

Fluorinated greenhouse gases 2014

Summary of data reported by companies on the production, import and export of fluorinated greenhouse gases in the European Union

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Executive summary

Background and policy

International policy

The greenhouse gases covered by the United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol include three groups of fluorinated greenhouse gases (the so-called F-gases): hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). The majority of these fluorinated greenhouse gases have very long lifetimes in the atmosphere and high global warming potentials (GWPs).

As a result of the phase-out of ozone-depleting substances (ODS) under the Montreal Protocol and Regulation (EC) No 1005/2009 ⁽¹⁾ on ODS, certain fluorinated greenhouse gases are used to replace ODS. The use of fluorinated greenhouse gases in many different applications has been increasing and has considerable potential for growth at a global level. Fluorinated greenhouse gases accounted for approximately 2.5% of overall greenhouse gas

emissions expressed in GWP in the 28 Member States of the European Union (EU) in 2013, and this proportion continues to increase.

The EU has a target under the Kyoto Protocol to reduce its whole basket of greenhouse gases — including fluorinated greenhouse gases — by 20% by 2020 compared with 1990 levels. Furthermore, the EU28 and Iceland have a joint target under the Kyoto Protocol to reduce greenhouse gas emissions ⁽²⁾ by 20% compared with 1990 during the Protocol's second commitment period, 2013–2020.

EU F-gas policy

Following a review of the 2006 F-Gas Regulation ⁽³⁾, a revision was adopted by the European Parliament and the European Council, Regulation (EU) No 517/2014 ⁽⁴⁾, the 'new F-Gas Regulation', which aims to reduce EU fluorinated greenhouse gas emissions by two thirds of the 2010 level by 2030. The new regulation maintains many of the previous measures,

Box ES.1 Changes to reporting obligations under the new F-Gas Regulation

The new F-Gas Regulation (EU) No 517/2014 introduces additional requirements to those set out in the 2006 F-Gas Regulation. The annual reporting obligations for producers, importers and exporters have changed. The list of fluorinated greenhouse gases subject to the reporting obligations has been extended, and there are revised reporting thresholds that are defined both in terms of physical quantities (metric tonnes) of gases and by their CO₂ equivalent. There are new reporting obligations for feedstock users, equipment importers and destruction companies. Producers also need to report on any destruction of their own production.

Planned future policy changes

In November 2015, an international in-principle agreement (the Dubai Pathway) on using the Montreal Protocol to reduce the production and use of climate-change-inducing HFCs was reached. This development reflects the strong policy mechanisms adopted by the EU under the new F-Gas Regulation implementing an EU-wide HFC phase-down.

⁽¹⁾ Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer.
⁽²⁾ The joint EU-28 and Iceland target for the second commitment period of the Kyoto Protocol also covers emissions of nitrogen trifluoride (NF₃), another fluorinated gas covered by this report.
⁽³⁾ Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases.
⁽⁴⁾ Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006.

in particular related to leak prevention, recovery, certification of technicians and selected restrictions on the use and marketing of fluorinated greenhouse gases.

Large reductions in fluorinated greenhouse gas use and emissions are expected to result from a new phase-down measure, which will progressively cap sales of HFCs allowed on the EU market, bringing maximum sales down to 21% of today's levels by 2030. Reductions are also expected to result from bans on the use of fluorinated greenhouse gases that have high GWPs. Box ES.1 outlines the changes to the reporting obligations.

Data covered in this report

This report is based on submissions for 2014, the first reporting year ⁽⁵⁾ under the new F-Gas Regulation 517/2014. The new regulation requires, among other things, that companies report on produced, imported and exported quantities of fluorinated greenhouse gases, including mixtures. Reporting obligations are also established for companies that:

- use fluorinated greenhouse gases as a feedstock for a chemical reaction process;
- destroy fluorinated greenhouse gases; or
- import products or equipment containing fluorinated greenhouse gases.

The specification of reportable gases in the new F-Gas Regulation extends the list of gases beyond the HFCs, PFCs and SF₆ covered by the old F-Gas Regulation to include:

- unsaturated hydro(chloro)fluorocarbons;
- fluorinated ethers and alcohols;
- other perfluorinated compounds.

For 2014, the number of reporting companies tripled compared with 2013 to 468. This increase is mostly attributable to importers of products and equipment containing reportable fluorinated gases (which were not covered under the old F-Gas Regulation) and to new bulk importers of gases.

For reporting years 2007–2013, this report relies on data reported by companies under the old F-Gas Regulation 842/2006, as presented in the 2014 European Environment Agency (EEA) report on fluorinated greenhouse gases (EEA, 2014).

This report applies confidentiality rules to protect company data. Where applicable, the confidentiality measures mean that some fluorinated greenhouse gas data are shown at higher levels of aggregation only. An account of the confidentiality measures is included in Annex 4.

Reporting process

Company registration for reporting and the reporting process are two separate procedures. In 2015, registration for reporting was centralised in the European Commission's F-gas portal at <https://webgate.ec.europa.eu/ods2/>, which hosts the HFC registry provided for under Article 17 of the new F-Gas Regulation. The F-gas portal also links directly to the reporting platform.

The system for submission of company reports is the Business Data Repository (BDR) at <https://bdr.eionet.europa.eu>. This reporting platform ensures that the reporting process maintains traceability and transparency for all stakeholders. The system includes automated quality checks and facilitates data processing after companies have submitted their reports. The completeness and consistency of the reported data are further assured by manual data quality checks, followed by bilateral communication with the reporting companies where necessary.

The EEA has the overall responsibility for collecting, archiving, checking and aggregating information of the companies' reports. The EEA also provides active support to assist reporters in fulfilling their obligations.

Key findings

The assessment of trends is dependent upon the unit used to express the amounts of fluorinated gases, i.e. physical tonnes or GWP-weighted tonnes (i.e. as CO₂ equivalent) ⁽⁶⁾. Statistics in physical tonnes reflect the use patterns of fluorinated gases in European industries, while statistics expressed as CO₂-eq. reflect

⁽⁵⁾ 'Reporting year' means the calendar year on which companies report. For example, in 2015 companies reported on their activities in the reporting year 2014.

⁽⁶⁾ The GWP values used in this report are those published in the IPCC's Fourth Assessment Report (AR4).

the relevance of usage of fluorinated gases for climate change policy.

The overall trends that can be identified from companies' reporting on fluorinated gases in 2014 can be summarised as follows:

- EU production continued to decline for the fourth consecutive year since 2011;
- bulk imports increased by 90% compared with last year's reporting (in CO₂-equivalent);
- the high increase in bulk imports is mostly due to a 95% increase in HFC imports, resulting to a large extent from HFC stockpiling in the EU;
- bulk exports continue to increase for the fifth year in a row;
- bulk supply increased drastically, mainly as a result of an HFC bulk supply increase of 90% (in CO₂-equivalent);
- there was a 61% increase in the amount of HFCs being placed on the market. This is most probably due to stockpiling in anticipation of the HFC phase-down and quota allocations for placing on the market from 2015.

EU production of reportable fluorinated gases in 2014

- Production of reportable fluorinated gases involved six HFCs (HFC134a, HFC365mfc, HFC143a, HFC32, HFC227ea and HFC23), four PFCs and SF₆. The supply of the other 19 gases used in the EU in 2014 relied entirely on imports.
- Production of fluorinated gases declined for the fourth consecutive year since 2011. Production measured in tonnes experienced a year-on-year decline of 15%, or 11% in terms of CO₂-equivalent.
- The decrease in production is largely the result of a 15% decrease in HFC production. HFC production was at its lowest level since the beginning of reporting under this legislation in 2007.
- HFCs account for more than 90% of production by weight, while SF₆ accounts for a considerable proportion when measured in CO₂-equivalent. Most SF₆ production is designated for export.

Bulk imports into the EU in 2014

- Bulk imports of reportable fluorinated gases were about 90% above 2013 levels, both by mass and as CO₂-equivalent.
- HFCs account for about 95% of the increase in bulk imports. HFC bulk imports were just over 90% higher than in 2013. About 5% (both by mass and as CO₂-equivalent) of the increase can be attributed to SF₆, PFCs and the new reportable gases.

Bulk exports into non-EU countries in 2014

- Exports of reportable fluorinated gases into non-EU countries have been increasing since 2009. There was an increase of 22% measured in tonnes, or 24% in CO₂-equivalent, compared with 2013. HFC exports increased by approximately 20% and SF₆ exports by 35%.
- SF₆ accounts for a considerable proportion of exports when reported as CO₂-equivalent, but for less than 10% by mass. Bulk SF₆ exports reached the highest level since reporting began in 2007.
- The remainder of the gas exported consisted mostly of HFCs. Bulk HFC exports were back at a level not seen since 2007.

The analysis of trends in production, imports, exports and supply from 2007 to 2014 (Figure ES.1 in tonnes, Figure ES.2 as CO₂-equivalent) is based on comparable reporting that took place under the old F-Gas Regulation and continues under the new Regulation.

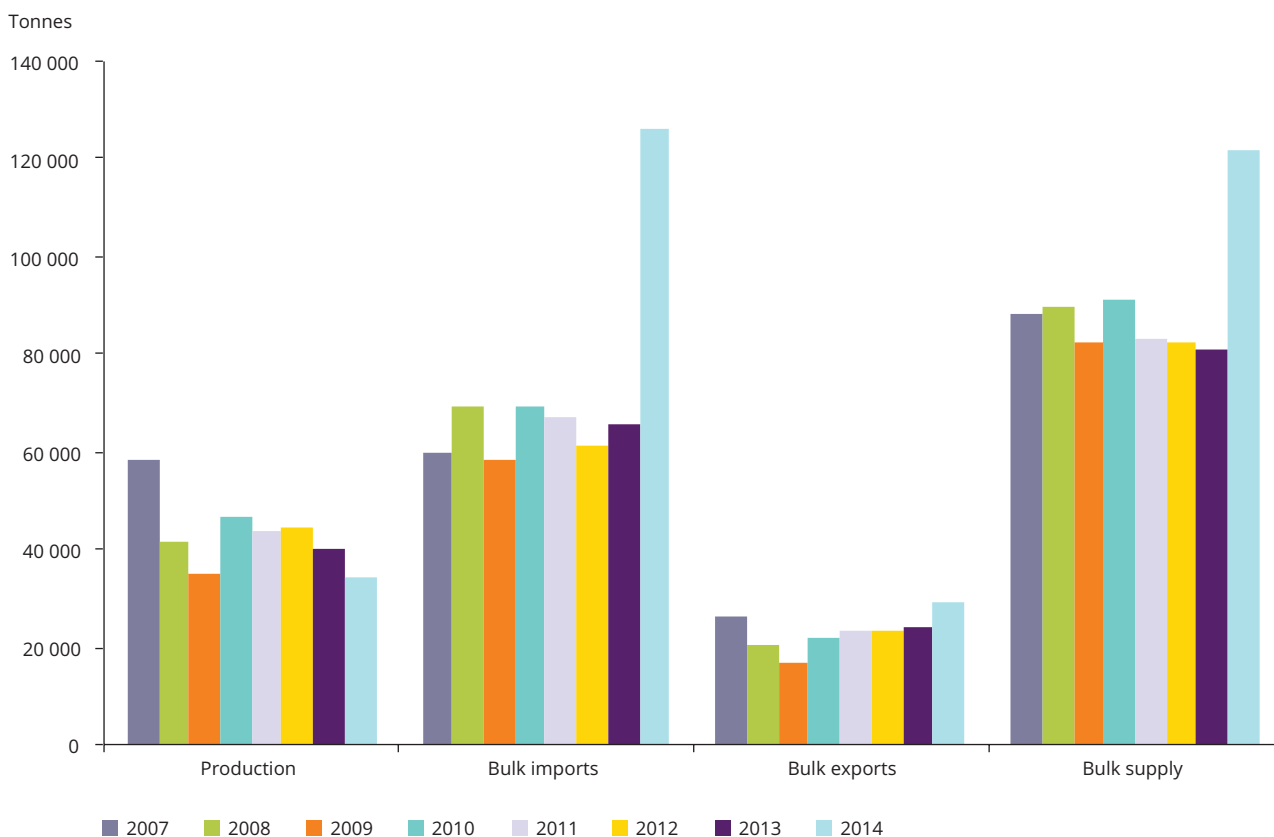
Bulk supply in 2014

HFCs dominated bulk supply, making up 97% by mass or 90% as CO₂-equivalent. SF₆ played a role only in terms of CO₂-equivalent.

