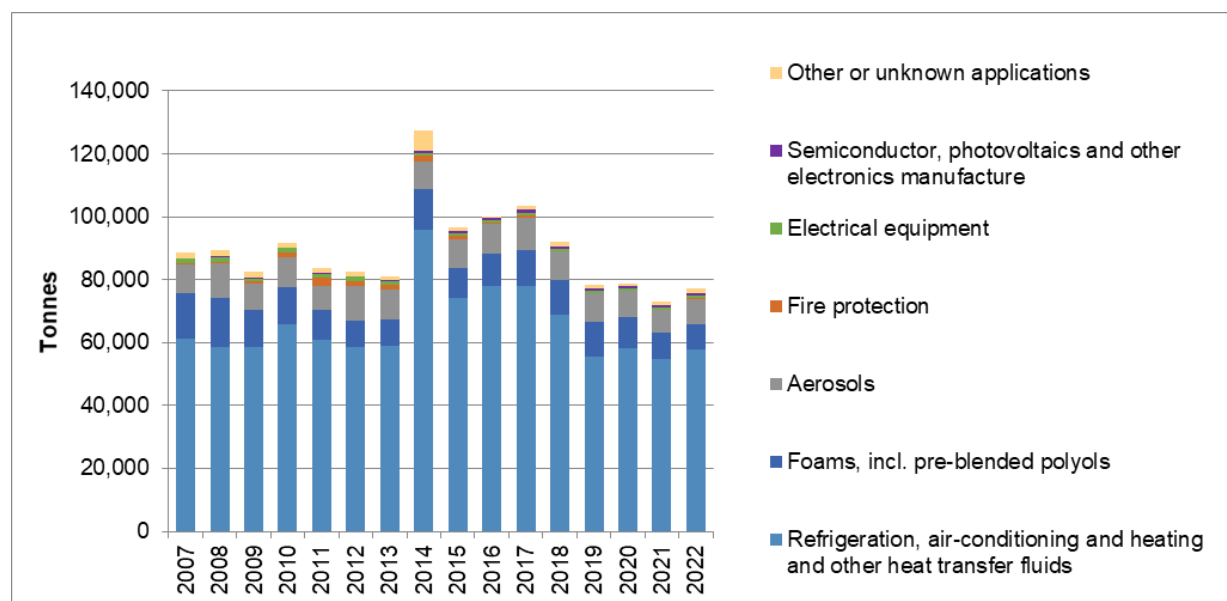
Figure 4-6 2021 EU F-gases supply by intended applications (% CO₂e)



Note: The geographical scope of presented data is EU-27.

Source: EEA, 2023b.

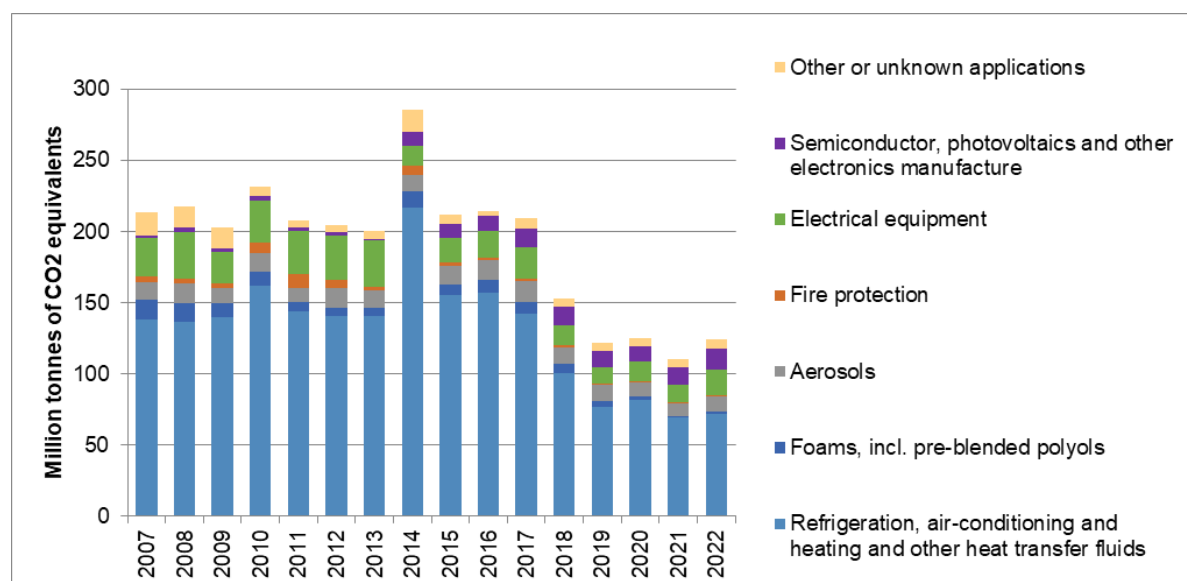
Figure 4-7 Intended applications of EU total supply of fluorinated gases (tonnes)



Note: The geographical scope of presented data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) and HFCs, PFCs and SF₆ imported in products and equipment were not subject to reporting for the years 2007-2013. Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Figure 4-8 Intended applications of EU total supply of fluorinated gases (CO₂e)



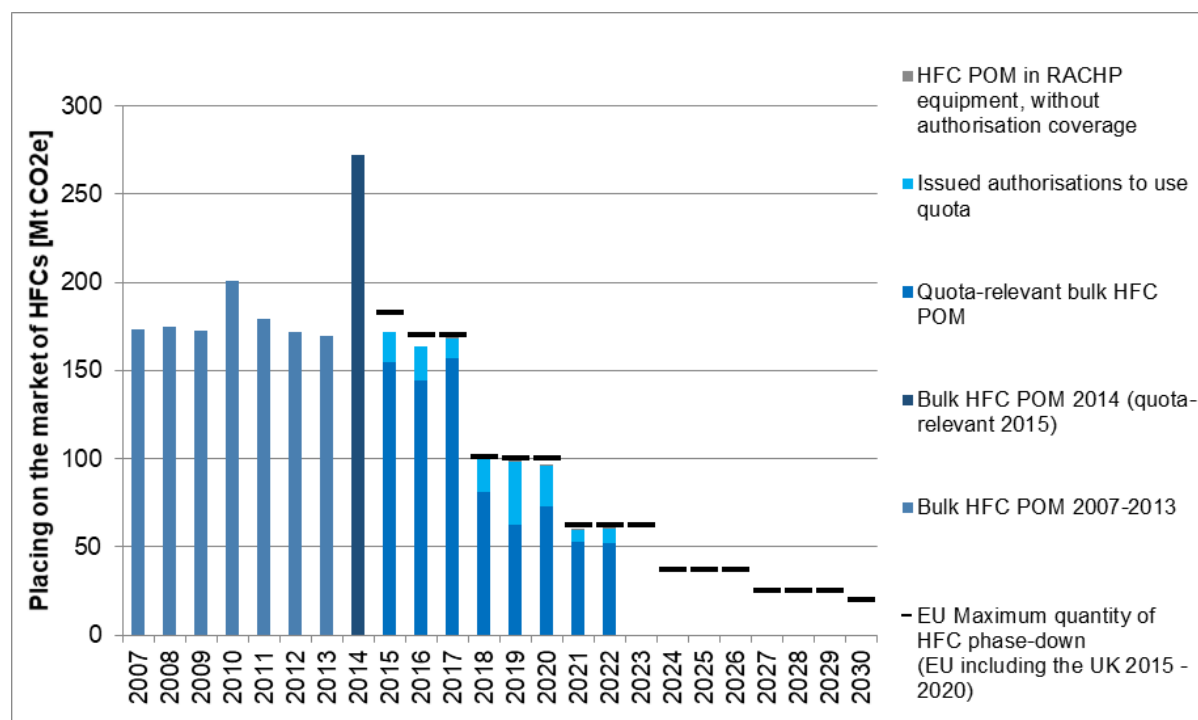
Note: The geographical scope of presented data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) and HFCs, PFCs and SF₆ imported in products and equipment were not subject to reporting for the years 2007-2013. Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Detailed data on intended applications can be found in tables Table 19 to Table 20, in section 7 (page 65f). For categories of supply in products and equipment, please refer to Table 11 and Table 12 (page 56f). For details of the calculation methods, please refer to section 10.

5 Figures on the progress of the EU HFC phase-down

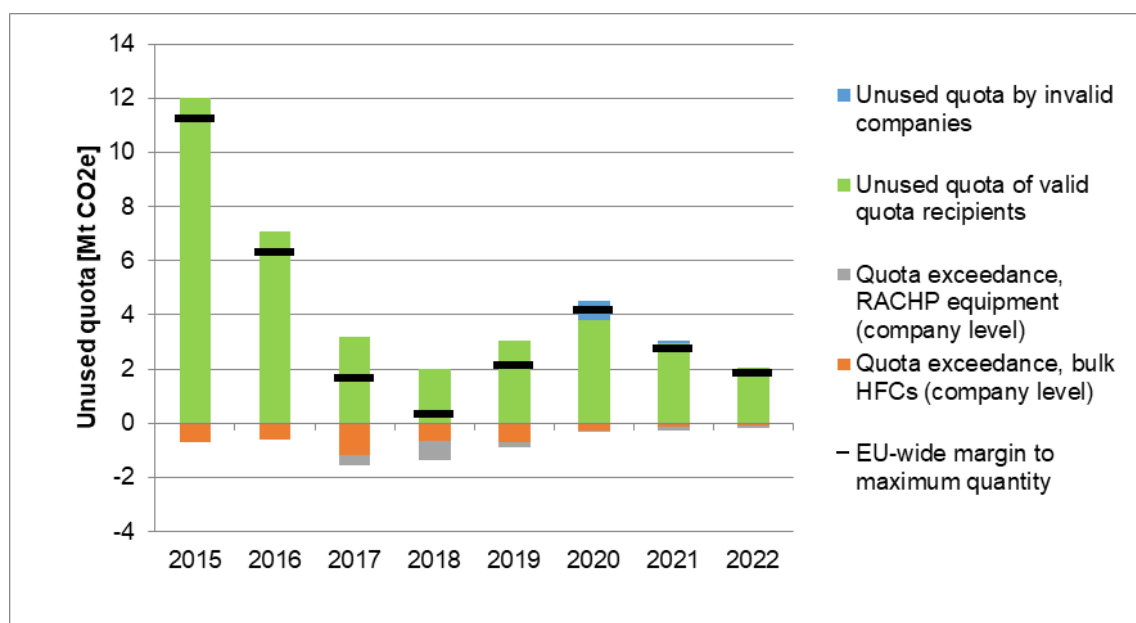
Figure 5-1 Progress of the EU HFC phase-down



Notes: POM, placing on the market. Values from 2007 to 2013 are based on the reporting obligations of the previous F-gas Regulation (EC) No 842/2006 and are therefore not fully comparable with data from 2014 onwards (based on the obligations of the revised F-gas Regulation (EU) No 517/2014). The geographical scope of presented POM data is EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. The maximum quantities of the EU HFC phase-down shown for 2015-2019 are given for the EU-28, the maximum quantity for 2020 applies to the EU-27 and the United Kingdom. Maximum quantities for 2021 onwards are given for the EU-27.