After several years of decreasing, bulk supply increased by 50% in tonnes or 37% in CO₂-equivalent compared with 2013. For HFCs alone, the increase was 50% in tonnes and 51% in CO₂-equivalent. In contrast, the bulk supply of SF₆ decreased significantly.

The increase in bulk supply reflects increases in bulk HFC imports in 2014, the last year before the commencement of the HFC phase-down. The increase in bulk supply was offset to some degree by decreases in EU production of fluorinated gases and by an increase in bulk exports.

Figure ES.1 Production, imports, exports and bulk supply of reportable fluorinated gases (tonnes)



Note: Annex II gases were not subject to reporting for the years 2007–2013.

Sources: EC, 2011; EEA, 2014 and 2015a.

Total supply in 2014

The total supply of reportable fluorinated gases comprises both the supply in bulk and the supply of gases contained in imported products and equipment, and is corrected for bulk exports of gases. Total supply amounted to 128 kt of gases or 286 Mt CO₂-equivalent. As gases contained in imported products and equipment were reported for the first time, no trend can be calculated for total supply.

By mass, 95% (96% as CO₂-equivalent) of 2014 EU total supplies were supplied in bulk; the balance of 5% (by mass) or 4% (as CO₂-equivalent) was supplied within products and equipment.

HFCs accounted for 98% of 2014 total supply by mass (Figure ES.3) or 91% as CO₂-equivalent (Figure ES.4).

Supply was reported for 30 out of the list of 70 reportable fluorinated gases: 12 HFCs, 7 PFCs, SF₆, 4 unsaturated HFCs and hydrochlorofluorocarbons (HCFCs), 4 hydrofluoroethers) HFEs and alcohols and 2 other perfluorinated compounds.

Intended applications in 2014

Intended applications for fluorinated gases are shown in Figures ES.5 and ES.6.

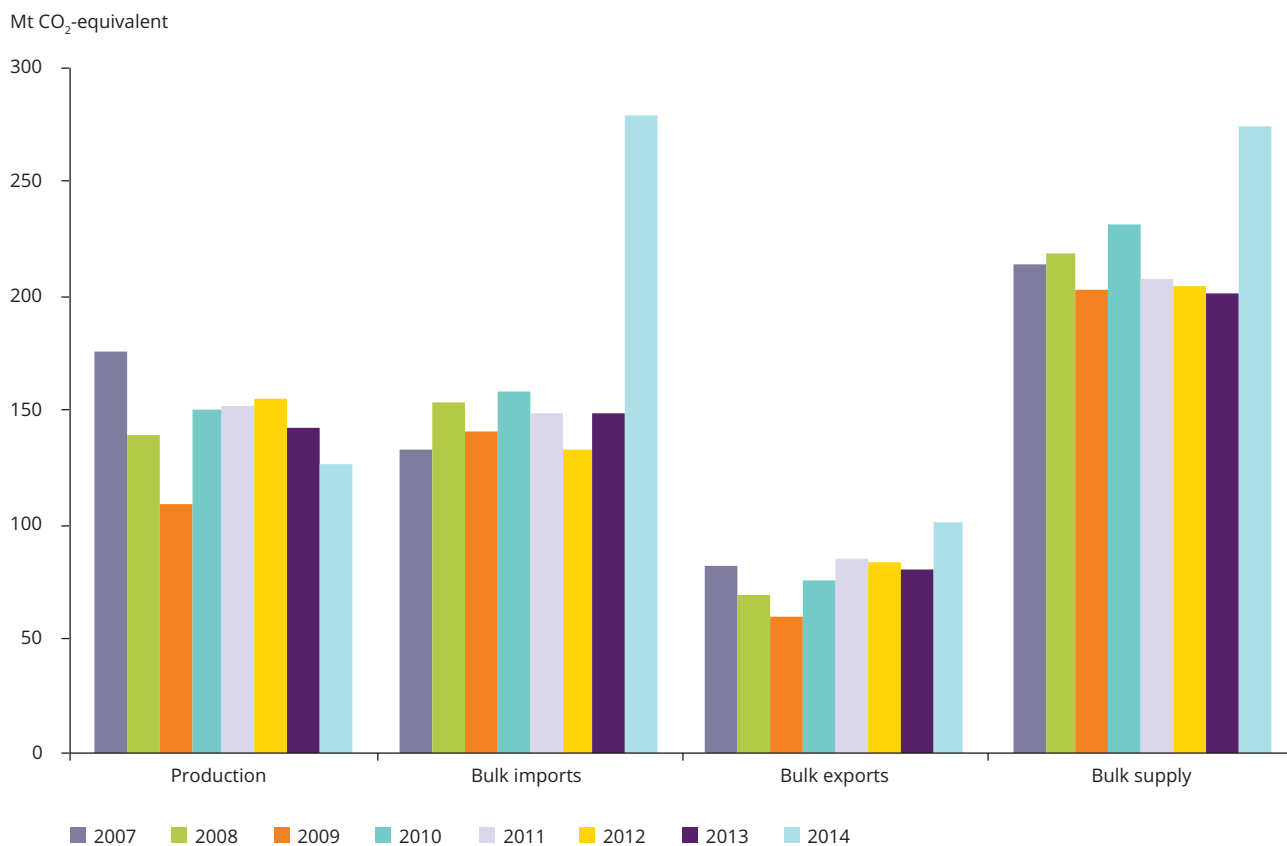
Approximately 75% (both in tonnes and CO₂-equivalent) of reportable fluorinated gases supplied to the EU market in 2014 were intended for the use as refrigerants for refrigeration, air conditioning and heating purposes. These were almost exclusively HFCs.

Of 2014 total supply, 10% (in tonnes) was intended for use in foams; 97% of this was HFCs. Measured in CO₂-equivalent, the proportion of fluorinated gases intended for use in foams was only 4%.

Aerosols (both medical and non-medical) were the intended application of 7% (tonnes) of 2014 total supply, 4% in CO₂-equivalent. The gases used for aerosols were almost entirely HFCs.

SF₆ intended for electrical equipment (switchgear) contributed 5% of supply as CO₂-equivalent, but only 0.5% when measured in tonnes.

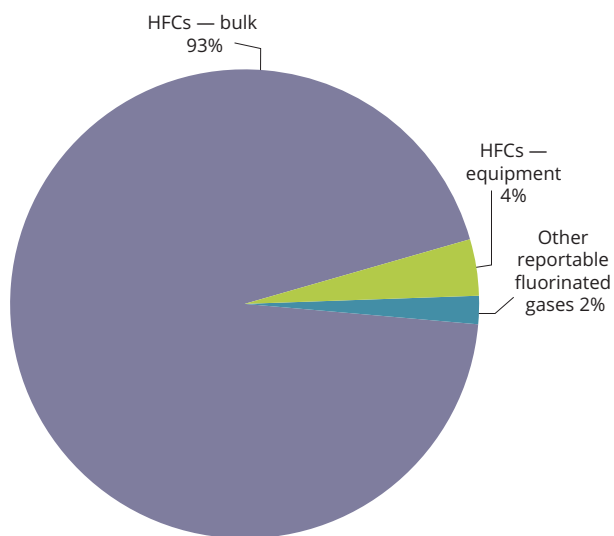
Figure ES.2 Production, imports, exports and bulk supply of reportable fluorinated gases (CO₂-equivalent)



Note: Annex II gases were not subject to reporting for the years 2007–2013.

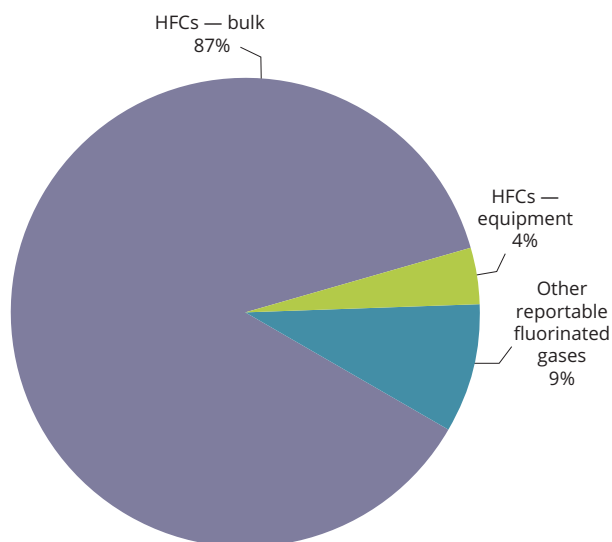
Sources: EC, 2011; EEA, 2014 and 2015a.

Figure ES.3 Total supply of reportable fluorinated gases (% tonnes)



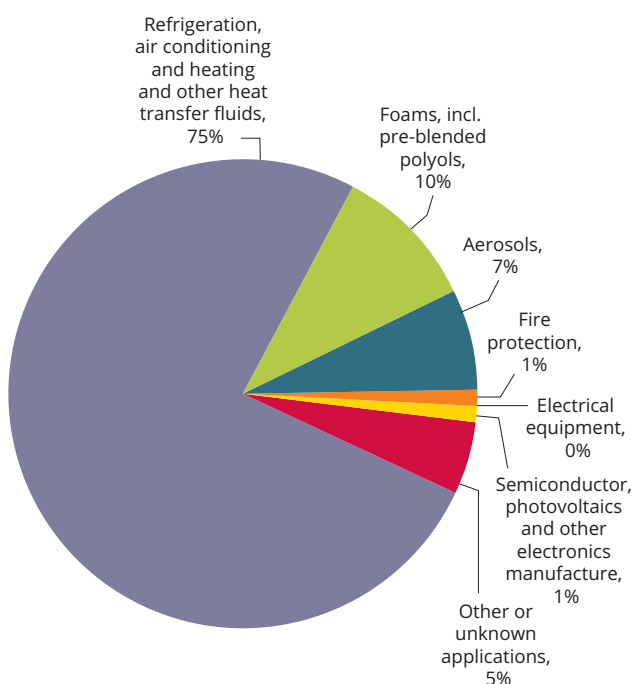
Source: EEA, 2015a.

Figure ES.4 Total supply of reportable fluorinated gases (% CO₂-equivalent)



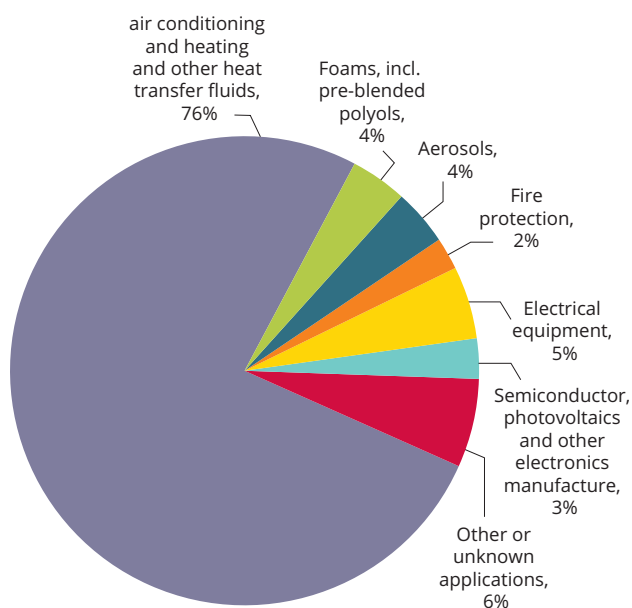
Source: EEA, 2015a.