Sources: EC, 2011, 2014 and 2020; EEA, 2022a and 2023b.

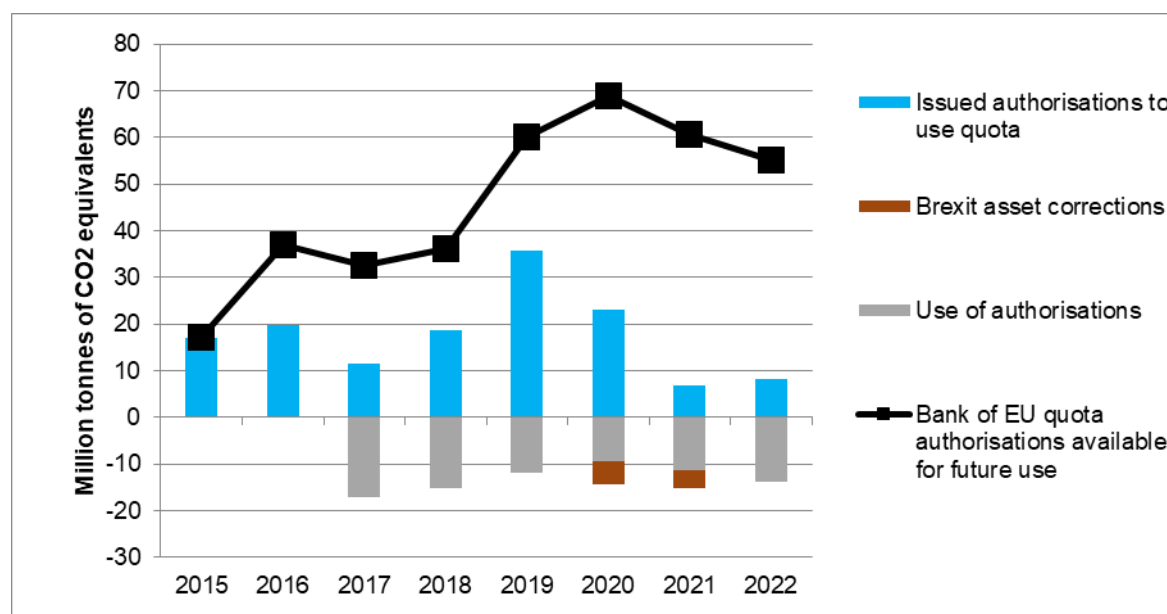
Figure 5-2 Balance between placing on the market of HFCs and related quotas at EU level



Note: The data for 2021 have not yet undergone scrutiny by the European Commission. The geographical scope of presented data is EU-28 for 2015-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years.

Sources: EC, 2023; EEA, 2022a and 2023b.

Figure 5-3 Bank of authorisations for HFCs in RACHP equipment imports



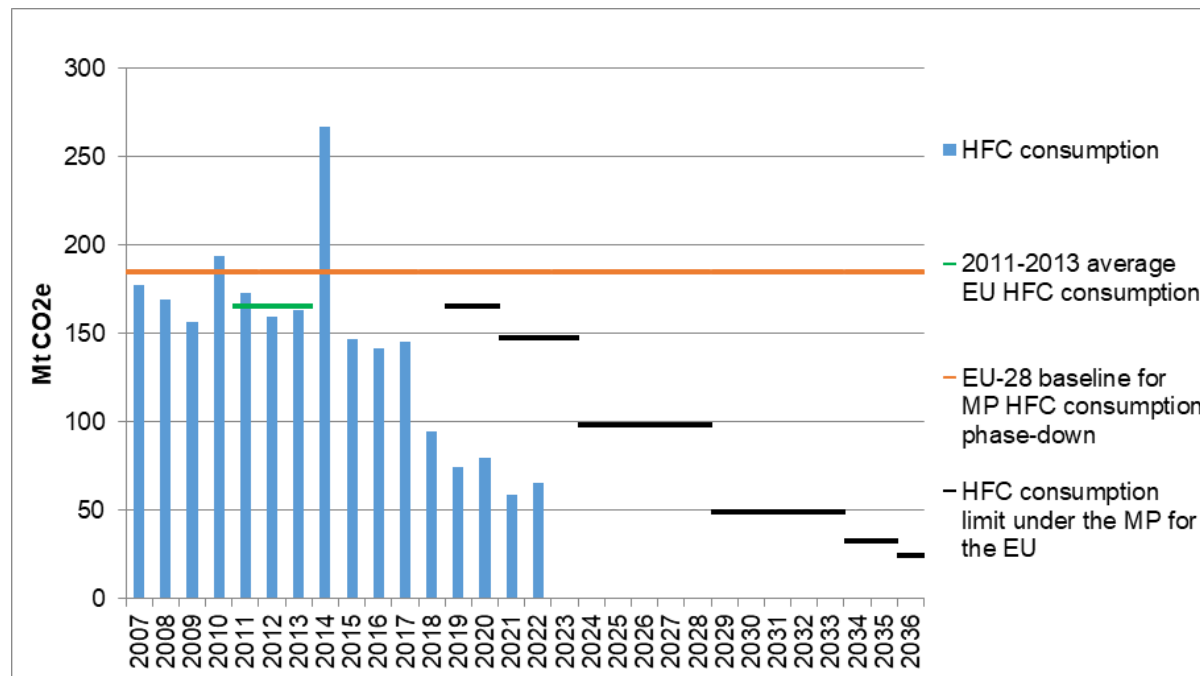
Notes: RACHP: refrigeration, air conditioning and heat pumps. The geographical scope of presented data is EU-28 for 2015-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years.

Sources: EC, 2023 and EEA, 2023b.

A tabular overview data related to the progress of the HFC phase-down under the FGR is given in Table 21 in section 7 (Data tables, page 67).

6 Figures on the international HFC phase-down under the Montreal Protocol

Figure 6-1 EU progress under the Montreal Protocol HFC phase-down



Notes: MP, Montreal Protocol. HFCs covered under the Montreal Protocol include all HFCs covered under EU F-gas Regulation No 517/2014, except HFC-161 (see 9). The geographical scope of presented HFC consumption data EU-28 except Croatia for 2007-2008, EU-28 for 2009-2019, EU-27+UK for 2020 and EU-27 from 2021 and subsequent years.

The HFC consumption limit is shown for EU-27+UK for 2019 and 2020 and for EU-27 from 2021 and subsequent years.

Sources: EC, 2011, and 2014; EEA, 2022a and 2023b.

A tabular overview of HFC consumption is given in Table 22 section 7 (Data tables, page 68).

7 Data tables

7.1 Measures to protect confidential data

The EEA takes appropriate steps to protect the confidentiality of commercially sensitive information in accordance with Article 19 (8) of the new F-gas Regulation. Throughout the report, three rules are applied to all numbers and figures to determine whether a data item must remain confidential.

Three-company group rule. This rule stipulates that any value that is published must be the sum of at least three different companies. In addition, companies are invited to specify affiliates in their report. These groups of affiliates, if mutually confirmed, count as one company for the purpose of this evaluation.

5% significance rule. The contributions of small companies to any value may be insignificant, and larger companies' confidentiality may be compromised despite the first rule. Therefore, a value remains confidential if fewer than three companies make up more than 95% of the total, discounting the smallest contributors that make up 5% of the sum.

Preventing deduction. Deduction might be possible where a confidential value is part of a sum of substances or transactions. For example, a confidential value for sulphur hexafluoride (SF₆) may be deduced if there are figures published for perfluorocarbons (PFCs) as well as a total for SF₆ and PFCs. In the case of metrics such as 'supply', a confidential value, e.g. for 'production', may be deduced if values for both 'import' and 'export' are known and the remainder of small transactions that make up 'supply' is very small. Therefore, two steps are taken:

- In cases where a sum across substances or transactions is published, and there is only one value contributing to that sum that is confidential according to the above rules, a second part of the sum is made confidential to make sure that the lone confidential value cannot be deduced from the sum and remaining parts.

In the case of supply metrics, a second of the major contributors (production, import and export) is made confidential if one of them is confidential according to the above rules and the remainder of small transactions makes up less than 5% of the total.

A practical guide to applying the 'three-company group rule' and '5% significance rule' measures to data

Operationalisation of the combined three-company group rule and 5% significance rule

Step 1: all values reported by companies of a given company group for a given transaction year were added up for a given transaction and substance or substance group.

$$\sum X_i = X_1 + X_2 + \dots + X_n$$

X_i = individual reported value by a single reporting undertaking

$\sum X_i$ = sum of individual reported values by reporting undertakings
belonging to the same company group

Step 2: the sum of all absolute contributions ($\sum |\sum X_i|$) across company groups was calculated.

Step 3: the percentage of step 1 in relation to step 2 was calculated for each company group.

$$\% = \frac{|\sum X_i|}{\sum |\sum X_i|} \cdot 100$$

Step 4: the company groups were sorted in ascending order of the percentages calculated in step 3.

Step 5: an accumulated percentage was calculated across the sorted company groups.

Step 6: the number of company groups for which the accumulated percentage was larger than 5% was counted.

If the number of company groups counted in step 6 was one or two, the full aggregated value across company groups was hidden as confidential. If the number was three or more, the full aggregated value across company groups was reported and was thus not confidential.

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Table 1 EU production of fluorinated gases (tonnes)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Tonnes											
HFCs	55 235	43 792	36 708	31 050	32 339	33 380	27 713	19 270	18 499	15 009	13 560	11 177
PFCs	C	C	C	C	C	C	C	C	C	C	C	140
SF6	C	C	C	C	C	C	C	C	C	C	C	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	-	C	C	C	C	-	-	-	-
HFES and alcohols	n.a.	n.a.	n.a.	-	-	-	-	-	-	-	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	-	-	-	-	-	-	-	-	C
Total fluorinated gases	58 098	46 440	39 901	34 049	35 377	36 159	30 345	21 787	21 160	17 219	15 714	13 724
<i>average GWP</i>	<i>3 012</i>	<i>3 226</i>	<i>3 573</i>	<i>3 723</i>	<i>3 419</i>	<i>3 293</i>	<i>3 470</i>	<i>4 054</i>	<i>4 820</i>	<i>4 970</i>	<i>6 162</i>	<i>7 758</i>

Notes: ‘-’: no data reported, ‘n.a.’: not applicable, ‘C’: Confidential, Annex II gases (unsaturated HFCs and HCFCs, HFES and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b).

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 2 EU production of fluorinated gases (CO2e)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Million tonnes of CO2 equivalents											
HFCs	112.2	91.1	73.1	61.1	54.6	58.6	49.6	35.3	45.8	38.6	49.3	50.2
PFCs	C	C	C	C	C	C	C	C	C	C	C	1.4
SF6	C	C	C	C	C	C	C	C	C	C	C	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	-	C	C	C	C	-	-	-	-
HFEs and alcohols	n.a.	n.a.	n.a.	-	-	-	-	-	-	-	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	-	-	-	-	-	-	-	-	C
Total fluorinated gases	175.0	149.8	142.6	126.8	121.0	119.1	105.3	88.3	102.0	85.6	96.8	106.5
<i>average GWP</i>	<i>3 012</i>	<i>3 226</i>	<i>3 573</i>	<i>3 723</i>	<i>3 419</i>	<i>3 293</i>	<i>3 470</i>	<i>4 054</i>	<i>4 820</i>	<i>4 970</i>	<i>6 162</i>	<i>7 758</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential, Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b).

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 3 EU reclamation of fluorinated gases (tonnes)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Tonnes											
HFCs	C	C	C	377	647	1 314	1 659	1 829	1 478	1 590	1 026	905
PFCs	-	-	-	C	C	C	C	C	C	-	-	-
SF6	C	C	C	C	C	C	69	C	C	C	C	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	-	C	C	C	C	C	C	C	C
HFEs and alcohols	n.a.	n.a.	n.a.	-	-	-	-	-	-	-	-	-
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	-	-	-	C	-	-	-	-	-
Total fluorinated gases	417	326	484	416	679	1 364	1 751	1 934	1 523	1 619	1 100	1 015
<i>average GWP</i>	<i>4 919</i>	<i>3 961</i>	<i>2 555</i>	<i>4 250</i>	<i>3 527</i>	<i>3 033</i>	<i>3 145</i>	<i>3 223</i>	<i>3 313</i>	<i>2 837</i>	<i>3 057</i>	<i>3 215</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential, Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b).

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 4 EU reclamation of fluorinated gases (CO₂e)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Million tonnes of CO₂ equivalents											
HFCs	C	C	C	0.9	1.7	3.1	3.8	4.8	4.0	4.0	2.3	2.1
PFCs	-	-	-	C	C	C	C	C	C	-	-	-
SF ₆	C	C	C	C	C	C	1.6	C	C	C	C	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	-	C	C	C	C	C	C	C	C
HFEs and alcohols	n.a.	n.a.	n.a.	-	-	-	-	-	-	-	-	-
NF ₃ and other perfluorinated compounds	n.a.	n.a.	n.a.	-	-	-	C	-	-	-	-	-
Total fluorinated gases	2.1	1.3	1.2	1.8	2.4	4.1	5.5	6.2	5.0	4.6	3.4	3.3
<i>average GWP</i>	<i>4 919</i>	<i>3 961</i>	<i>2 555</i>	<i>4 250</i>	<i>3 527</i>	<i>3 033</i>	<i>3 145</i>	<i>3 223</i>	<i>3 313</i>	<i>2 837</i>	<i>3 057</i>	<i>3 215</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential, Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b).

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 5 Total EU imports of fluorinated gases (tonnes)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Tonnes											
HFCs	58 519	69 089	65 221	128 452	78 026	78 938	88 531	77 286	62 272	64 064	53 612	60 237
PFCs	253	230	155	350	409	363	498	416	397	341	304	502
SF ₆	747	539	483	430	382	420	565	420	410	416	151	179
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	1 900	3 413	6 356	14 609	19 235	20 437	17 730	21 763	20 475
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
NF ₃ and other perfluorinated compounds	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
Total fluorinated gases	59 518	69 858	65 859	131 794	82 910	86 878	104 836	98 223	84 293	83 290	76 748	82 451
<i>average GWP</i>	<i>2 215</i>	<i>2 287</i>	<i>2 257</i>	<i>2 209</i>	<i>2 170</i>	<i>2 113</i>	<i>1 887</i>	<i>1 525</i>	<i>1 432</i>	<i>1 492</i>	<i>1 243</i>	<i>1 317</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential, Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) and HFCs, PFCs and SF₆ in products and equipment were not subject to reporting for the years 2007-2013. The data shown for 2007-2013 are thus limited to bulk imports. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 6 Total EU imports of fluorinated gases (CO2e)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Million tonnes of CO2 equivalents											
HFCs	112.2	145.0	136.0	272.1	161.9	161.9	171.7	129.0	99.5	104.5	80.5	89.7
PFCs	2.6	2.5	1.6	3.4	3.9	3.6	4.7	4.0	3.8	3.2	2.9	4.8
SF6	17.0	12.3	11.0	9.8	8.7	9.6	12.9	9.6	9.3	9.5	3.4	4.1
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	C	0.0	C	C	C	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	C	C	C	8.5	C	C	C	C	C
Total fluorinated gases	131.8	159.7	148.7	291.1	179.9	183.6	197.8	149.8	120.7	124.3	95.4	108.6
<i>average GWP</i>	<i>2 215</i>	<i>2 287</i>	<i>2 257</i>	<i>2 209</i>	<i>2 170</i>	<i>2 113</i>	<i>1 887</i>	<i>1 525</i>	<i>1 432</i>	<i>1 492</i>	<i>1 243</i>	<i>1 317</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential, Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) and HFCs, PFCs and SF₆ in products and equipment were not subject to reporting for the years 2007-2013. The data shown for 2007-2013 are thus limited to bulk imports. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 7 EU bulk imports of fluorinated gases (tonnes)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Tonnes											
HFCs	58 519	69 089	65 221	122 781	70 993	68 971	79 577	67 152	52 317	54 540	42 300	46 400
PFCs	253	230	155	C	C	355	496	416	396	341	303	501
SF6	747	539	483	C	377	417	563	400	401	395	135	173
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	19 899
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
Total fluorinated gases	59 518	69 858	65 859	125 986	75 606	76 247	95 013	87 221	73 475	73 171	64 752	68 031
<i>average GWP</i>	<i>2 215</i>	<i>2 287</i>	<i>2 257</i>	<i>2 218</i>	<i>2 196</i>	<i>2 149</i>	<i>1 897</i>	<i>1 517</i>	<i>1 461</i>	<i>1 555</i>	<i>1 290</i>	<i>1 388</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential, Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. Bulk imports under FGR definition. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 8 EU bulk imports of fluorinated gases (CO2e)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Million tonnes of CO2 equivalents											
HFCs	112.2	145.0	136.0	260.9	148.3	142.3	154.1	111.9	86.4	94.5	69.0	75.7
PFCs	2.6	2.5	1.6	C	C	3.5	4.7	4.0	3.8	3.2	2.9	4.8
SF6	17.0	12.3	11.0	C	8.6	9.5	12.8	9.1	9.1	9.0	3.1	3.9
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	0.1
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	C	C	C	8.5	C	C	C	C	C
Total fluorinated gases	131.8	159.7	148.7	279.4	166.0	163.8	180.2	132.3	107.4	113.8	83.5	94.4
<i>average GWP</i>	<i>2 215</i>	<i>2 287</i>	<i>2 257</i>	<i>2 218</i>	<i>2 196</i>	<i>2 149</i>	<i>1 897</i>	<i>1 517</i>	<i>1 461</i>	<i>1 555</i>	<i>1 290</i>	<i>1 388</i>

Notes: ‘-’: no data reported, ‘n.a.’: not applicable, ‘C’: Confidential, Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. Bulk imports under FGR definition. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 9 EU imports of fluorinated gases within products and equipment (tonnes)

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Tonnes								
HFCs	5 671	7 033	9 967	8 954	10 134	9 955	9 524	11 313	13 837
PFCs	C	C	7	2	1	1	1	1	1
SF6	C	6	2	2	19	9	21	16	6
Unsaturated HFCs and HCFCs	C	C	C	C	C	C	C	C	575
HFEs and alcohols	-	C	C	C	C	C	C	C	0
NF3 and other perfluorinated compounds	-	-	-	-	-	-	-	-	-
Total fluorinated gases	5 808	7 304	10 631	9 823	11 002	10 818	10 118	11 996	14 420
<i>average GWP</i>	<i>2 015</i>	<i>1 898</i>	<i>1 860</i>	<i>1 792</i>	<i>1 591</i>	<i>1 235</i>	<i>1 040</i>	<i>991</i>	<i>981</i>

Notes: '-': no data reported, 'C': Confidential. The geographical scope of presented data is EU-28 for 2014-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Imports of pre-blended polyols are not included.

Sources: EEA, 2022a and 2023b.

Table 10 EU imports of fluorinated gases within products and equipment (CO2e)

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Million tonnes of CO2 equivalents								
HFCs	11.2	13.6	19.6	17.5	17.1	13.1	10.0	11.5	14.0
PFCs	C	C	0.1	0.0	0.0	0.0	0.0	0.0	0.0
SF6	C	0.1	0.1	0.1	0.4	0.2	0.5	0.4	0.1
Unsaturated HFCs and HCFCs	C	C	C	C	C	C	C	C	0.0
HFEs and alcohols	-	C	C	C	C	C	C	C	0.0
NF3 and other perfluorinated compounds	-	-	-	-	-	-	-	-	-
Total fluorinated gases	11.7	13.9	19.8	17.6	17.5	13.4	10.5	11.9	14.1
<i>average GWP</i>	<i>2 015</i>	<i>1 898</i>	<i>1 860</i>	<i>1 792</i>	<i>1 591</i>	<i>1 235</i>	<i>1 040</i>	<i>991</i>	<i>981</i>

Notes: '-': no data reported, 'C': Confidential. The geographical scope of presented data is EU-28 for 2014-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. Imports of pre-blended polyols are not included.

Sources: EEA, 2022a and 2023b.

Table 11 Categories of imports of fluorinated gases in products and equipment (tonnes)

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Categories of products and equipment	Tonnes								
Stationary equipment for comfort cooling or heating	4 698	5 239	8 325	7 681	8 093	8 584	8 402	10 165	12 633
Mobile air conditioning equipment	798	1 205	1 405	1 210	1 206	1 210	863	960	923
Other refrigeration, air conditioning and heat pump equipment	208	363	570	559	628	530	463	669	757
Other products and equipment	104	496	331	373	1 076	494	391	201	107
Total supply in products and equipment	5 808	7 304	10 631	9 823	11 002	10 818	10 118	11 996	14 420

Notes: The geographical scope of presented data is EU-28 for 2014-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. 'n.a.': not applicable: Imports of pre-blended polyols were not subject to separate reporting before 2018. '-': no data reported.

Sources: EEA, 2022a and 2023b.

Table 12 Categories of imports of fluorinated gases in products and equipment (CO2e)

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Categories of products and equipment	Million tonnes of CO2 equivalents								
Stationary equipment for comfort cooling or heating	9.8	10.8	17.1	15.6	13.7	10.6	8.4	9.9	12.5
Mobile air conditioning equipment	1.0	1.4	1.1	0.5	0.6	0.6	0.5	0.5	0.5
Other refrigeration, air conditioning and heat pump equipment	0.4	0.7	1.0	1.0	1.0	0.8	0.6	0.8	0.9
Other products and equipment	0.6	0.9	0.6	0.5	2.2	1.4	1.0	0.7	0.3
Total supply in products and equipment	11.7	13.9	19.8	17.6	17.5	13.4	10.5	11.9	14.1

Notes: The geographical scope of presented data is EU-28 for 2014-2019, EU-27+UK for 2020, and EU-27 for 2021 and subsequent years. 'n.a.': not applicable: Imports of pre-blended polyols were not subject to separate reporting before 2018. '-': no data reported.

Sources: EEA, 2022a and 2023b.