Figure ES.5 Total supply by intended application (% tonnes)



Source: EEA, 2015a.

Figure ES.6 Total supply by intended application (% CO₂-equivalent)



Source: EEA, 2015a.

Trends in intended applications in 2014

An analysis of trends in intended applications can be carried out only in relation to bulk supply, because imports of gases in products and equipment, and thus total supply, was reported for the first time in 2015 on 2014 activities. While the trends are similar whether measured in tonnes or in CO₂-equivalent, analysis is limited by inconsistencies in classifying intended applications across companies' reports. Nevertheless, some conclusions are possible.

The increase in HFC supply from 2013 can be almost entirely attributed to the refrigeration, air conditioning and heating sector.

After several years of decline in reporting of foams as the intended application, supply for foams approximately tripled compared with 2013 levels and was close to the levels reported for 2007 and 2008, which were the highest since reporting began in 2007.

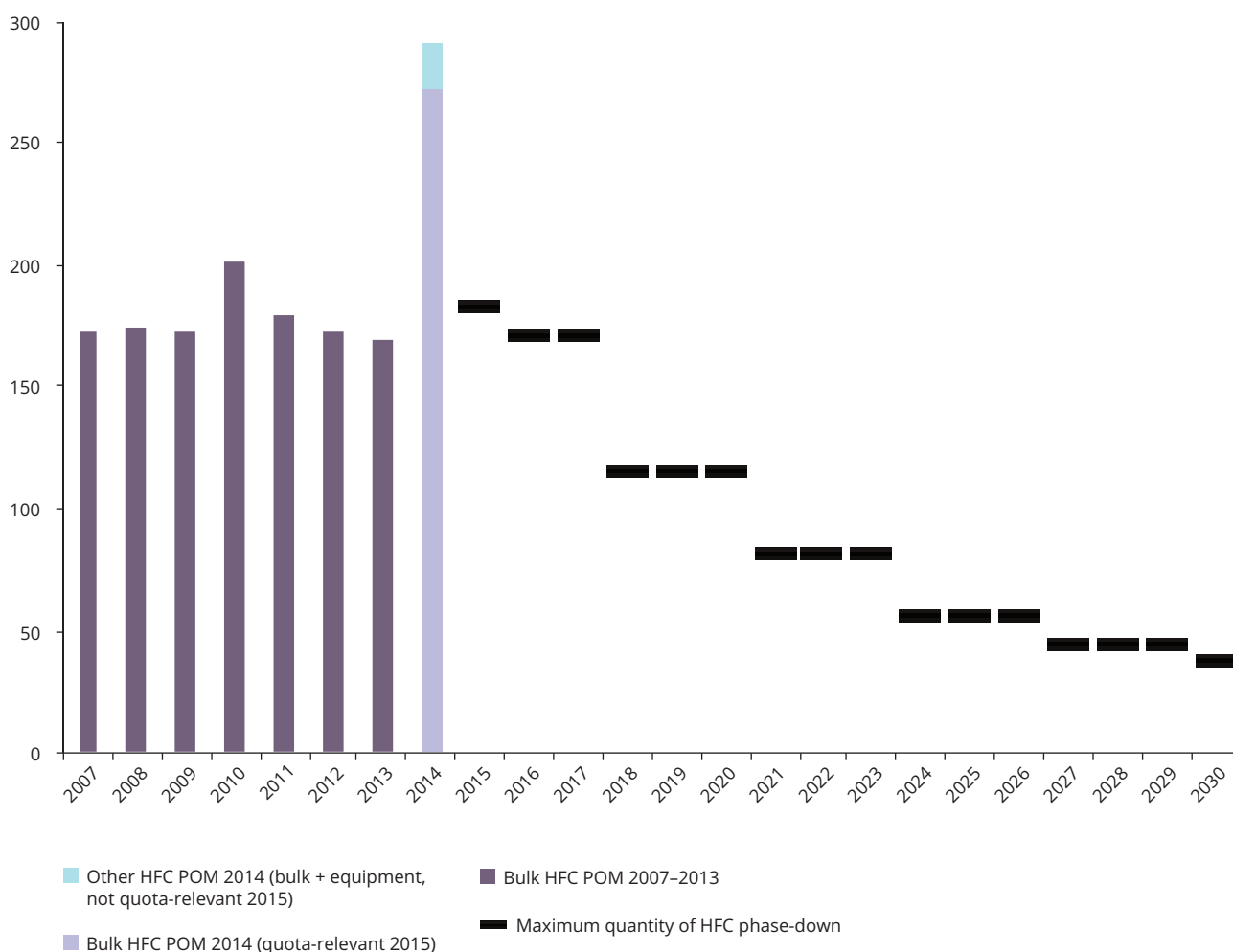
Aerosol use was approximately 10% above that reported in 2013. However, amounts intended for aerosol use do not show a consistent trend.

SF₆ use in electrical equipment decreased by 44% on 2013 and reached its lowest level since 2007.

Trends in reclamation, feedstock use and destruction of fluorinated gases, 2007–2014

Reclamation of reportable fluorinated gases has been at low levels, typically making up less than 1% of bulk supply.

Gases used as feedstock are not included in the bulk supply/total supply metrics, and the trend in feedstock use is irregular (both by mass and as CO₂-equivalent). The 2007–2014 levels of feedstock use were less than 0.5% of bulk supply measured as CO₂-equivalent, and considerably less by mass.

Figure ES.7 Outlook for the HFC phase-downPlacing on the market of HFCs (Mt CO₂-equivalent)

Sources: EC, 2011; EU, 2014a; EEA, 2014 and 2015a.

Destruction saw a steady increase in terms of tonnes, with the exception of very low numbers reported for 2013. Destroyed gases are not accounted for in the bulk supply/total supply metrics. The 2014 level of destruction reached 0.7% of bulk supply by mass and less than 3% as CO₂-equivalent.

Placing of HFCs on the market

The placing on the market (POM) of bulk HFCs decreased steadily from 2010 to 2013. In 2014, bulk HFC POM, excluding gases exempted from the phase-down, amounted to 272 Mt CO₂-equivalent, which is 61% above the amount calculated for 2013.

This marked increase is due to a 90% increase in bulk HFC imports.

The large increase in HFC POM may reflect the fact that 2014 was the last year for HFC importers to place on the market quota-free HFCs and for HFC distributors and HFC consumers to stock up on HFCs that can be marketed and consumed outside the quota restriction in 2015 and thereafter.

The HFC phase-down will commence in 2015, introducing a gradual limitation on bulk HFCs that can be placed on the market to achieve a reduction of 79% by 2030, in line with Annex V of the new F-Gas Regulation.

1 Introduction

1.1 Background

International policy framework

The greenhouse gases covered by the Kyoto Protocol include three groups of fluorinated gases (the so-called F-gases): hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). The majority of these fluorinated greenhouse gases have very long lifetimes in the atmosphere and high global warming potentials (GWPs).

As a result of the phase-out of ozone-depleting substances (ODS) under the Montreal Protocol and Regulation (EC) No 1005/2009⁽⁷⁾ on ozone depleting substances, certain fluorinated greenhouse gases are used for the replacement of ODS. The use of fluorinated greenhouse gases in many different applications has been increasing and has considerable potential for growth. Fluorinated greenhouse gases accounted for approximately 2.5% of overall greenhouse gas emissions expressed in GWP in the 28 Member States of the European Union (EU) in 2013 (EEA, 2015b), and this proportion continues to increase.

The EU has a target under the Kyoto Protocol to reduce its whole basket of greenhouse gases — including fluorinated greenhouse gases — by 20% by 2020 compared with 1990 levels. Furthermore, the EU28 and Iceland have a joint target under the Kyoto Protocol to reduce greenhouse gas emissions⁽⁸⁾ by 20% compared with 1990 during the Protocol's second commitment period, 2013–2020.

EU fluorinated gases legal framework

Old F-Gas Regulation

The old F-Gas Regulation employed two tracks of action from 2007:

- Improving the leak-tightness of equipment containing fluorinated greenhouse gases. Measures comprised labelling of equipment containing fluorinated greenhouse gases, training and certification of personnel and companies handling these gases, containment of fluorinated greenhouse gases within equipment, and proper recovery of fluorinated greenhouse gases from equipment that is no longer used.
- Avoiding the use of fluorinated greenhouse gases in some applications in which more environmentally superior alternatives are already cost-effective. Measures included restrictions on the use and marketing of fluorinated greenhouse gases in these cases.

New F-Gas Regulation

Following a review of the old F-Gas Regulation, a revision was adopted by the European Parliament and the European Council, Regulation (EU) No 517/2014⁽⁹⁾, the 'new F-Gas Regulation', which aims to reduce EU fluorinated greenhouse gas emissions by two thirds of the 2010 level by 2030. The new regulation maintains many of the previous measures, in particular related to leak prevention, recovery, certification of technicians and selected restrictions on the use and marketing of fluorinated greenhouse gases.

Large reductions in fluorinated greenhouse gas use and emissions are expected to result from a new phase-down measure, which will progressively cap sales of HFCs allowed on the EU market, bringing maximum sales down to of 21% of today's levels by 2030. Reductions are also expected to result from bans on the use of fluorinated greenhouse gases that have high GWPs.

This report summarises the data reported by companies in accordance with Article 19 of the new

⁽⁷⁾ Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer.

⁽⁸⁾ The joint EU-28 and Iceland target for the second commitment period of the Kyoto Protocol also covers emissions of nitrogen trifluoride (NF₃), another fluorinated gas covered by this report.

⁽⁹⁾ Regulation (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing Regulation (EC) No 842/2006.

F-Gas Regulation 517/2014. The new regulation continues the requirement for companies to report on produced, imported and exported quantities of fluorinated greenhouse gases, including mixtures. Additional reporting obligations were established under Article 19 for companies that:

- use fluorinated greenhouse gases as a feedstock for a chemical reaction process;
- destroy fluorinated greenhouse gases; or
- import products or equipment containing fluorinated greenhouse gases.

Furthermore, under the new regulation the list of reportable gases was extended beyond HFCs, PFCs and SF₆ (as listed in Annex I of the new F-Gas Regulation 517/2014) to include:

- unsaturated hydro(chloro)fluorocarbons (Section 1 of Annex II of the new F-Gas Regulation 517/2014);
- fluorinated ethers and alcohols (Section 2 of Annex II);
- other perfluorinated compounds (Section 3 of Annex II).

The Commission Implementing Regulation (EU) No 1191/2014⁽¹⁰⁾ establishes the format in which the reports are to be submitted.

Planned future policy changes

In November 2015, an international in-principle agreement (the Dubai Pathway) on using the Montreal Protocol to reduce the production and use of climate-change-inducing HFCs was reached. This development reflects the strong policy mechanisms adopted by the EU under the new F-Gas Regulation implementing an EU-wide HFC phase-down.

1.2 Report structure

This introduction has given a brief summary of the policy framework and goes on to outline the institutional arrangements, reporting procedure and methodological parameters.

Chapter 2 presents aggregated data on fluorinated greenhouse gas production, import, export,

reclamation, feedstock use and destruction. In Chapter 3, reported data are analysed to calculate the supply to the EU market and its intended applications. Chapter 4 addresses the assessment metric 'placing on the market' (POM) in relation to compliance with the HFC phase-down.

The calculation methodologies used in this report are described in detail in Annex 5.

1.3 Institutional arrangements

In 2015, companies reported on their fluorinated gas activities for reporting year 2014, the first reporting year under the new F-Gas Regulation. Since 2012, the European Environment Agency (EEA) has been responsible for collecting, archiving, checking and documenting the information provided in the companies' reports. The EEA is also responsible for assisting the reporters in fulfilling their obligations. To that end, the EEA's European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM)⁽¹¹⁾ provides technical support. Until 2011, collection, quality control, analysis and support were carried out or provided by consultants under service contracts with the European Commission.

1.4 Reporting procedure

Reporting format and quality control

The format for reporting on transactions involving reportable gases, in accordance with Article 19 of the new F-Gas Regulation, is laid down in Commission Implementing Regulation (EU) No 1191/2014.

Company registration for reporting and the reporting process are two separate procedures. In 2015, registration for reporting was centralised in the European Commission's F-gas portal at <https://webgate.ec.europa.eu/ods2/>. This provides 'one-stop-shop' access both to the HFC Registry (for quota purposes) and for reporting under Article 19.

From their account in the F-gas portal, companies have a direct link to the Business Data Repository (BDR) at <https://bdr.eionet.europa.eu>. This reporting platform ensures that the reporting process maintains traceability and transparency for all stakeholders. The system includes automated quality checks and facilitates data processing after companies have

⁽¹⁰⁾ Commission Implementing Regulation (EU) No 1191/2014 of 30 October 2014 determining the format and means for submitting the report referred to in Article 19 of Regulation (EU) No 517/2014 of the European Parliament and of the Council on fluorinated greenhouse gases.

⁽¹¹⁾ <http://acm.eionet.europa.eu>.

submitted their reports. The completeness and consistency of the reported data are further assured by manual data quality checks, followed by bilateral communication with the reporting companies where necessary.

Reporting companies in 2015

For the 2014 reporting year, 468 companies submitted a data report. Five of these were rejected because of severe quality problems, and their data were thus not included in the aggregation report.

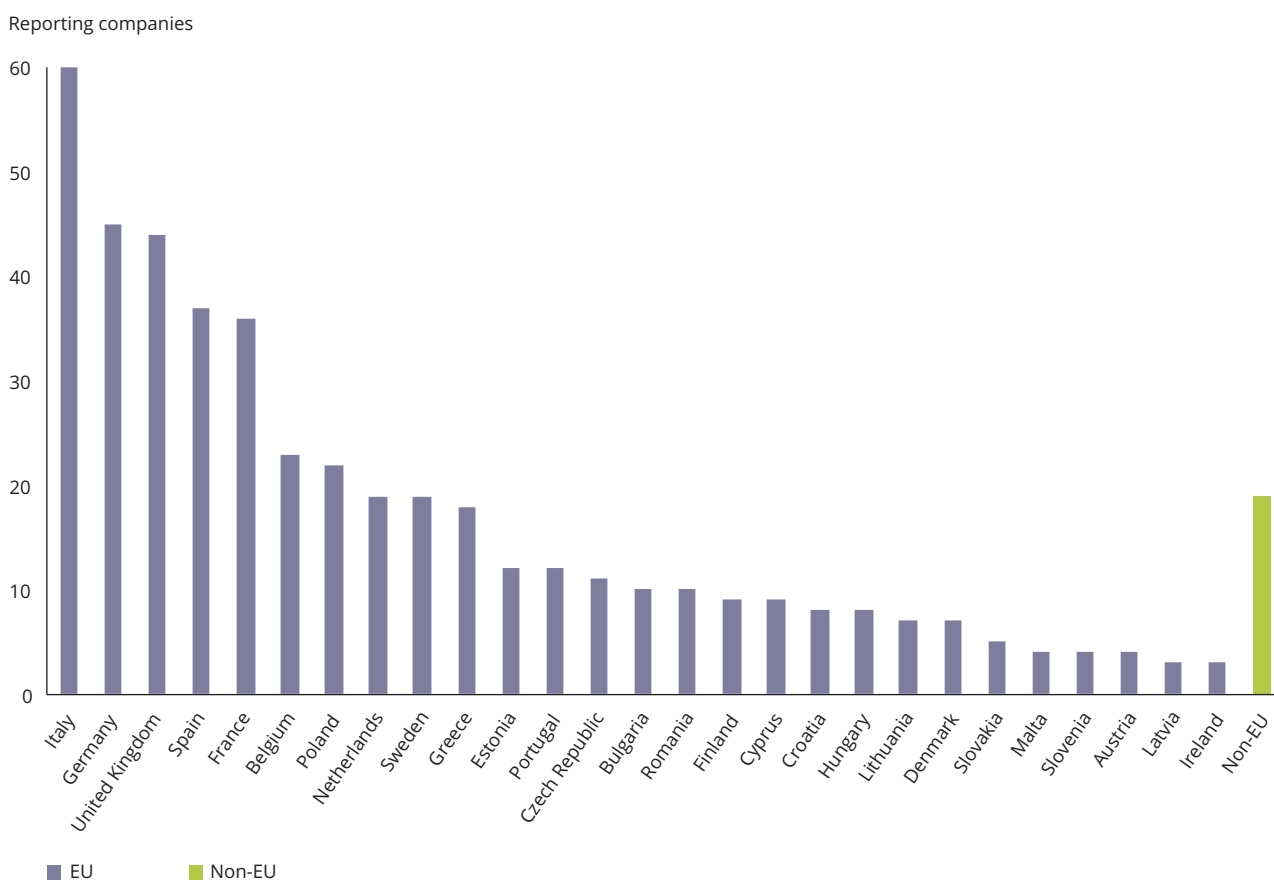
The number of reporters increased significantly with the new reporting obligations, but the distribution across Member States remains largely the same, as shown in Figure 1.1. Just under half of all reporting companies (222) are located in five large Member States (France, Germany, Italy, Spain and the United Kingdom). Austrian and Finnish companies reported

for the first time this year. Luxembourg remains the only Member State without a reporting company. This was the first year for which non-EU companies were obliged to report their activities within the EU. Nineteen reporting companies are located outside the EU.

Table A3.1 in Annex 3 shows the distribution of reporting companies by Member State and activity (i.e. producers, importers, exporters, feedstock users, destruction companies and equipment importers). Note that the sum of the different activities exceeds the number of reporters in some cases, as a single company may report for more than one activity.

Non-EU companies took part in reporting for the first time. Non-EU companies are represented by an 'only representative' inside the Union. Table A3.1 does not count these representatives as reporting companies for their respective Member States. Instead, a breakdown of non-EU companies and their representation can be found in Tables A3.2 and A3.3.

Figure 1.1 Reporting companies by Member State for the 2014 reporting year



Note: Non-EU countries: China, the former Yugoslav Republic of Macedonia, Japan, Switzerland, Turkey, United States of America.

Source: EEA, 2015a.

The number of reporting companies for 2014 tripled compared with 2013 because the new reporting obligations were in place for the first time. Most of the new reporters are importing companies, largely importers of equipment or bulk importers of gases. Table A3.4 in Annex 3 shows the numbers of reporters for the reporting years 2007–2014.

1.5 Terminology

Reportable gases

Fluorinated gases covered by this report can be grouped into:

- 'fluorinated greenhouse gases' (F-gases, Annex I gases under the new F-Gas Regulation 517/2014), as listed in Annex 1 of this report;
- 'other fluorinated gases' (Annex II gases under the new F-Gas Regulation), as listed in Annex 2 of this report.

Jointly, those gases are referred to in this report as 'reportable gases' under the new F-Gas Regulation. The list of reportable gases under the old F-Gas Regulation was restricted to HFCs, PFCs and SF₆. Annex 1 provides a detailed overview, including information on which Annex I gases were covered by the old F-Gas Regulation 842/2006.

F-gases (Annex I gases)

F-gases (fluorinated greenhouse gases under Annex I of the new F-gas Regulation 517/2014) include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). The majority of these gases have very long lifetimes in the atmosphere and high global warming potentials (GWPs).

HFCs

Hydrofluorocarbons (HFCs) are organic compounds that contain fluorine, carbon and hydrogen. They are most commonly used as used as refrigerants. Nineteen HFCs and their GWPs are listed in Annex 1. All HFCs in Annex 1 except HFC152 and HFC161 were previously covered by the old F-Gas Regulation 842/2006.

PFCs

Perfluorocarbons (PFCs) are organic compounds that contain fluorine and carbon. 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.

SF₆

Sulphur hexafluoride (SF₆) is an inorganic compound; as 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.

Other fluorinated gases (Annex II gases)

'Other fluorinated gases' are listed in Annex II of Regulation 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 (Section 3 of Annex II).

All these gases and their GWPs are listed in Annex 2 of this report. The Annex II gases were not covered by the reporting obligations under the old F-Gas Regulation 842/2006.

Global warming potentials

GWPs are used to make different gases comparable in terms of their potential impact on climate change. The multiplication of a quantity of a given gas expressed in tonnes by its specific GWP results in that quantity expressed in tonnes of CO₂ equivalent.

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 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 used TAR GWPs.

Quantities of fluorinated gases are reported in metric tonnes. Conversion of the figures into CO₂-equivalent based on gas-specific GWPs facilitates a focus on the potential greenhouse gas emissions if the gases were released into the atmosphere. Both metrics are used in this report when analysing the data; however, for POM

and consumption, only CO₂-equivalent amounts are relevant. The GWPs of gases in this report are listed in Annexes 1 and 2.

Mixtures

Mixtures of fluorinated gases are often used in industrial applications. Under Article 19 of the new F-Gas Regulation 517/2014, companies report on their transactions (import, export, etc.) involving such mixtures and specify the mixtures' compositions. Unless otherwise indicated, in this report mixtures were recalculated into the respective shares of their constituent reportable gases as listed in Annexes 1 and 2.

1.6 Confidentiality

The new F-Gas Regulation maintains the confidentiality provisions of the old F-Gas Regulation 842/2006, and the EEA continues to take appropriate measures to protect confidentiality and prevent the publication of commercially sensitive information. These measures

include public reporting of fluorinated gas data at higher levels of aggregation only, to protect data that are the result of reports from less than three corporate groups, and additional steps to prevent deduction of sensitive information. It is for confidentiality reasons that some of the statements about fluorinated gas activity in this report are of a general nature and do not refer to figures or percentages. A detailed account of the confidentiality measures applied throughout the report is included in Annex 4.

1.7 Data covered in this report

The 2014 data in this report are based on submissions for the reporting year ⁽¹²⁾ 2014, the first reporting year under the new F-Gas Regulation. They include all acceptable submissions received by 31 July 2015.

Data for the years 2007–2013 are from information reported by companies under the old F-Gas Regulation 842/2006, as presented in the 2014 EEA report on fluorinated greenhouse gases (EEA, 2014).

⁽¹²⁾ 'Reporting year' means the calendar year on which companies report. For example, in 2015 companies reported on their activities in the reporting year 2014.

2 Production, import, export, reclamation and destruction

2.1 Production of fluorinated gases

Production of fluorinated gases in Europe has seen an ongoing decline (Figure 2.1). For 2014, EU companies reported on the production of 11 gases: 6 HFCs, 4 PFCs and SF₆. The total production of fluorinated gases declined from 40 kt to 34 kt, or by 15% compared with 2013. In terms of CO₂-equivalent, production declined by 15.8 Mt CO₂-equivalent, or 11%. The decrease in production was largely the result of a decrease in HFC production, in particular production of HFC-134a and HFC-125 (production of HFC-125 ceased in 2013). HFC production in the EU in 2014 was at its lowest level since reporting began in 2007.

Reporting on the production of Annex II gases (see Annex 2) was not required under the previous regulation. Although reporting on the production of Annex II gases is required under the new Regulation, no production of Annex II gases was reported for 2014 (Tables A3.5 and A3.6 in Annex 3).