Table 13 EU bulk exports of fluorinated gases (tonnes)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Tonnes											
HFCs	24 162	20 455	21 699	26 239	25 577	27 414	29 224	26 039	22 475	21 222	16 081	13 214
PFCs	83	C	253	91	95	132	176	C	297	212	94	92
SF6	1 670	C	1 871	2 522	2 426	2 012	1 669	1 862	2 000	1 572	1 571	1 444
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	C	C	C	C	C	1 246	1 504	4 198	3 753
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	8	C	10	C	C	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	C	C	C	10	6	C	C	C	C
Total fluorinated gases	25 915	22 233	23 822	29 065	28 417	30 274	32 105	29 350	26 033	24 528	21 961	18 522
<i>average GWP</i>	<i>3 140</i>	<i>3 411</i>	<i>3 405</i>	<i>3 469</i>	<i>3 506</i>	<i>3 263</i>	<i>2 828</i>	<i>2 958</i>	<i>3 308</i>	<i>3 077</i>	<i>2 843</i>	<i>2 967</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential: Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. Data given for 2014-2017 include gases exported in pre-blended polyols. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 14 EU bulk exports of fluorinated gases (CO2e)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Million tonnes of CO2 equivalents											
HFCs	42.5	36.4	36.0	42.4	43.2	50.7	50.9	43.2	37.6	37.4	25.4	20.9
PFCs	0.8	C	2.4	0.8	0.9	1.3	1.7	C	2.8	2.0	0.9	0.9
SF6	38.1	C	42.7	57.5	55.3	45.9	38.0	42.5	45.6	35.8	35.8	32.9
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	C	C	C	0.0	C	0.0	0.0	0.0	0.0
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	C	0.0	C	C	C	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	C	C	C	0.2	0.1	C	C	C	C
Total fluorinated gases	81.4	75.8	81.1	100.8	99.6	98.8	90.8	86.8	86.1	75.5	62.4	55.0
<i>average GWP</i>	<i>3 140</i>	<i>3 411</i>	<i>3 405</i>	<i>3 469</i>	<i>3 506</i>	<i>3 263</i>	<i>2 828</i>	<i>2 958</i>	<i>3 308</i>	<i>3 077</i>	<i>2 843</i>	<i>2 967</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential: Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. Data given for 2014-2017 include gases exported in pre-blended polyols. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 15 Total EU supply of fluorinated gases (tonnes)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas	Tonnes											
HFC-23	247	299	73	94	78	63	95	54	45	40	45	32
HFC-32	3 987	5 390	5 334	11 060	9 384	11 022	12 053	15 535	14 488	17 065	17 765	19 959
HFC-41	C	C	C	1	2	1	1	1	1	2	3	4
HFC-125	12 371	18 248	15 116	25 476	17 916	18 701	17 409	13 770	9 582	9 950	8 406	8 559
HFC-134	C	C	-	-	C	C	-	-	-	-	-	-
HFC-134a	49 080	43 657	39 334	60 771	46 282	44 184	40 912	33 750	25 734	25 988	22 362	24 035
HFC-143	C	-	-	-	-	-	-	-	-	-	-	-
HFC-143a	8 998	10 572	8 809	13 512	7 069	7 205	6 006	843	1 268	1 519	844	773
HFC-152a	4 292	4 695	3 657	6 227	3 914	3 431	3 552	3 245	3 157	2 733	2 569	1 832
HFC-227ea	789	2 082	1 610	2 695	1 948	1 753	1 628	1 501	1 252	777	450	697
HFC-236fa	C	30	38	52	40	42	37	C	C	18	C	20
HFC-245ca	-	-	-	-	-	C	-	-	-	-	-	-
HFC-245fa	C	C	C	C	C	C	C	C	876	C	C	C
HFC-365mfc	C	C	C	C	C	C	C	C	C	C	C	C
HFC-43-10mee	C	C	C	C	C	C	C	C	C	C	C	C
PFC-14	C	59	2	147	168	152	196	170	143	157	164	162
PFC-116	C	153	C	157	164	129	148	137	156	108	121	122
PFC-218	112	24	38	41	59	37	23	32	20	C	C	C
PFC-c-318	C	C	C	14	27	C	C	C	C	-13	C	C
PFC-3-1-10	C	C	-	C	C	C	C	C	C	C	-	-
PFC-4-1-12	-	-	-	C	C	C	-	-	-	-	-	-
PFC-5-1-14	C	C	C	C	C	117	C	C	C	C	C	C
SF6	1 810	1 522	1 535	716	909	1 004	1 225	843	727	831	778	1 157
bis(trifluoromethyl)-methanol	n.a.	n.a.	n.a.	2	1	1	1	2	0	3	C	C
HCFC-1233xf	n.a.	n.a.	n.a.	-	-	C	C	-	-	-	-	-
HCFC-1233zd	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
HFC-1234yf	n.a.	n.a.	n.a.	C	C	5 214	10 574	11 451	10 296	8 860	9 741	9 980
HFC-1234ze	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
HFC-1336mzz	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
HFE-236fa	n.a.	n.a.	n.a.	-	-	-	C	-	-	-	-	-
HFE-245fa1	n.a.	n.a.	n.a.	-	-	C	-	-	-	-	-	-
HFE-347mcc3	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
HFE-347pcf2	n.a.	n.a.	n.a.	-	-	-	C	-	C	C	C	C
HFE-356mm1	n.a.	n.a.	n.a.	-	-	-	-	-	-	C	-	-
HFE-449sl	n.a.	n.a.	n.a.	C	C	C	90	C	C	C	C	C
HFE-569sf2	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
2,2,3,3,3-pentafluoropropanol	n.a.	n.a.	n.a.	-	C	C	C	C	C	C	C	-
NF3	n.a.	n.a.	n.a.	321	339	381	492	433	402	C	C	C
PFPME	n.a.	n.a.	n.a.	C	-	-	-	C	C	-	-	C
Other	-1	-	-	-1	4	2	1	0	0	0	0	0
Gas group												
HFCs	86 477	89 924	79 215	124 408	92 062	91 592	87 583	72 179	58 021	59 509	53 043	57 660
PFCs	299	303	139	480	524	464	649	563	436	358	386	399
SF6	1 810	1 522	1 535	716	909	1 004	1 225	843	727	831	778	1 157
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	C	C	6 305	13 400	17 767	18 353	17 380	17 899	17 217
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	303	127	C	C	C	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	C	339	381	492	C	C	C	C	C
Total fluorinated gases	88 586	91 749	80 889	127 547	96 750	100 049	103 476	92 179	78 303	78 848	73 027	77 411

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential: Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) and HFCs, PFCs and SF₆ in products and equipment were not subject to reporting for the years 2007-2013. The data shown for 2007-2013 are thus limited to bulk supply. The geographical scope of presented data is the EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 16 Total EU supply of fluorinated gases (CO2e)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas	Million tonnes of CO2 equivalents											
HFC-23	3.7	4.4	1.1	1.4	1.2	0.9	1.4	0.8	0.7	0.6	0.7	0.5
HFC-32	2.7	3.6	3.6	7.5	6.3	7.4	8.1	10.5	9.8	11.5	12.0	13.5
HFC-41	C	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HFC-125	43.3	63.9	52.9	89.2	62.7	65.5	60.9	48.2	33.5	34.8	29.4	30.0
HFC-134	C	C	-	-	C	C	-	-	-	-	-	-
HFC-134a	70.2	62.4	56.2	86.9	66.2	63.2	58.5	48.3	36.8	37.2	32.0	34.4
HFC-143	C	-	-	-	-	-	-	-	-	-	-	-
HFC-143a	40.2	47.3	39.4	60.4	31.6	32.2	26.8	3.8	5.7	6.8	3.8	3.5
HFC-152a	0.5	0.6	0.5	0.8	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.2
HFC-227ea	2.5	6.7	5.2	8.7	6.3	5.6	5.2	4.8	4.0	2.5	1.5	2.2
HFC-236fa	C	0.3	0.4	0.5	0.4	0.4	0.4	C	C	0.2	C	0.2
HFC-245ca	-	-	-	-	-	C	-	-	-	-	-	-
HFC-245fa	C	C	C	C	C	C	C	C	0.9	C	C	C
HFC-365mfc	C	C	C	C	C	C	C	C	C	C	C	C
HFC-43-10mee	C	C	C	C	C	C	C	C	C	C	C	C
PFC-14	C	0.4	0.0	1.1	1.2	1.1	1.4	1.3	1.1	1.2	1.2	1.2
PFC-116	C	1.9	C	1.9	2.0	1.6	1.8	1.7	1.9	1.3	1.5	1.5
PFC-218	1.0	0.2	0.3	0.4	0.5	0.3	0.2	0.3	0.2	C	C	C
PFC-c-318	C	C	C	0.1	0.3	C	C	C	C	-0.1	C	C
PFC-3-1-10	C	C	-	C	C	C	C	C	C	C	-	-
PFC-4-1-12	-	-	-	C	C	C	-	-	-	-	-	-
PFC-5-1-14	C	C	C	C	C	1.1	C	C	C	C	C	C
SF6	41.3	34.7	35.0	16.3	20.7	22.9	27.9	19.2	16.6	18.9	17.7	26.4
bis(trifluoromethyl)-methanol	n.a.	n.a.	n.a.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	C	C
HCFC-1233xf	n.a.	n.a.	n.a.	-	-	C	C	-	-	-	-	-
HCFC-1233zd	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
HFC-1234yf	n.a.	n.a.	n.a.	C	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HFC-1234ze	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
HFC-1336mzz	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
HFE-236fa	n.a.	n.a.	n.a.	-	-	-	C	-	-	-	-	-
HFE-245fa1	n.a.	n.a.	n.a.	-	-	C	-	-	-	-	-	-
HFE-347mcc3	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
HFE-347pcf2	n.a.	n.a.	n.a.	-	-	-	C	-	C	C	C	C
HFE-356mm1	n.a.	n.a.	n.a.	-	-	-	-	-	-	C	-	-
HFE-449sl	n.a.	n.a.	n.a.	C	C	C	0.0	C	C	C	C	C
HFE-569sf2	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
2,2,3,3,3-pentafluoropropanol	n.a.	n.a.	n.a.	-	C	C	C	C	C	C	C	-
NF3	n.a.	n.a.	n.a.	5.5	5.8	6.6	8.5	7.4	6.9	C	C	C
PFPME	n.a.	n.a.	n.a.	C	-	-	-	C	C	-	-	C
Other	-	-	-	-	-	-	-	-	-	-	-	-
Gas group												
HFCs	169.3	193.5	163.7	259.2	179.8	180.4	167.2	120.6	93.6	95.2	80.6	85.9
PFCs	3.0	3.1	1.4	4.6	5.0	4.4	6.1	5.4	4.3	3.3	3.7	3.8
SF6	41.3	34.7	35.0	16.3	20.7	22.9	27.9	19.2	16.6	18.9	17.7	26.4
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	C	C	0.0	0.1	C	0.1	0.1	0.1	0.1
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	0.1	0.0	C	C	C	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	C	6	7	8	C	C	C	C	C
Total fluorinated gases	214	231	200	286	212	214	210	153	122	125	111	125