SF₆ accounted for a considerable proportion of 2014 production when reported as CO₂-equivalent. The remainder consisted mostly of HFCs, of which HFC-134a was the main gas. HFC-365mfc, HFC-143a, and HFC-32 were also produced in significant amounts, while the proportion of the overall figure made up by PFCs was relatively small.

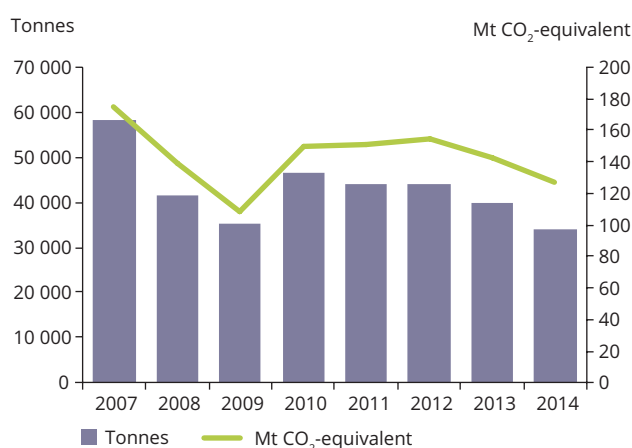
2.2 Imports of fluorinated gases

Bulk imports of fluorinated gases

Imports in 2014 were at about twice the level seen in any other year in the entire 2007–2013 period (Figure 2.2). For 2014, bulk imports were reported for 12 HFCs, 5 PFCs and SF₆, as well as for 4 unsaturated HFCs and hydrochlorofluorocarbons (HCFCs), 5 hydrofluoroethers (HFEs) and alcohols, and 1 other perfluorinated compound (NF₃). Total bulk imports of reportable gases grew by 91% in 2014 to 126 kt (Tables A3.7 and A3.8 in Annex 3).

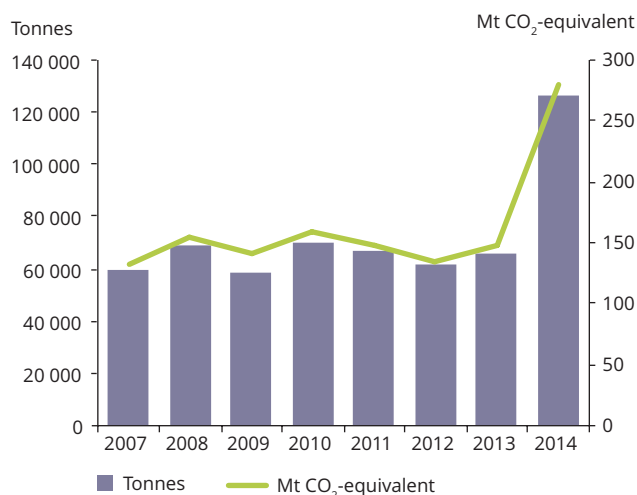
HFCs, which accounted for about 95% of the increase, were about 90% above 2013 levels. About 5% (both

Figure 2.1 Production of fluorinated gases



Sources: EC, 2011; EEA, 2014 and 2015a.

Figure 2.2 Bulk imports of fluorinated gases



Note: Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols, and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013.

Sources: EC, 2011; EEA, 2014 and 2015a.

by mass and as CO₂-equivalent) of the increase can be attributed to SF₆, PFCs and the newly reportable Annex II gases.

The large increase in HFC imports may be a reflection of a number of special circumstances.

- 2014 was the last year before the HFC phase-down entered into force. Therefore, companies clearly had an incentive to import HFCs and stockpile them for use or later EU sales in 2015 and beyond. Quota restrictions were not yet applicable because these imports would be considered to have been placed on the market in 2014.
- Moreover, because new entrants to the market will receive only small quotas, 2014 presented an excellent opportunity for companies who had not previously reported to maximise their EU imports of HFCs before the quota system entered into force.
- Furthermore, a number of companies that had not previously reported may have been alerted through the HFC phase-down and quota system to both the existing and the new reporting obligations.

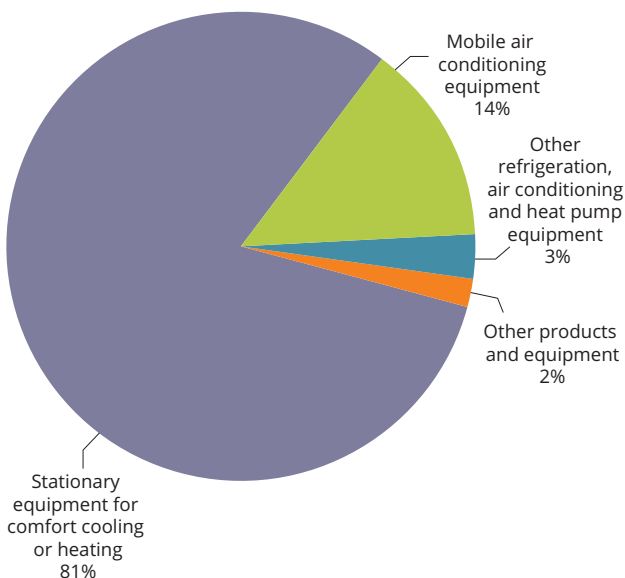
Imports of fluorinated gases within products and equipment in 2014

Imports of fluorinated gases contained in products or equipment were reported the first time for 2014. Under the new F-Gas Regulation, importers of products or equipment containing reportable fluorinated gases are required to report on quantities imported and placed on the market. Products and equipment imported but not placed on the market (e.g. for re-export) are not to be reported.

Imports in products or equipment amounted to 5.8 kt of reportable fluorinated gases or 11.8 Mt CO₂-equivalent in 2014 (Table 2.1). This amounted to 5% (tonnes) or 4% (CO₂-equivalent) of EU bulk supply. The reported quantities of reportable gases can be attributed almost entirely to three refrigerants: R-410A accounts for 80% of equipment charges (by mass), R134a for 16% and HFC1234yf for 2%.

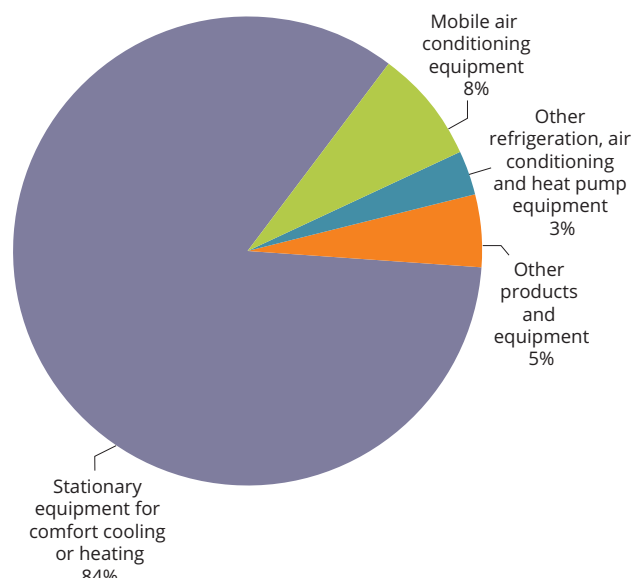
The most important import category was stationary equipment for comfort cooling or heating (Figures 2.3 and 2.4). Stationary equipment consisted mainly of split units (61% of refrigerant charge) and multi-split units (30%), both using R410A.

Figure 2.3 Imports in products and equipment, 2014 (% tonnes)



Source: EEA, 2015a.

Figure 2.4 Imports in products and equipment, 2014 (% CO₂-equivalent)



Source: EEA, 2015a.

Table 2.1 Import in products and equipment

2014	Stationary equipment for comfort cooling or heating	Mobile air conditioning equipment	Other refrigeration, air conditioning and heat pump equipment	Other products and equipment	Total
Tonnes	4 754	798	208	104	5 864
Mt CO ₂ -equivalent	9.9	1.0	0.4	0.6	11.8

Source: EEA, 2015a.

Total imports of fluorinated gases

The total imports of reportable fluorinated gases in 2014 amounted to 132 kt of gases or 291 Mt CO₂-equivalent (Table 2.2). The proportion of imports in products and equipment was only 4%, both in tonnes and CO₂-equivalent.

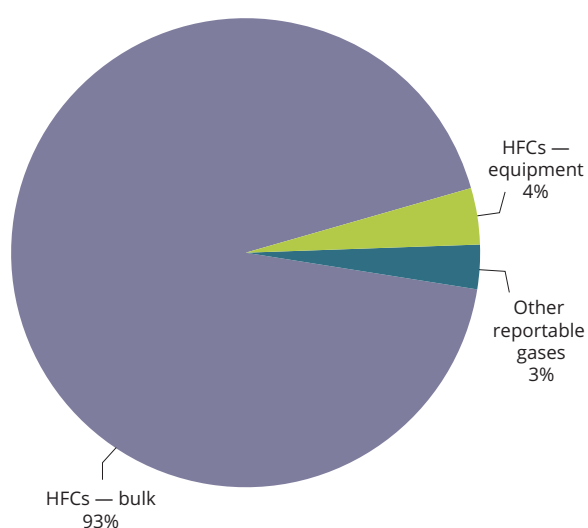
Imports were dominated by HFCs, which account for 97% (in tonnes) or 94% (in CO₂-equivalent). Figures 2.5 and 2.6 show the proportions of gas groups in 2014 total imports.

Table 2.2 Import of reportable fluorinated gases by gas group

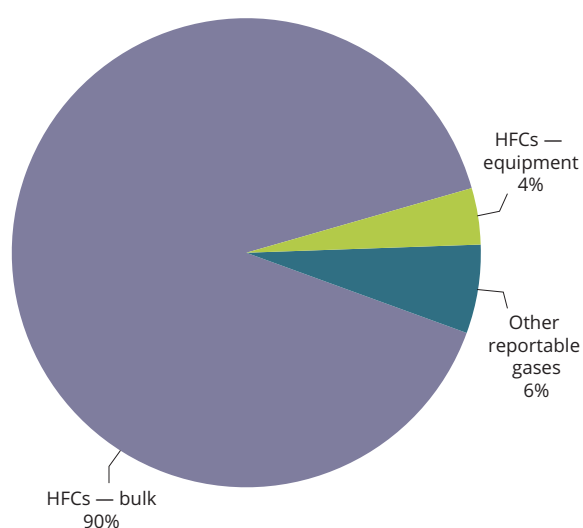
2014 Gas	Tonnes			Million tonnes of CO ₂ equivalents		
	Bulk	Products/equipment	Total imports	Bulk	Products/equipment	Total imports
HFCs	122 781	5 727	128 508	260.9	11.3	272.2
PFCs	C	C	350	C	C	3.4
SF ₆	C	C	430	C	C	9.8
Unsaturated HFCs and HCFCs	C	C	C	C	C	C
HFEs and alcohols	C	-	C	C	-	C
Other perfluorinated compounds	C	-	333	C	-	5.7
Total fluorinated gases	125 986	5 864	131 850	279.4	11.8	291.2

Notes: C, confidential; -, no data reported.

Source: EEA, 2015a.

Figure 2.5 Total imports in 2014 by gas group (% by mass)


Source: EEA, 2015a.

Figure 2.6 Total imports in 2014 by gas group (% CO₂-equivalent)


Source: EEA, 2015a.

2.3 Exports of fluorinated gases

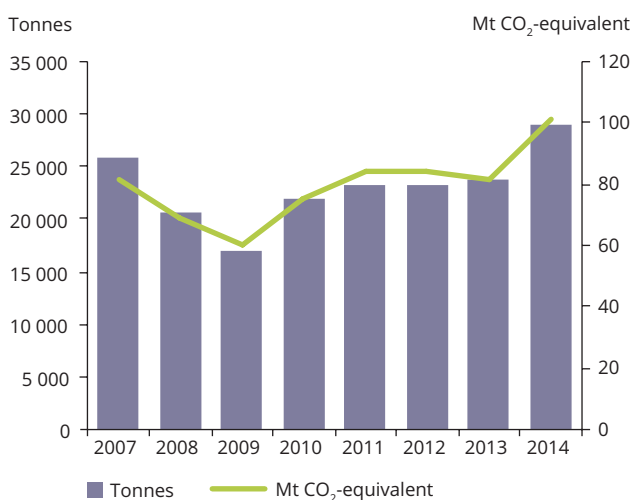
Exports of reportable fluorinated gases increased for the fifth consecutive year. Total bulk exports of reportable fluorinated gases in 2014 increased by 22% to 29 kt, or 24% in terms of CO₂-equivalent (Figure 2.7).

Both HFC and SF₆ exports increased sharply. HFC exports increased by approximately 20% and SF₆ exports by 35% compared with 2013 (Figure 2.8).

In 2014, SF₆ accounted for 57% of exports when reported as CO₂-equivalent (Figure 2.9), reaching the highest level since reporting began in 2007. The remainder of the exported gas consisted mostly of HFCs. In 2014, bulk HFC exports were back at the high levels reported in 2007.

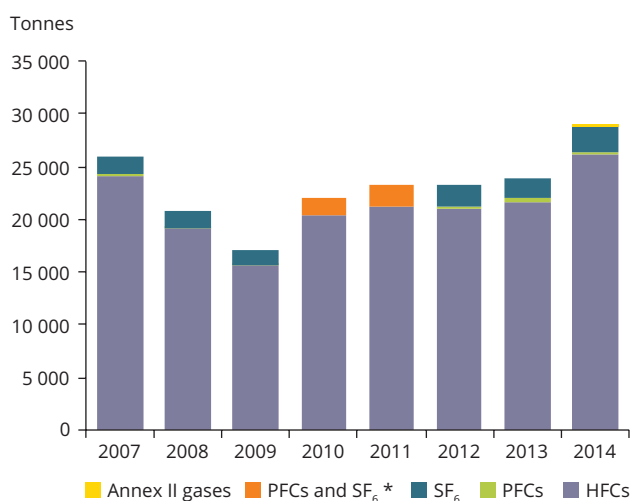
In 2014, bulk exports were reported for 12 HFCs, 6 PFCs and SF₆, as well as for 3 unsaturated HFCs and HCFCs, 2 HFEs and alcohols and 2 other perfluorinated compounds. Confidentiality restrictions mean that only annual total exports can be shown; however, in 2014 HFC exports increased by approximately 20% and SF₆ exports by 35%. In 2014, SF₆ accounted for a larger proportion than all the other exports when reported as CO₂-equivalent but for less than 10% by mass. Bulk SF₆ exports in 2014 reached the highest level since reporting began in 2007. The remainder of the exported gas mostly consisted of HFCs (Tables A3.9 and A3.10 in Annex 3).

Figure 2.7 Bulk exports of reportable fluorinated gases



Source: EEA, 2015a.

Figure 2.8 Bulk exports 2007–2014 by gas group (tonnes)

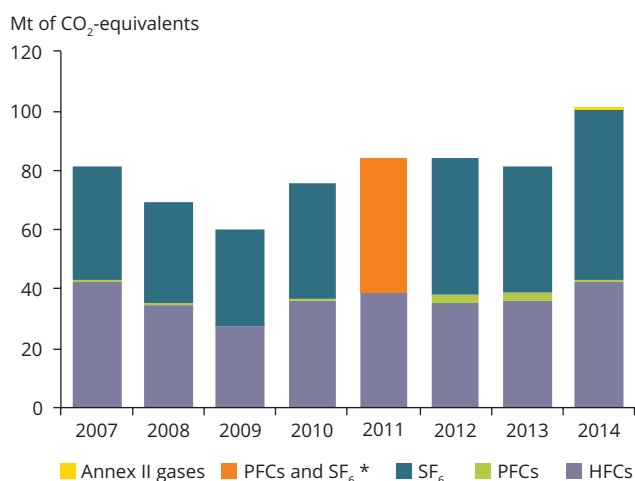


Note: Annex II gases were not subject to reporting for the years 2007–2013.

* For 2010 and 2011, PFCs and SF₆ are displayed jointly for reasons of confidentiality in relation to PFC exports in those years.

Source: EEA, 2015a.

Figure 2.9 Bulk exports 2007–2014 by gas group (CO₂-equivalent)



Note: Annex II gases were not subject to reporting for the years 2007–2013.

* For 2011, PFCs and SF₆ are displayed jointly for reasons of confidentiality in relation to PFC exports.

Source: EEA, 2015a.

2.4 Reclamation, feedstock use and destruction of fluorinated gases

Reclamation was reported for eight HFCs, PFC-14 and SF₆. For the period 2007–2014, reclamation of reportable fluorinated gases have been reported at low levels that generally make up less than 1% of bulk supply. Reported SF₆ reclamation is well below the levels reported for the period 2007–2009 (Table 2.3).

Feedstock use was reported mainly for HFC-23 but also in smaller amounts for HFC134a, HFC-245fa and HCFC-1233zd. Gases used as feedstock are not included in the bulk supply/total supply metrics. If compared

with bulk supply the amounts used as feedstock for the period 2007–2014 represent less than 0.5% as CO₂-equivalent, and considerably less by mass. The reported feedstock amounts are confidential and not included in Table 2.3.

Destruction of reportable gases saw an eight-fold increase in 2014 due in part to very low volumes reported for 2013 (Table 2.3). With 2013 being an exception, the trend in destruction reported for 2007–2014 shows a steady increase in terms of tonnes. Although destroyed gases are not counted in the bulk supply or total supply metrics, the mass of destroyed gases in 2014 reached a level of 0.7% of bulk supply.

Table 2.3 Reclamation and destruction of reportable fluorinated gases

		2007	2008	2009	2010	2011	2012	2013	2014
Reclamation	Tonnes	417	398	177	326	508	487	484	416
	Mt CO ₂ -equivalent	2.1	1.9	1.9	1.3	1.8	1.6	1.2	1.8
Destruction	Tonnes	56	49	96	179	221	487	101	887
	Mt CO ₂ -equivalent	0.1	0.1	0.4	1.7	2.1	1.8	1.1	C

Note: C, confidential.

Sources: EC, 2011; EEA, 2014 and 2015a.

3 Supply of fluorinated gases

'EU total supply' is a parameter that provides information on the actual use of reportable gases by EU industries. It is focused on potentially emission-relevant supplies of gases to EU industries and thus does not cover EU supplies intended for feedstock use or destruction. 'EU total supply' (Section 3.3) is the sum of 'EU bulk supply' (Section 3.1) and 'EU supply in products and equipment' (Section 3.2).

3.1 Bulk supply

Bulk supply is the sum of the reported amounts for production, bulk imports, reclamation and stocks from own production or imports held on 1 January of the reporting year, minus amounts of bulk exports, amounts used as feedstock, amounts imported for destruction, amounts from own production sent for destruction before sales and stocks from own production or imports held on 31 December of the reporting year.

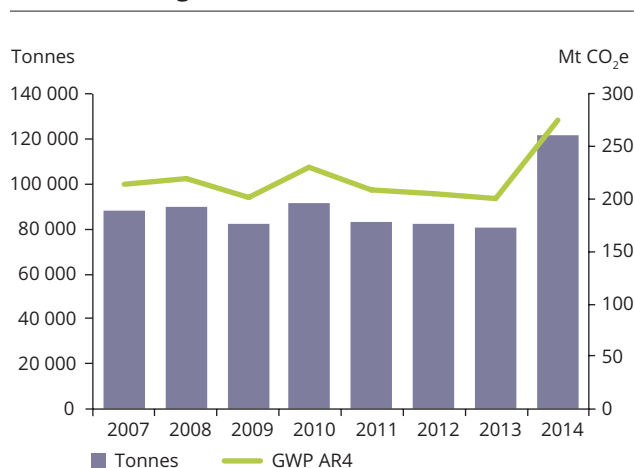
The bulk supply of fluorinated gases to the EU increased by about 50% in 2014 compared with 2013 (in tonnes), or by 37% as CO₂-equivalent. Figure 3.1 shows that the 2014 increase is in contrast to decreases for the years 2011–2013.

Note: Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013.

The 2014 increase reflects higher bulk HFC imports (see Section 2.2) in the last year before the HFC phase-down and quota obligations come into force. The impending quota limitations may have been an incentive to import HFCs and stockpile them for use or onward sale in 2015. The increase in bulk supply was largely in HFCs, by both mass and as CO₂-equivalent (Figures 3.2 and 3.3). As also shown in Tables A3.11 and A3.12 in Annex 3, HFCs dominated the overall bulk supply in 2014, making up 97% (by mass) or 90% (as CO₂-equivalent).

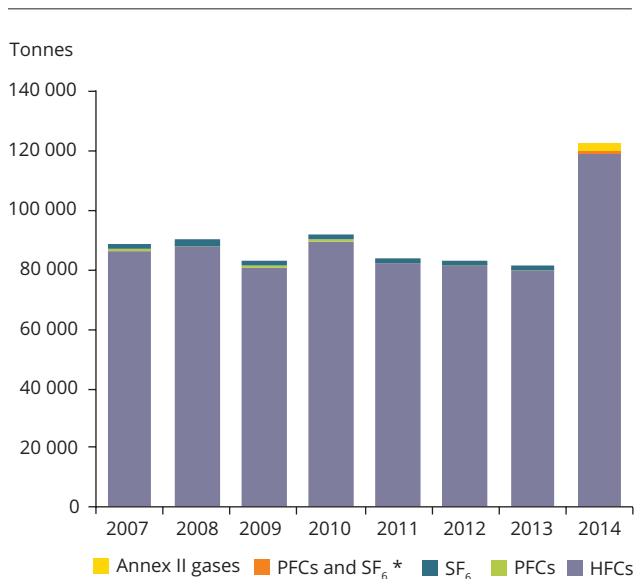
HFCs made up by far the greatest proportion of reportable gases supplied, constituting 98% of 2014 bulk supply by mass and 90% of 2014 bulk supply by CO₂-equivalent. As shown in Tables A3.11 and A3.12 in

Figure 3.1 Bulk supply of reportable fluorinated gases



Sources: EC, 2011; EEA, 2014 and 2015a.

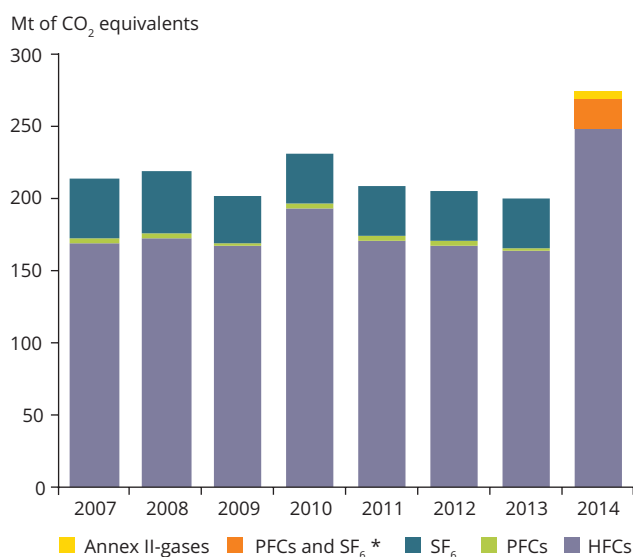
Figure 3.2 Bulk supply by gas group (tonnes)



Note: Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013.