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential: Annex II F-gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) and HFCs, PFCs and SF₆ in products and equipment were not subject to reporting for the years 2007-2013. The data shown for 2007-2013 are thus limited to bulk supply. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 17 EU bulk supply of fluorinated gases (tonnes)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Tonnes											
HFCs	86 477	89 924	79 215	118 737	85 028	81 625	78 629	62 044	48 066	49 986	41 731	43 823
PFCs	299	303	139	C	C	457	647	562	435	357	386	398
SF6	1 810	1 522	1 535	C	903	1 001	1 223	824	718	810	762	1 151
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	16 642
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	C	339	381	492	C	C	C	C	C
Total fluorinated gases	88 586	91 749	80 889	121 739	89 446	89 418	93 653	81 177	67 485	68 730	61 031	62 991
<i>average GWP</i>	<i>2 410</i>	<i>2 521</i>	<i>2 473</i>	<i>2 251</i>	<i>2 210</i>	<i>2 176</i>	<i>2 052</i>	<i>1 667</i>	<i>1 603</i>	<i>1 667</i>	<i>1 617</i>	<i>1 761</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential: Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆. Imports of pre-blended polyols are not included since 2018.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 18 EU bulk supply of fluorinated gases (CO2e)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gas group	Million tonnes of CO2 equivalents											
HFCs	169.3	193.5	163.7	248.0	166.3	160.7	149.6	103.5	80.5	85.1	69.1	71.9
PFCs	3.0	3.1	1.4	C	C	4.3	6.1	5.4	4.2	3.3	3.7	3.8
SF6	41.3	34.7	35.0	C	20.6	22.8	27.9	18.8	16.4	18.5	17.4	26.3
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	0.1
HFEs and alcohols	n.a.	n.a.	n.a.	C	C	C	C	C	C	C	C	C
NF3 and other perfluorinated compounds	n.a.	n.a.	n.a.	C	5.8	6.6	8.5	C	C	C	C	C
Total fluorinated gases	213.5	231.3	200.1	274.1	197.7	194.5	192.2	135.3	108.2	114.6	98.7	110.9
<i>average GWP</i>	<i>2 410</i>	<i>2 521</i>	<i>2 473</i>	<i>2 251</i>	<i>2 210</i>	<i>2 176</i>	<i>2 052</i>	<i>1 667</i>	<i>1 603</i>	<i>1 667</i>	<i>1 617</i>	<i>1 761</i>

Notes: '-': no data reported, 'n.a.': not applicable, 'C': Confidential: Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) were not subject to reporting for the years 2007-2013. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆. Imports of pre-blended polyols are not included since 2018.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 19 Intended applications of EU total supply of fluorinated gases (tonnes)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Intended applications of bulk supply	Tonnes											
Refrigeration, air-conditioning and heating and other heat transfer fluids	61 377	65 964	58 999	95 688	74 024	78 016	78 012	68 676	55 609	58 322	54 785	58 069
Foams, incl. pre-blended polyols	14 286	11 503	8 202	12 967	9 597	10 179	11 521	11 083	11 041	9 815	8 360	8 080
Aerosols	9 090	9 547	9 690	8 954	9 356	9 397	10 300	9 109	8 964	8 204	7 250	8 053
Fire protection	649	1 677	1 385	1 858	862	596	502	324	130	150	112	133
Electrical equipment	1 197	1 290	1 419	622	745	813	951	640	534	616	539	813
Semiconductor, photovoltaics and other electronics manufacture	127	265	71	1 057	715	755	924	897	769	748	874	972
Other or unknown applications	1 861	1 501	1 124	6 402	1 452	294	1 266	1 450	1 255	992	1 108	1 291
Total fluorinated gases - Total supply	88 586	91 749	80 889	127 547	96 750	100 049	103 476	92 179	78 303	78 848	73 027	77 411

Notes: '-': no data reported. Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) and data on products and equipment were not subject to reporting for the years 2007-2013. The data presented for these years thus equal data presented for bulk supply. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆. '*' Categories marked with an * were not applicable (n.a.) for reporting on 2007 – 2013. Starting 2014, the category 'aerosols' was replaced by separate categories for medical and non-medical aerosols. Feedstock use does not appear in this table as it is excluded from the scope of EU total supply.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 20 Intended applications of EU total supply of fluorinated gases (CO2e)

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Intended applications of bulk supply	Million tonnes of CO2 equivalents											
Refrigeration, air-conditioning and heating and other heat transfer fluids	138.5	161.6	140.4	216.5	155.3	157.0	142.3	100.2	76.3	81.9	69.4	72.0
Foams, incl. pre-blended polyols	13.4	10.4	5.9	11.7	7.3	8.9	8.4	6.8	4.7	2.1	1.1	1.9
Aerosols	12.2	12.5	12.7	11.7	12.9	13.8	14.4	11.7	11.3	10.0	8.5	10.5
Fire protection	4.0	7.5	2.6	6.6	3.2	2.2	1.8	1.1	0.5	0.5	0.7	0.5
Electrical equipment	27.3	29.4	32.4	14.2	17.0	18.5	21.7	14.6	12.2	14.0	12.2	18.5
Semiconductor, photovoltaics and other electronics manufacture	1.5	3.1	1.0	9.4	9.9	10.6	13.2	12.4	10.9	10.9	12.8	14.5
Other or unknown applications	16.7	6.7	5.2	15.8	6.0	3.2	7.9	6.0	5.7	5.7	5.9	7.1
Total supply Total fluorinated gases	213.5	231.3	200.1	285.8	211.5	214.3	209.8	152.8	121.5	125.1	110.6	125.1

Notes: '-': no data reported. Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and NF₃ and other perfluorinated compounds) and data on products and equipment were not subject to reporting for the years 2007-2013. The data presented for these years thus equal data presented for bulk supply. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Data available for Croatia 2009-2012 is limited to HFCs and does not cover PFCs and SF₆. '*' Categories marked with an * were not applicable (n.a.) for reporting on 2007 – 2013. Starting 2014, the category 'aerosols' was replaced by separate categories for medical and non-medical aerosols. Feedstock use does not appear in this table as it is excluded from the scope of EU total supply.

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 21 HFCs placed on the market and quota compliance

		2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
POM category		Million tonnes of CO2 equivalents											
(1)	Bulk HFC POM 2007-2013	173.5	200.6	169.5									
(2)	Bulk HFC POM 2014 onwards				279.4	162.6	158.2	165.8	102.5	83.8	92.7	67.5	67.9
	<i>thereof:</i>												
(3)	<i>for exempted uses Art.15(2)a-f:</i>				C	16.5	23.3	18.8	21.1	21.6	19.7	14.9	15.8
(4)	<i>thereof: for exempted uses Art.15(2)a-e:</i>				7.0	7.9	14.2	9.2	11.1	11.2	C	C	C
(5)	<i>thereof: Exemption Art. 15(2)f: Pharmaceutical MDIs</i>				C	8.6	9.2	9.6	10.0	10.3	C	C	C
(6)	Quota-relevant bulk HFC POM 2015 onwards						154.7	144.0	156.7	81.4	62.3	73.0	52.6
(7)	POM of HFCs in equipment 2014 onwards:				11.2	13.6	19.7	17.5	15.4	12.2	9.6	11.3	14.0
	<i>thereof:</i>												
(8)	<i>HFC POM in RACHP equipment</i>				11.1	12.8	19.2	17.0	15.3	12.0	9.5	11.2	13.9
(9)	<i>thereof: without quota authorisation coverage, 2017 onwards</i>							0.4	0.7	0.2	0.1	0.1	0.1
(10)	<i>HFC POM in other equipment</i>				0.1	0.7	0.5	0.5	0.2	0.2	0.1	0.1	0.1
(11)	Total physical HFC POM 2014 onwards (bulk + equipment)				290.6	176.2	177.8	183.4	117.9	96.0	102.2	78.8	81.9
(12)	Quota authorisations issued 2015 onwards					17.1	19.9	11.6	18.8	35.7	23.0	6.8	8.2
(13)	Quota-relevant POM 2015 onwards						171.8	163.9	168.6	100.8	98.1	59.5	60.4
(14)	Maximum quantity of HFC phase-down						183.1	170.3	170.3	101.2	100.3	62.3	62.3
	Quota compliance 2015 onwards:												
(15)	Unused quota (company level)						12.0	7.1	3.2	2.0	3.0	3.0	2.1
(16)	<i>thereof: unused quota reserved for invalid companies</i>						-	-	-	-	0.7	0.1	-
(17)	Quota exceedance (company level)						0.7	0.6	1.6	1.4	0.9	0.3	0.2
(18)	<i>thereof: production / bulk import of HFCs</i>						0.7	0.6	1.2	0.6	0.7	0.1	0.1
(19)	EU-wide margin to maximum quantity						11.2	6.3	1.6	0.4	2.2	4.2	1.9

Notes: '-': no data reported; n.a., 'C': Confidential:: not applicable; POM: Placing on the market; RACHP: refrigeration, air conditioning, and heat pumps
The geographical scope of presented POM data EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b).

Sources: EC, 2011, 2014 and 2020; EEA, 2022a and 2023b.

Table 22 Consumption of HFCs covered under the Montreal Protocol

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	Million tonnes of CO2 equivalents											
EU consumption of HFCs covered under the Montreal Protocol	177.5	194.0	163.1	267.0	146.9	141.4	145.1	94.8	74.4	79.4	58.7	65.6

Note: The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b).

Sources: EC, 2011 and 2014; EEA, 2022a and 2023b.

Table 23 Companies reporting on 2022 by Member State and reported activities

Country	Total	thereof:						
		Producers	Importers	Exporters	Equipment importers	Feed-stock users	Destruction companies	Quota authorisers
Austria	62	-	9	-	17	-	-	39
Belgium	44	1	13	6	29	-	1	4
Bulgaria	70	-	32	1	31	-	-	12
Croatia	38	-	14	2	26	-	-	6
Cyprus	37	-	17	-	17	-	-	8
Czech Republic	46	-	20	-	26	-	1	1
Denmark	26	-	11	3	15	-	-	6
Estonia	60	-	31	-	7	-	1	31
Finland	26	-	6	2	17	-	1	1
France	138	2	35	11	96	1	3	16
Germany	176	3	46	18	111	1	6	20
Greece	73	-	16	3	46	-	-	7
Hungary	45	-	14	-	31	-	-	-
Ireland	16	-	8	2	9	-	-	3
Italy	337	1	222	15	106	-	1	17
Latvia	27	-	18	-	7	-	-	1
Lithuania	24	-	17	-	7	-	-	6
Luxembourg	1	-	1	1	-	-	-	-
Malta	25	-	5	1	17	-	-	1
Northern Ireland (UK)	2	-	1	-	1	-	-	-
Netherlands	99	1	31	7	63	1	1	9
Poland	260	-	148	8	87	-	1	33
Portugal	45	-	8	2	31	-	-	3
Romania	80	-	13	-	51	-	1	21
Slovakia	28	-	17	-	10	-	1	5
Slovenia	34	-	8	-	26	-	-	-
Spain	118	-	37	10	65	-	-	15
Sweden	40	-	11	4	27	-	1	3
EU Total	1977	8	809	96	976	3	19	268
Great Britain (Post-Brexit)	54	-	26	1	16	-	-	18
Other Non-EU	208	n.a.	34	1	12	n.a.	n.a.	163

Note: Companies may report for more than one activity type. '-': no data reported, 'n.a.': not applicable: Non-EU companies are not eligible to report as producers, feedstock users, or destruction companies.