* For 2014, PFCs and SF₆ are displayed jointly for reasons of confidentiality in relation to PFC exports.

Sources: EC, 2011; EEA, 2014 and 2015a.

Figure 3.3 Bulk supply by gas group (Mt CO₂-equivalent)

Note: Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013.

* For 2014, PFCs and SF₆ are displayed jointly for reasons of confidentiality in relation to PFC exports.

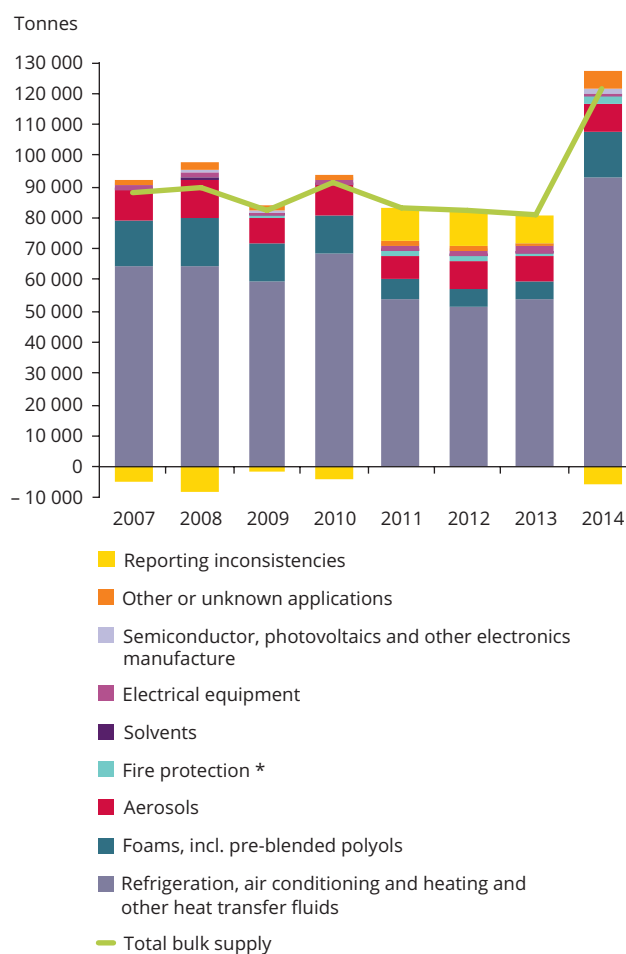
Sources: EC, 2011; EEA, 2014 and 2015a.

Annex 3, among the HFCs, the most significant gases in terms of bulk supply are HFC-134a, HFC125, HFC143a and HFC-32, which form, respectively, 50%, 19%, 11% and 7% of the total (by mass). These gases are the constituents of the most commonly used refrigerants. In addition to refrigeration, HFC-134a is also used for aerosols and (less frequently) as a foam blowing agent. When reported as CO₂-equivalent, the proportions of total bulk supply made up of HFC-134a, HFC-125, HFC143a and HFC-32 are, respectively, 34%, 33%, 24% and 2%.

The typical uses of gases reported as bulk supply are reflected in the reported intended applications. Figures 3.4 and 3.5 show EU bulk supply in 2007–2014 by intended application, as reported by companies. Some categories have been merged for reasons of confidentiality, or to ensure that the graphics are clear; the same level of detail is shown in Tables A3.13 and A3.14 in Annex 3.

Reporting inconsistencies shown in Figures 3.4 and 3.5 result from differences between exporters' reports and producers' and importers' reports.

Refrigeration, air conditioning and heating is by far the most common application of bulk supplies to the EU. Almost the entire increase in bulk supply between 2013 and 2014 can be attributed to refrigerant uses,

Figure 3.4 Bulk supply 2007–2014 by intended application (tonnes)

Notes: Reporting inconsistencies may occur because the scope of companies' reporting on intended applications does not exactly match the scope of bulk supply. Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013.

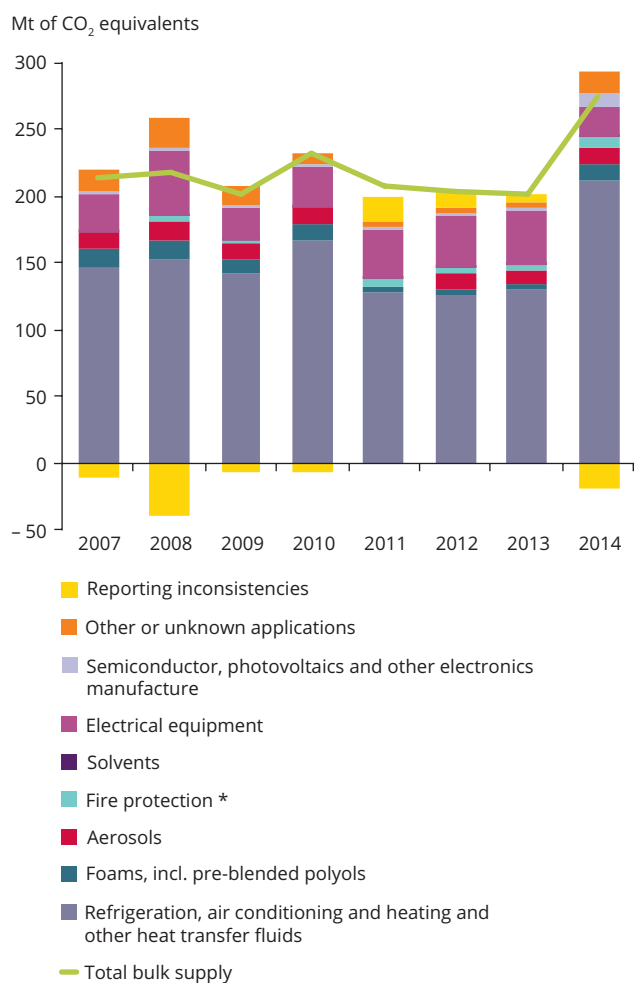
* 'Other or unknown applications' includes fire protection for 2007 and 2010.

Sources: EC, 2011; EEA, 2014 and 2015a.

with bulk supply rising by 73% (in tonnes) or 62% (in CO₂-equivalent) compared with 2013. It is likely that the increase in bulk supply was not actually consumed in 2014 but rather stockpiled.

After several years of decline of HFC use for foam, the amounts reported for 2014 were back to the high levels reported in 2007, which may also be a result of stockpiling. The decrease in supply for electrical equipment is consistent with a decline in bulk SF₆ supply. The increase in supply for semiconductor and photovoltaics manufacture is not solely attributable to increased use of SF₆, but will also reflect the fact that NF₃ was included among the reportable gases for the first time for 2014.

Figure 3.5 Bulk supply 2007–2014 by intended application (CO₂-equivalent)



Notes: Reporting inconsistencies may occur because the scope of companies' reporting on intended applications does not exactly match the scope of bulk supply. Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013.

* 'Other or unknown applications' includes fire protection for 2007 and 2010, and aerosols for 2011.

Sources: EC, 2011; EEA, 2014 and 2015a.

3.2 Supply in products and equipment

Data on the 'supply in products and equipment' is presented in Section 2.2, under the heading 'Imports of fluorinated gases within products and equipment in 2014'.

3.3 Total supply

The total EU supply of reportable fluorinated gases was calculated for the first time for the 2014 reporting year. No trends can be identified owing to the lack of

data on imported products and equipment containing reportable gases.

The EU total supply calculated for 2014 is 128 kt of reportable fluorinated gases, corresponding to 286 Mt CO₂-equivalent (Tables 3.1 and 3.2). By mass, 95% (96% as CO₂-equivalent) of 2014 EU total supply was supplied in bulk; the balance of 5% (by mass) or 4% (as CO₂-equivalent) was within products and equipment.

Figures 3.6 and 3.7 show the proportions of gas groups in tonnes and as CO₂-equivalent, respectively. HFCs accounted for 98% of total supply by mass or 91% as CO₂-equivalent. When measured in tonnes, SF₆ and unsaturated HFCs/HCFCs contributed only very small amounts to the 2014 total supply. PFCs and other perfluorinated compounds also constituted only a small fraction of supply.

Analysis of data reported for intended applications is limited by reporting inconsistencies (reporting inconsistencies are also discussed in relation to bulk supply in Section 3.1, and they are shown in Figure 3.4). To assess the intended applications of the EU total supply, the amounts identified as reporting inconsistencies were proportionally distributed to the reporting categories for intended applications on a gas-by-gas basis. Three quarters of the total supply of reportable gases are intended for use in refrigeration and air conditioning. Table 3.3, Figure 3.8 and Figure 3.9 show the proportions of the total EU supply of reportable fluorinated gases in 2014 by intended application.

Refrigeration, air conditioning and heating is the largest application category, with 75% of the total supply of reportable fluorinated gases in 2014 intended for refrigerant use. The gases primarily used as refrigerants are HFC-134a, HFC-125, HFC-143a and HFC-32 (Figure 3.10 and Figure 3.11). These gases are the constituents of the most common refrigerants, R134a, R404A, R407C, R410A and R507A. The new low-GWP unsaturated HFC-1234yf (GWP: 4) still had a share of the market for fluorinated refrigerants of less than 1% of. Other HFCs and PFCs made up even smaller proportions.

Foam blowing was the second most common intended application of reportable fluorinated gases in 2014 (10% by mass, 4% as CO₂-equivalent). Often, the gases reported for foam blowing are supplied as mixtures. The most commonly used fluorinated gases in this context are HFC365mfc, HFC152a and HFC134a (Figure 3.12 and Figure 3.13). HFC245fa, HFC227ea made up small proportions of the total supply for foam blowing. The new low-GWP unsaturated HFC1234ze

Table 3.1 Total supply of reportable fluorinated gases (tonnes)

Gas group	Bulk supply	Supply in products/ equipment	EU total supply
	Metric tonnes		
HFCs	118 737	5 727	124 464
PFCs	C	C	480
SF ₆	C	C	716
Unsaturated HFCs and HCFCs	C	C	C
HFEs and alcohols	C	-	C
Other perfluorinated compounds	321	-	321
Total fluorinated gases	121 739	5 864	127 603

Notes: C, confidential; -: no data reported.

Source: EEA, 2015a.

Table 3.2 Total supply of reportable fluorinated gases (CO₂-equivalent)

Gas group	Bulk supply	Supply in products/ equipment	EU total supply
	Million tonnes of CO ₂ equivalents		
HFCs	248.0	11.3	259.3
PFCs	C	C	4.6
SF ₆	C	C	16.3
Unsaturated HFCs and HCFCs	C	C	C
HFEs and alcohols	C	C	C
Other perfluorinated compounds	5.5	-	5.5
Total fluorinated gases	274.1	11.8	285.9

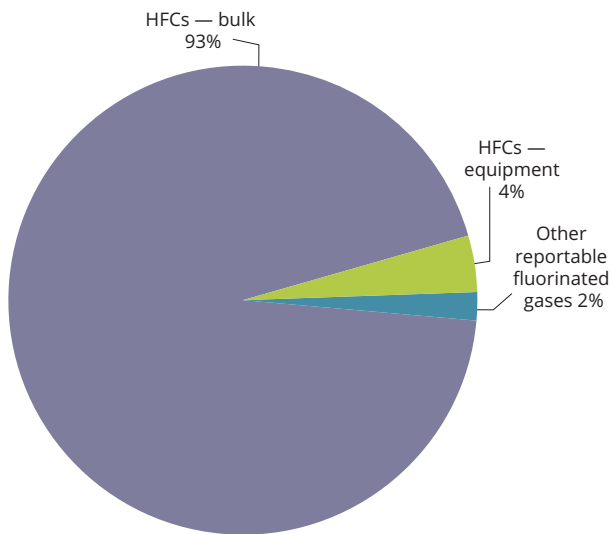
Notes: C, confidential; -: no data reported.