Source: EEA, 2023b.

Table 24 Non-EU companies reporting on 2022 by location of Only Representative

EU Country of Only Representative	Total represented non-EU companies	Thereof from:																							
		United Arab Emirates	Albania	Australia	Brazil	Canada	Switzerland	China	Hong Kong	India	Japan	Korea, Republic of	Monaco	Marshall Islands	Malaysia	Norway	Serbia	Russian Federation	Saudi Arabia	Singapore	Turkey	Taiwan, Province of China	Great Britain (Post-Brexit)	United States	South Africa
Belgium	17	2	-	-	1	-	-	-	-	-	1	-	-	-	-	1	-	-	1	-	2	-	7	1	1
Bulgaria	3	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Croatia	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
Cyprus	44	-	-	-	-	-	44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	22	-	-	-	-	1	1	-	2	-	-	-	-	-	-	-	1	-	-	1	-	14	2	-	-
France	5	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-
Germany	20	-	-	-	-	-	-	3	1	-	1	2	-	-	1	-	-	-	-	-	-	1	8	3	-
Ireland	110	-	1	-	-	-	-	101	-	1	-	-	-	1	-	-	-	-	-	1	-	-	5	-	-
Italy	6	1	-	-	-	-	1	-	-	1	-	-	-	-	-	-	1	-	-	-	-	2	-	-	-
Malta	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	16	-	-	-	-	-	3	-	-	-	2	5	-	-	-	3	-	-	-	-	-	-	3	-	-
Poland	3	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
Romania	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Spain	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-
EU Total	262	3	1	1	1	1	7	152	3	2	4	7	1	1	1	4	1	2	1	1	5	1	54	7	1

Note: '-': no data reported

Source: EEA, 2023b.

Table 25 Activities reported 2007–2022

	2007	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Data Reports Received	77	110	153	468	780	1284	1729	2138	3159	2482	2220	2239
of which mention:												
Production of F-gases	6	7	8	10	9	9	8	8	9	9	9	8
<i>thereof: HFC production</i>	4	5	6	6	6	6	5	5	7	7	8	7
Bulk import of F-gases	55	70	112	187	293	379	577	895	1693	1197	895	869
<i>thereof: bulk HFC import</i>	48	66	107	173	282	366	563	877	1674	1179	879	848
Bulk export of F-gases	44	75	82	92	99	111	119	115	112	113	107	98
<i>thereof: bulk HFC export</i>	37	67	72	81	89	98	104	100	94	97	89	80
Import of products or equipment pre-charged with F-gases	n.a.	n.a.	n.a.	228	427	840	1 040	1 079	1 022	976	1 004	1004
<i>thereof: RACHP equipment charged with HFCs</i>	n.a.	n.a.	n.a.	220	409	826	1 029	1 067	1 012	965	993	993
Destruction	6	8	10	10	15	13	13	17	18	18	18	19
Feedstock use	2	2	1	3	3	3	3	5	2	3	2	3
Supply of quota authorisation	n.a.	n.a.	n.a.	n.a.	20	34	94	335	842	357	339	449
<i>thereof: quota authorisation without any EU production, import or export</i>	n.a.	n.a.	n.a.	n.a.	9	18	41	114	424	267	263	329
Nil Reports received	n.a.	n.a.	55	336	363	805	1 019	2 156	1 633	2 139	2 384	2452

Note: 'n.a.': not applicable: The reporting obligation for equipment importers applied for reporting on 2014 for the first time. Reporting on quota authorised to other companies has been applying since 2015. The geographical scope of presented data is EU-28 except Croatia for 2007, EU-28 for 2010-2019, EU-27+UK for 2020 and EU-27 for 2021 and subsequent years. For reasons of clarity, the years 2008-2009 and 2011-2012 are not shown in this table. The values can be found in the ETC CM Report 2022/3 (EEA, 2022b). Companies may report on more than one activity. RACHP equipment: refrigeration, air conditioning, and heat pumps.

Sources: EEA, 2023b.

8 Terminology

Fluorinated gases (F-gases)

F-gases covered by this report can be grouped into:

- gases contained in Annex I of the new F-gas Regulation, as listed in Table 26 in Section 9 of this report;
- gases contained in Annex II of the new F-gas Regulation, as listed in Table 27 in Section 9 of this report.

Jointly, those gases are referred to in this report as 'fluorinated gases' or 'F-gases'.

The list of reportable fluorinated gases under the old F-gas Regulation was restricted to HFCs, PFCs and SF₆, as identified in section 9 on page 74.

Annex I F-gases

F-gases under Annex I of the new F-gas Regulation include HFCs, PFCs and SF₆. The majority of these gases have high GWPs.

The gases of Annex I of the new F-gas Regulation are given in section 9 of this annex.

Hydrofluorocarbons (HFCs)

HFCs are relatively short aliphatic organic compounds that contain fluorine, carbon and hydrogen. They are most commonly used as refrigerants. Nineteen HFCs and their GWPs are listed in Annex 1. All HFCs in Annex 1, except HFC-152 and HFC-161, were previously covered by the old F-gas Regulation (EC) No 842/2006. Any mixture (blend) that includes at least one HFC is considered an HFC under the F-gas Regulation and therefore is covered by the quota system. The GWP of such a mixture is calculated according to Annex IV of the F-gas Regulation.

Perfluorocarbons (PFCs)

PFCs are relatively short aliphatic organic compounds that contain fluorine and carbon only. They are most commonly used in semiconductor manufacture. Seven PFCs and their GWPs are listed in Annex 1. All PFCs in Annex 1 were previously covered by the old F-gas Regulation.

Sulphur hexafluoride (SF₆)

SF₆ is an inorganic compound; because it is an excellent electrical insulator, its main use is in the electrical industry. SF₆ is a potent greenhouse gas; its GWP is listed in Annex 1. SF₆ was also covered by the old F-gas Regulation.

Annex II F-gases

'Other fluorinated greenhouse gases' are listed in Annex II of Regulation No 517/2014 and include:

- unsaturated hydro(chloro)fluorocarbons (Section 1 of Annex II);
- fluorinated ethers and alcohols (Section 2 of Annex II);
- other perfluorinated compounds, including NF₃ (Section 3 of Annex II).

All these gases and their GWPs are listed in section 9 of this annex. The Annex II F-gases were not covered by the reporting obligations under the old F-gas Regulation (EC) No 842/2006.

Bulk gases and gases contained in equipment

Gases contained in gas containers, including bottles and isotanks, are referred to as bulk gases, irrespective of the absolute amounts of gases handled. Bulk gases are to be differentiated from gases contained in products or equipment, as different reporting obligations apply.

Mixtures

Mixtures of fluorinated gases are often used in industrial applications. In their reports under Article 19 of the F-gas Regulation (EU) No 517/2014, companies report on their transactions (import, export, etc.) of such mixtures, while specifying their composition. For the purpose of the present aggregation report, the amounts of mixtures are recalculated as the proportions of their constituent fluorinated gases as listed in section 9, unless indicated otherwise.

Annex IV gases

Annex IV of the new F-gas Regulation lists some non-fluorinated greenhouse gases that have GWPs that also need to be considered when determining the GWP of a mixture. These gases and their GWPs are also listed in section 9 of this annex (Table 28). For all other substances included in a mixture, a default value of 0 is used for the calculation the GWP.

Nil report

A nil report is a notification by a company that it considers itself not obliged to report under the F-gas Regulation.

Global warming potentials (GWPs)

GWPs are used to make different gases comparable in terms of their potential impact on climate change. The multiplication of a quantity of a gas by its GWP results in that quantity expressed as CO₂e.

The GWPs used under the new F-gas Regulation are in line with those published in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) (IPCC, 2007). The old F-gas Regulation (EC) No 842/2006 used the earlier set of GWPs published by the IPCC in its Third Assessment Report (TAR) (IPCC, 2001). Accordingly, previous EEA technical reports on fluorinated gases up to 2014 used TAR GWPs.

Quantities of F-gases are reported in physical tonnes. Conversion of the figures into CO₂e based on gas-specific GWPs facilitates a focus on the potential warming effect caused by these gases after release to the atmosphere. Both metrics are used in this report when analysing the data.

The GWPs of gases used for the present report are listed in section 9. GWPs of mixtures are calculated according to Annex IV of the new F-gas regulation (EU, 2014).

9 Gases covered by Regulation (EU) No 517/2014

Table 26 Annex I of Regulation (EU) No 517/2014

Gas	GWP (AR4)	Gas group	Reference	Coverage in the 'old' F-gas Regulation 842/2006
HFC-23	14 800	HFCs	Annex I Section 1	covered
HFC-32	675	HFCs	Annex I Section 1	covered
HFC-41	92	HFCs	Annex I Section 1	covered
HFC-125	3 500	HFCs	Annex I Section 1	covered
HFC-134	1 100	HFCs	Annex I Section 1	covered
HFC-134a	1 430	HFCs	Annex I Section 1	covered
HFC-143	353	HFCs	Annex I Section 1	covered
HFC-143a	4 470	HFCs	Annex I Section 1	covered
HFC-152	53	HFCs	Annex I Section 1	not covered
HFC-152a	124	HFCs	Annex I Section 1	covered
HFC-161	12	HFCs	Annex I Section 1	not covered
HFC-227ea	3 220	HFCs	Annex I Section 1	covered
HFC-236cb	1 340	HFCs	Annex I Section 1	covered
HFC-236ea	1 370	HFCs	Annex I Section 1	covered
HFC-236fa	9 810	HFCs	Annex I Section 1	covered
HFC-245ca	693	HFCs	Annex I Section 1	covered
HFC-245fa	1 030	HFCs	Annex I Section 1	covered
HFC-365mfc	794	HFCs	Annex I Section 1	covered
HFC-43-10mee	1 640	HFCs	Annex I Section 1	covered
PFC-14 (CF ₄)	7 390	PFCs	Annex I Section 2	covered
PFC-116 (C ₂ F ₆)	12 200	PFCs	Annex I Section 2	covered
PFC-218 (C ₃ F ₈)	8 830	PFCs	Annex I Section 2	covered
PFC-3-1-10 (C ₄ F ₁₀)	8 860	PFCs	Annex I Section 2	covered
PFC-4-1-12 (C ₅ F ₁₂)	9 160	PFCs	Annex I Section 2	covered
PFC-5-1-14 (C ₆ F ₁₄)	9 300	PFCs	Annex I Section 2	covered
PFC-c-318 (c-C ₄ F ₈)	10 300	PFCs	Annex I Section 2	covered
SF ₆	22 800	SF ₆	Annex I Section 3	covered

Sources: EU, 2006; EU, 2014.

Table 27 Annex II of Regulation (EU) No 517/2014 (not covered by old Regulation (EC) No 842/2006)

Gas	GWP (AR4)	Gas group	Reference
HFC-1234yf	4	Unsaturated HFCs/HCFCs	Annex II Section 1
HFC-1234ze	7	Unsaturated HFCs/HCFCs	Annex II Section 1
HFC-1336mzz	9	Unsaturated HFCs/HCFCs	Annex II Section 1
HCFC-1233zd	5	Unsaturated HFCs/HCFCs	Annex II Section 1
HCFC-1233xf	1	Unsaturated HFCs/HCFCs	Annex II Section 1
HFE-125	14 900	HFEs and alcohols	Annex II Section 2
HFE-134	6 320	HFEs and alcohols	Annex II Section 2
HFE-143a	756	HFEs and alcohols	Annex II Section 2
HCFE-235da2 (isofluorane)	350	HFEs and alcohols	Annex II Section 2
HFE-245cb2	708	HFEs and alcohols	Annex II Section 2
HFE-245fa2	659	HFEs and alcohols	Annex II Section 2
HFE-254cb2	359	HFEs and alcohols	Annex II Section 2
HFE-347 mcc3 (HFE-7000)	575	HFEs and alcohols	Annex II Section 2
HFE-347pcf2	580	HFEs and alcohols	Annex II Section 2
HFE-356pcc3	110	HFEs and alcohols	Annex II Section 2
HFE-449sl (HFE-7100)	297	HFEs and alcohols	Annex II Section 2
HFE-569sf2 (HFE-7200)	59	HFEs and alcohols	Annex II Section 2
HFE-43-10pccc124	1 870	HFEs and alcohols	Annex II Section 2
HFE-236ca12 (HG-10)	2 800	HFEs and alcohols	Annex II Section 2
HFE-338pcc13 (HG-01)	1 500	HFEs and alcohols	Annex II Section 2
HFE-347mmy1	343	HFEs and alcohols	Annex II Section 2
2,2,3,3,3-pentafluoropropanol	42	HFEs and alcohols	Annex II Section 2
bis(trifluoromethyl)-methanol	195	HFEs and alcohols	Annex II Section 2
HFE-227ea	1 540	HFEs and alcohols	Annex II Section 2
HFE-236ea2 (desfluoran)	989	HFEs and alcohols	Annex II Section 2
HFE-236fa	487	HFEs and alcohols	Annex II Section 2
HFE-245fa1	286	HFEs and alcohols	Annex II Section 2
HFE 263fb2	11	HFEs and alcohols	Annex II Section 2
HFE-329mcc2	919	HFEs and alcohols	Annex II Section 2
HFE-338mcf2	552	HFEs and alcohols	Annex II Section 2
HFE-338mmz1	380	HFEs and alcohols	Annex II Section 2
HFE-347mcf2	374	HFEs and alcohols	Annex II Section 2
HFE-356mec3	101	HFEs and alcohols	Annex II Section 2
HFE-356mm1	27	HFEs and alcohols	Annex II Section 2
HFE-356pcf2	265	HFEs and alcohols	Annex II Section 2
HFE-356pcf3	502	HFEs and alcohols	Annex II Section 2
HFE 365mcf3	11	HFEs and alcohols	Annex II Section 2

Gas	GWP (AR4)	Gas group	Reference
HFE-374pc2	557	HFEs and alcohols	Annex II Section 2
- (CF ₂) ₄ CH(OH) -	73	HFEs and alcohols	Annex II Section 2
NF ₃ (nitrogen trifluoride)	17 200	Other perfluorinated compounds	Annex II, Section 3
c-C ₃ F ₆ (perfluorocyclopropane)	17 340	Other perfluorinated compounds	Annex II, Section 3
PFPME	10 300	Other perfluorinated compounds	Annex II, Section 3
SF ₅ CF ₃	17 700	Other perfluorinated compounds	Annex II, Section 3

Note: Annex II F-gases were not covered under the old F-gas Regulation (EC) No 842/2006.

Source: EU, 2014.

Table 28 Non-fluorinated gases in Annex IV of Regulation (EU) No 517/2014 (not covered by the old Regulation (EC) No 842/2006)

According to Annex IV of the new F-gas Regulation (EU) No 517/2014, the GWP of mixtures containing gases outside the scope of Annexes I and II of Regulation (EU) No 517/2014 are to be calculated using the GWPs given here for the non-fluorinated gases. For other constituents of mixtures that are not listed here (e.g. ODS), a GWP value of zero shall be used.

Substance	Formula	GWP (AR4)
R-170 (Ethane)	CH ₃ CH ₃	6
R-290 (Propane)	CH ₃ CH ₂ CH ₃	3
R-600 (Butane)	CH ₃ CH ₂ CH ₂ CH ₃	4
R-600A (Isobutane)	CH(CH ₃) ₂ CH ₃	3
R-601 (Pentane)	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	5
R-601A (Isopentane)	(CH ₃) ₂ CHCH ₂ CH ₃	5
C ₅ H ₁₀ (Cyclopentane)	C ₅ H ₁₀	5
R-610 (Ethoxyethane, diethyl ether)	CH ₃ CH ₂ OCH ₂ CH ₃	4
R-611 (Methyl formate)	HCOOCH ₃	25
R-702 (Hydrogen)	H ₂	6
R-717 (Ammonia)	NH ₃	0
R-744 (Carbon dioxide)	CO ₂	1
R-1150 (Ethylene)	C ₂ H ₄	4
R-1270 (Propylene)	C ₃ H ₆	2
E-170 (Dimethyl ether)	CH ₃ OCH ₃	1
CH ₃ Cl (Methyl chloride)	CH ₃ Cl	13
CHCl ₃ (Chloroform)	CHCl ₃	31
Methylene chloride	CH ₂ Cl ₂	9
CH ₄ (Methane)	CH ₄	25
N ₂ O (nitrous oxide)	N ₂ O	298

Source: EU, 2014.

10 Calculation methods

This section provides documentation for:

- Calculation of EU imports (page 78)
- Calculation of EU exports (page 78)
- Calculation of EU supply (page 78); Calculation of HFC amounts placed on the market (POM) under the EU HFC phase-down (page 79) and
- Calculation of HFC consumption under the international HFC phase-down under the Montreal Protocol (page 80).

Table 30 (page 84) provides a summary comparison between the three metrics supply, POM, and consumption.

Calculation of EU imports

HFC imports reported from intermediate storage under customs warehousing after inward processing are not considered for the EU imports statistics. This data is available since 2018. However such data is relevant for the calculation of amounts placed on the market (POM).

Calculation of EU exports

HFC exports reported to intermediate storage under customs warehousing after inward processing are not considered for the EU exports statistics. This data is available since 2018. However such data is relevant for the calculation of amounts placed on the market (POM).

Data reported for the export of pre-blended polyols, available since 2018, is not considered for the EU statistics on bulk exports.

Calculation of EU supply

Total supply (TS)

‘EU total supply’ is a parameter that provides information on the actual use of fluorinated gases by EU industries. Notably, TS also includes gases that are contained in exported products and equipment. In the logic of the supply metrics used in this report, such gases count towards the gas demand of EU industries. ‘EU total supply’ is the sum of ‘EU bulk supply’ and ‘EU supply in products/equipment’. It is comparable to the net supply metric used in earlier EEA reports on F-gases.

Bulk supply (BS)

The ‘bulk supply’ metric is focused on emission-relevant supplies of bulk gases to EU industries and therefore does not cover EU supplies intended for feedstock or destruction. Starting in 2014, BS has been defined as:

Bulk supply (BS) = production (1A) – destroyed (captured) production (1D) + full imports (2A) – full exports (3A) + 1 January stocks from own import/production (4B) – 31 December stocks from own import/production (4G) + reclamation (4K) – POM intended for destruction (6B) – feedstock use (7A).

Since 2018, the new reporting items on imports (2A_pp) and exports (3A_pp) of pre-blended polyols are considered: Imports of pre-blended are subtracted and exports of pre-blended polyols are added in the equation for BS.

Since 2019, the explicit inclusion of non-captured production in the reporting scheme was reflected in order to exclude the emissions of non-captured production from supply: non-captured production totals (1Aa) are subtracted and amounts of non-captured production used as feedstock (1A_fs1) are added in the equation for BS. Furthermore, imports from and exports into EU intermediate storage under customs warehousing after inward processing were excluded from the BS calculation (those amounts are also excluded from the data shown in this report for imports and exports, respectively).

For the years 2007-2013, bulk supply (BS) is calculated as follows:

BS = Production + Imports – Exports + Stocks 1 January – Stocks 31 December + Reclamation – own feedstock use – intended application: feedstock.

EU supply in products/equipment

The ‘EU supply in products/equipment’ (SPE) metric covers the amount of fluorinated gases that are imported into the EU within products or equipment and placed on the market. Exports of F-gases within products and equipment are not reported under the new F-gas Regulation (No 517/2014) or subtracted for the SPE metric. Thus, the SPE metric covers only imports and it is not intended to cover the net flows of F-gases within products or equipment across EU borders.

SPE is calculated as the sum of all gases reported in Section 11 of the reporting questionnaire. Since 2018, the new reporting item on imports of pre-blended polyols (2A_pp) is added. No data on SPE were collected before 2014.

Intended applications of bulk or total supply

In Section 6 of the reporting questionnaire, companies report on the intended applications of bulk gases supplied to the EU market (6X). This metric differs from bulk supply in the way it accounts for re-exports, amounts intended for destruction and feedstock. It is calculated as follows:

6X = (net) production (1E = 1A–1D) + full imports (2A) – re-exports within products of own bulk imports (2B) – bulk re-exports of own imports (3B) + 1 January stocks from own import/production (4B) – 31 December stocks from own import/production (4G) + reclamation (4K).

To estimate the intended applications of EU bulk or total supply, a five-step process is used:

- 1 Per gas, determine the proportion of each reported application in a subset of categories without export (6A), destruction (6B), leakage (6U) and accountancy adjustments (6V).
- 2 Assume leakage and accountancy adjustments in bulk or total supply to be equal to the amounts reported in Section 6 and subtract those from total bulk or total supply.
- 3 Apply the proportions determined in step 1 to the remainder of bulk or total supply.
- 4 Assign any remainder to the category ‘Other or unknown applications’ (6T).
- 5 Assign all net exports of pre-blended polyols (3A_pp-2A_pp) to the intended application 6G (pre-blended polyols).

Calculation of HFC amounts placed on the market (POM) under the EU HFC phase-down

The quota of relevant POM starting in 2015 is calculated as:

Bulk HFCs physically placed on the market (4M), converted into CO₂e

minus

Exemptions under Article 15(2) (5A + (5B) + 5C_exempted + 5D + 5E), converted into CO₂e (5F is included in the exemptions from 2017)

plus
Issued authorisations (9A).

For years where the POM compliance exercise by DG CLIMA has been completed, The POM amounts given are based on the POM established in the HFC registry.

Bulk HFC POM 2007-2013 is calculated per year and per company based on data reported under the old F-gas Regulation as:

HFC production, converted into CO₂e
plus
HFC imports, converted into CO₂e
minus
HFC exports, converted into CO₂e
plus
1 January HFC stocks, converted into CO₂e
minus
31 December HFC stocks, converted into CO₂e
minus
HFCs used for feedstock, converted into CO₂e
minus
HFC supplies intended for feedstock use, converted into CO₂e.

Where the amount thus calculated is negative for a given company in a given year, the POM is set to zero before calculating the EU total as the sum of all companies.

Calculation of HFC consumption under the international HFC phase-down under the Montreal Protocol

The HFCs considered under the Montreal Protocol are all HFCs as listed in Annex I, Section 1 of the new F-gas Regulation No 517/2014 (see 9, page 74), except HFC-161.

HFC consumption starting in 2019 is calculated as follows:

Starting 2019, HFC consumption under the MP is calculated separately for HFC-23 (Annex F, Group II under the MP) and all other HFCs (Group I) covered by the MP:

For Group I HFCs, the calculation approach as depicted below for 2018 is continued with the additional element that imports from and exports to dependent overseas territories are not considered. A list of dependent territories is given in Table 29 (page 83). However, for the calculation of HFC consumption starting 2021, marking the end of the Brexit transition period, trade with UK overseas territories was considered for EU consumption.

For Group II HFCs / HFC-23, generated amounts not captured are not taken into account. In addition to the calculation scheme for Group I HFCs, the following data is thus subtracted/added:

minus
uncaptured HFC production (1Aa), converted into CO₂e
plus
destroyed uncaptured HFC production (1A_a), converted into CO₂e
plus
uncaptured HFC production used as feedstock (1A_fs1), converted into CO₂e

HFC consumption in 2018 is calculated as follows:

HFC production (1A), converted into CO₂e
minus
HFC production for feedstock use within the Union (1A_fs), converted into CO₂e
minus
HFC production for other uses exempted under the Montreal Protocol (1A_ex), converted into CO₂e
(1A_ex is not yet applicable as no exemptions have been agreed upon under the Montreal Protocol
so far)
plus
HFC imports (2A), converted into CO₂e
minus
HFC imports of pre-blended polyols (2A_pp), converted into CO₂e
minus
imports of used, recycled or reclaimed HFCs (2C), converted into CO₂e
minus
virgin HFC imports for feedstock use (2D), converted into CO₂e
minus
virgin HFC imports exempted under the Montreal Protocol (2E), converted into CO₂e
(2E is not yet applicable as no exemptions have been agreed so far under the Montreal Protocol)
minus
HFC exports (3A), converted into CO₂e
plus
HFC exports of pre-blended polyols (3A_pp), converted into CO₂e
plus
exports of used, recycled or reclaimed HFCs (3G), converted into CO₂e
plus
virgin HFC exports for feedstock use (3H), converted into CO₂e
plus
virgin HFC exports exempted under the Montreal Protocol (3I), converted into CO₂e
(3I is not yet applicable as no exemptions have been agreed so far under the Montreal Protocol)
minus
Total HFC destruction (8D), converted into CO₂e.

Imports reported from and exports reported to intermediate storage under customs warehousing
after inward processing are not considered as imports or exports for the purpose of consumption
under the MP.

HFC consumption starting in 2014 - 2017 is calculated as follows:

HFC production (1A), converted into CO₂e
plus
HFC imports (2A), converted into CO₂e
minus
HFC exports (3A), converted into CO₂e
plus

HFC exports for recycling (3D), converted into CO₂e
plus
HFC exports for reclamation (3E), converted into CO₂e
plus
HFC exports for destruction (3F), converted into CO₂e
minus
HFC feedstock use (7A), converted into CO₂e
minus
Total HFC destruction (8D), converted into CO₂e.

HFC consumption until 2013 is calculated from data reported under the old F-gas Regulation as follows:

HFC production, converted into CO₂e
plus
HFC imports, converted into CO₂e
minus
HFC exports, converted into CO₂e
plus
HFC exports for recycling, reclamation or destruction, converted into CO₂e
minus
Reporting companies' own HFC destruction, converted into CO₂e
minus
HFC amounts supplied by reporting companies to third parties for destruction, converted into CO₂e
minus
HFCs used for feedstock, converted into CO₂e
minus
HFC supplies intended for feedstock use, converted into CO₂e

Table 29 Dependent overseas territories of the EU-27 and the United Kingdom

Territory	MS Dependency relation
Anguilla	UK
Aruba	NL
Bermuda	UK
Bonaire, Sint Eustatius and Saba	NL
British Indian Ocean Territory	UK
Cayman Islands	UK
Curaçao	NL
Falkland Islands (Malvinas)	UK
Faroe Islands	DK
French Polynesia	FR
French Southern Territories	FR
Gibraltar	UK
Greenland	DK
Guernsey	UK
Isle of Man	UK
Jersey	UK
Montserrat	UK
New Caledonia	FR
Pitcairn	UK
Saint Barthélemy	FR
Saint Helena, Ascension and Tristan da Cunha	UK
Saint Pierre and Miquelon	FR
Sint Maarten (Dutch part)	NL
South Georgia and the South Sandwich Islands	UK
Turks and Caicos Islands	UK
Virgin Islands, British	UK
Wallis and Futuna	FR

Note: Dependent overseas territories of the United Kingdom were considered for the calculation of HFC consumption of the EU for the years until 2019, and for joint EU-27 and UK consumption in the year 2020.

Source: EEA, 2022a.

Comparison of supply, POM and consumption metrics

Table 30 Scope of supply, POM, and consumption metrics

		Supply	Placing on the market (POM), relevant for compliance with the EU HFC phase-down	Consumption, relevant for compliance with the MP HFC phase-down	
	<i>covered gases</i>	<i>applicable to total F-gases and single gases/gas groups (e.g. HFCs)</i>	<i>HFCs of Annex I of EU F-gas Regulation 517/2014, including HFC shares and non-HFC shares of HFC-containing mixtures</i>	<i>HFCs of Annex I of EU F-gas Regulation 517/2014 except HFC-161, including HFC shares of HFC-containing mixtures</i>	
	<i>units used</i>	<i>both physical tonnes and t CO₂e (GWP: AR4)</i>	<i>t CO₂e (GWP: AR4)</i>	<i>t CO₂e (GWP: AR4)</i>	
Transactions covered	Type of contribution				
Production	captured amounts	plus	yes	yes	yes
	Uncaptured amounts	plus	yes	yes	no
	Emissions of uncaptured amounts	minus	yes	no	not applicable
Reclamation	plus	yes	no	no	
Recycling	plus	no	no	no	
Bulk imports	from EU intermediate storage under customs warehousing after inward processing	plus	no	yes	no
	from dependent overseas territories	plus	yes	yes	no
	from other origins	plus	yes	yes	yes (except import of recycled and used bulk HFCs)
Imports in products and equipment	Pre-blended polyols	plus	yes	yes	no
	Refrigeration, air conditioning and heat pump (RACHP) equipment	plus	yes	2015-2016: no starting 2017, only amounts not covered by quota authorisations	no
	other products and equipment	plus	yes	no	no

		Supply	Placing on the market (POM), relevant for compliance with the EU HFC phase-down	Consumption, relevant for compliance with the MP HFC phase-down	
		<i>covered gases</i>	<i>applicable to total F-gases and single gases/gas groups (e.g. HFCs)</i>	<i>HFCs of Annex I of EU F-gas Regulation 517/2014, including HFC shares and non-HFC shares of HFC-containing mixtures</i>	
		<i>units used</i>	<i>both physical tonnes and t CO₂e (GWP: AR4)</i>	<i>t CO₂e (GWP: AR4)</i>	
Transactions covered	Type of contribution				
Bulk exports	into EU intermediate storage under customs warehousing after inward processing	minus	no	exports from own production and exports from own imports are subtracted. Other bulk exports subtracted if directly supplied by the importer/producer to the exporter (exemption Art. 15(2)c)	no
	to dependent overseas territories	minus	yes		no
	to other destinations	minus	yes		yes (except export of recycled and used bulk HFCs)
exports in products and equipment	Pre-blended polyols	minus	no	yes	no
	other products and equipment	minus	no	subtracted in case the contained gases had never been placed on the market after bulk import (re-export, reported in section 2B)	no
Destruction	of EU production, destroyed before placing on the market and imports for destruction	minus	yes	yes (exemption Art. 15(2)a)	yes
	of used gases recovered within the EU	minus	no	no	yes
Feedstock use		minus	yes	yes (exemption Art. 15(2)b)	yes (HFC production for feedstock use in the Union and HFC import for feedstock use)
Supplies to military uses		minus	no	yes (exemption Art. 15(2)d)	no
Supplies to semiconductor industry		minus	no	yes (exemption Art. 15(2)e)	no

		Supply	Placing on the market (POM), relevant for compliance with the EU HFC phase-down	Consumption, relevant for compliance with the MP HFC phase-down
	<i>covered gases</i>	<i>applicable to total F-gases and single gases/gas groups (e.g. HFCs)</i>	<i>HFCs of Annex I of EU F-gas Regulation 517/2014, including HFC shares and non-HFC shares of HFC-containing mixtures</i>	<i>HFCs of Annex I of EU F-gas Regulation 517/2014 except HFC-161, including HFC shares of HFC-containing mixtures</i>
	<i>units used</i>	<i>both physical tonnes and t CO₂e (GWP: AR4)</i>	<i>t CO₂e (GWP: AR4)</i>	<i>t CO₂e (GWP: AR4)</i>
Transactions covered	Type of contribution			
Supplies to pharmaceutical MDIs	minus	no	not considered 2015-2017, considered 2018 onwards (exemption Art. 15(2)f)	no
1 January stocks	plus	full EU-based stocks from own production or own import considered, stocks under customs warehousing not considered, stocks from EU purchases not considered	only those EU-based stocks from own production or own import considered that have not yet been placed on the market, stocks under customs warehousing not considered, stocks from EU purchases and stocks from own imports/own production already placed on the market not considered	no
31 December stocks	minus			
HFC quota authorisations issued by producers/importers	plus	no	yes	no

List of abbreviations

Abbreviation	Name
EEA	European Environment Agency
BDR	Business Data Repository of the EEA
CFC	Chlorofluorocarbon
CO ₂	Carbon dioxide
CO ₂ e	CO ₂ equivalent
EC	European Commission
DG CLIMA	Directorate-General for Climate Action of the European Commission
EEA	European Environment Agency
ETC CM	European Topic Centre for Climate change mitigation
EU	European Union
EU-27	Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden
EU-28	Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom
AR4	Fourth Assessment Report of the IPCC
F-gases	Fluorinated gases
FGR	F-gases Regulation (EU) 517/2014
GWP	Global warming potential
HCFC	Hydrochlorofluorocarbon
HFC	Hydrofluorocarbon
HFE	Hydrofluoroether
HFO	Hydrofluoroolefin
IPCC	Intergovernmental Panel on Climate Change
kg	Kilogramme
kt	Kilotonne
MP	Montreal Protocol
Mt	Megatonne
NF ₃	Nitrogen trifluoride
ODS	Ozone-depleting substances
PFCs	Perfluorocarbons
PFPME	Perfluoropolymethylisopropylether
POM	Placing on the market
QA/QC	Quality assurance/quality control

Abbreviation	Name
R-134a	Refrigerant classification of HFC-134a
R-404A	Refrigerant mixture of HFCs (52% HFC-143a, 44% HFC-125, 4% HFC-134a)
R-407C	Refrigerant mixture of HFCs (52% HFC-134a, 25% HFC-125, 23% HFC-32)
R-410A	Refrigerant mixture of HFCs (50% HFC-125, 50% HFC-32)
R-507A	Refrigerant mixture of HFCs (50% HFC-143a, 50% HFC-125)
RACHP	Refrigeration, air conditioning and heat pump
SF ₆	Sulphur hexafluoride
t	Tonne
TAR	Third Assessment Report of the IPCC
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

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