Source: EEA, 2015a.

Table 3.3 Total supply by intended applications (%)

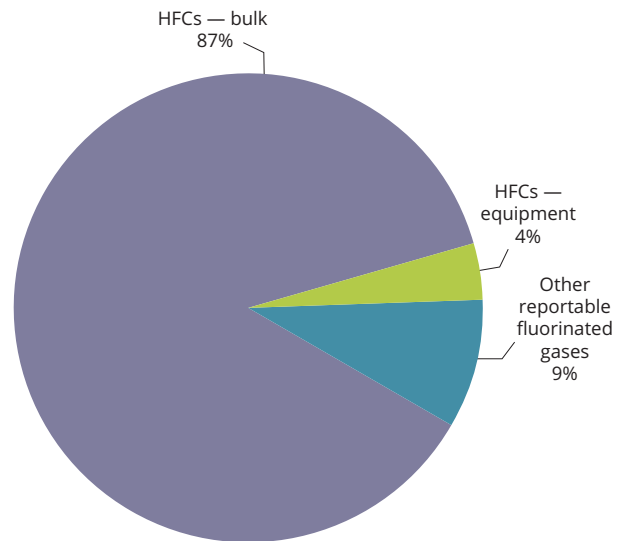
Intended application	Tonnes		Mt CO ₂ -equivalent	
	Approximated for reporting inconsistencies	Share	Approximated for reporting inconsistencies	Share
2014				
Refrigeration, air conditioning and heating and other heat transfer fluids	95 730	75	216.6	76
Foams, incl. pre-blended polyols	12 971	10	11.7	4
Aerosols	8 956	7	11.7	4
Fire protection	1 858	1	6.6	2
Electrical equipment	621	0	14.2	5
Semiconductor, photovoltaics and other electronics manufacture	1 058	1	9.4	3
Other or unknown applications	6 410	5	15.8	6
EU total supply	127 603	100	285.9	100

Figure 3.6 Total supply of reportable fluorinated gases (% tonnes)



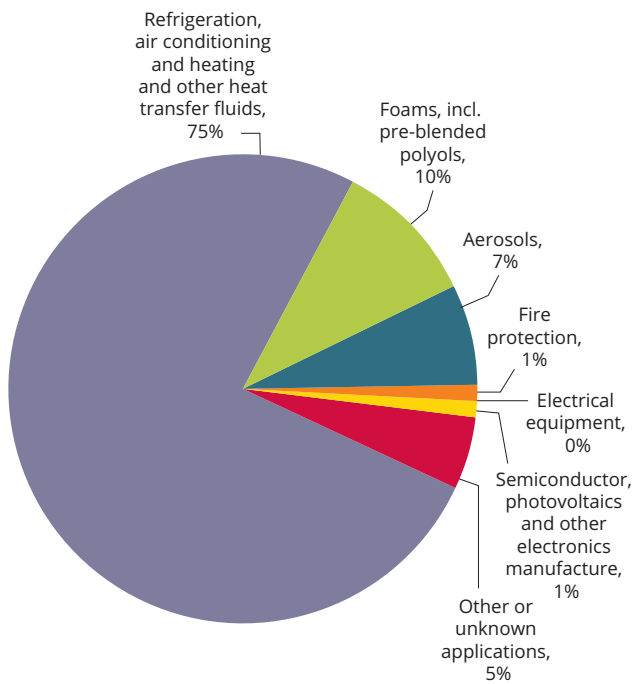
Source: EEA, 2015a.

Figure 3.7 Total supply of reportable fluorinated gases (% CO₂-equivalent)



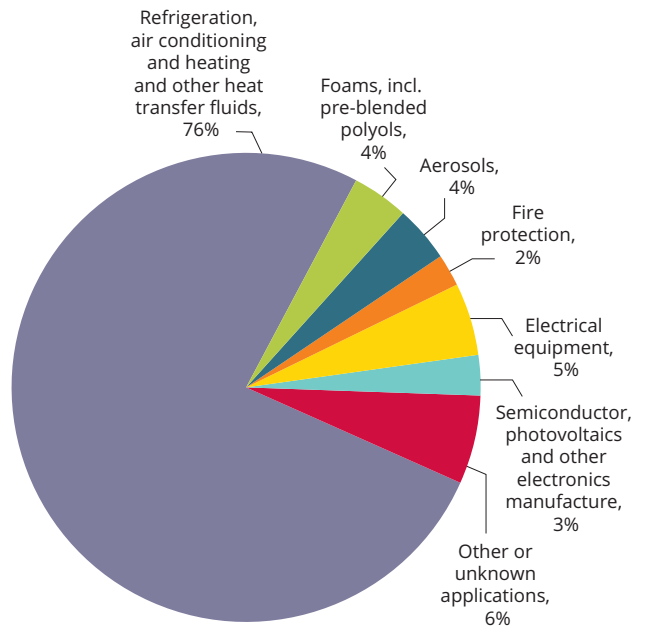
Source: EEA, 2015a.

Figure 3.8 Total supply by intended application (% tonnes)



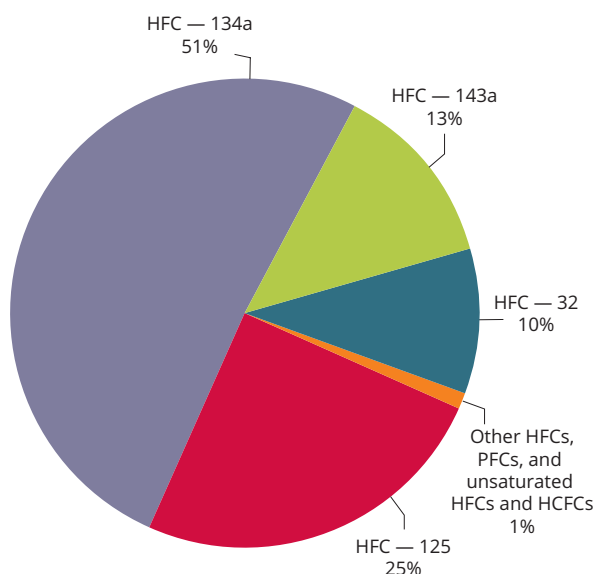
Source: EEA, 2015a.

Figure 3.9 Total supply by intended application (% CO₂-equivalent)



Source: EEA, 2015a.

Figure 3.10 Reportable fluorinated gases for refrigeration, air conditioning and heating (% tonnes)



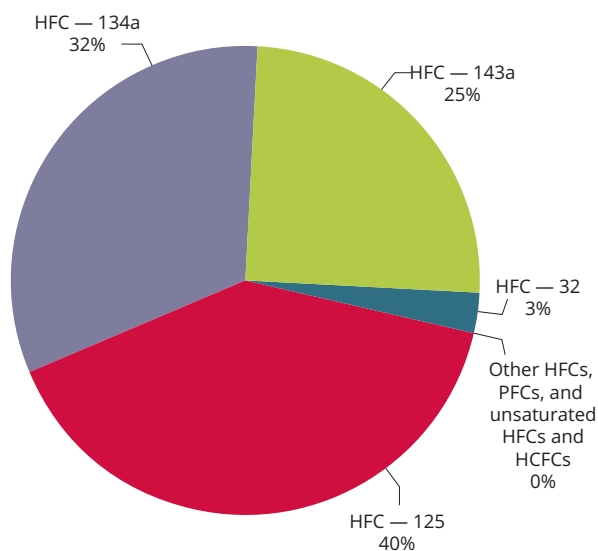
Source: EEA, 2015a.

(GWP: 7), included among unsaturated HFCs and HCFCs, had a share of the market for fluorinated blowing agents of almost 3% (in tonnes).

Gases for use in aerosols accounted for 7% (by mass) of the 2014 EU total supply of reportable gases. This is the sum of gases for medical and non-medical aerosols. HFC134a, HFC152a and HFC227ea had an almost 100% share of the 2014 market for fluorinated aerosol carriers (Figure 3.14 and Figure 3.14). For medical aerosols, HFC134a accounted for 90% (by mass) of reportable fluorinated gases. For non-medical aerosols, however, the proportion of HFC134a was limited to 65%, HFC152 accounting for the residual 35% (both by mass).

Gases for use in fire protection accounted for only 1.5% (by mass), or 2% as CO₂-equivalent, of the 2014 EU total supply of reportable fluorinated gases. HFC227ea is the most commonly used gas, making up 95% (by mass) or 87% (as CO₂-equivalent) of gas

Figure 3.11 Reportable fluorinated gases for refrigeration, air conditioning and heating (% CO₂-equivalent)



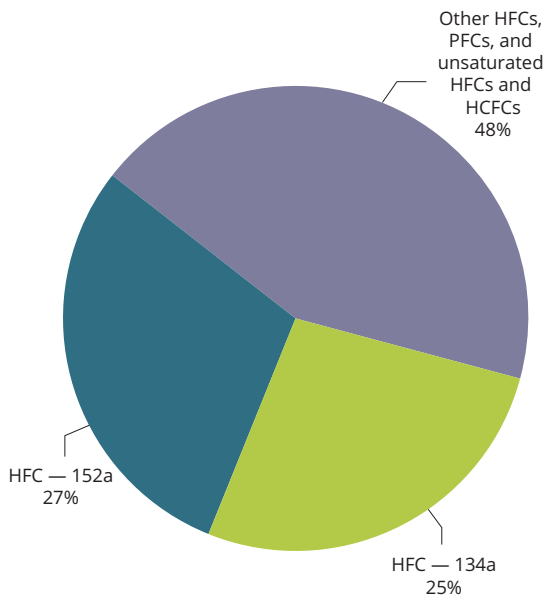
Source: EEA, 2015a.

for this application. The rest was constituted by a few other HFCs (Figure 3.16).

Electrical equipment (switchgear) is the major application for SF₆. No other reportable fluorinated gases are used for this application, which accounted for only 0.5% of the 2014 total supply by mass. The high GWP of SF₆ means that electrical equipment accounted for 5% of 2014 total supply when expressed in CO₂-equivalent.

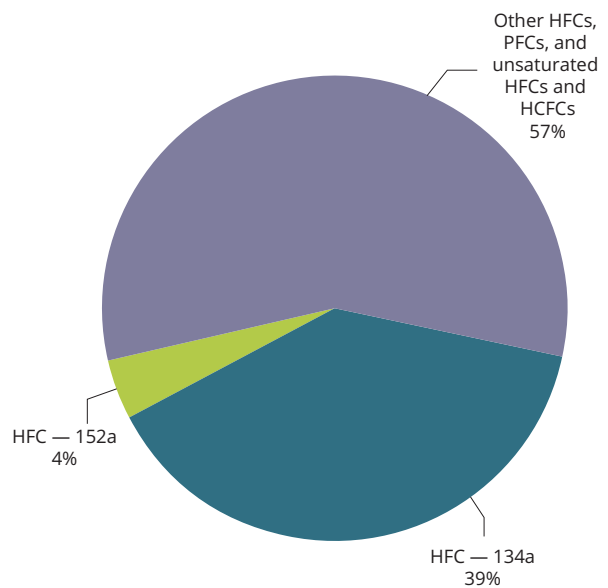
Almost 1% (by mass) of 2014 total supply of reportable fluorinated gases was intended for semiconductor, photovoltaic or other electronics manufacturing industries. When expressed as CO₂-equivalent the proportion is higher than 3%, as a result of the high GWPs of the majority of these gases. The most commonly used reportable fluorinated gases for these industries are NF₃, HFC152a, PFC14 and PFC116 (Figures 3.18 and 3.19).

Figure 3.12 Reportable fluorinated gases for foams (% tonnes)



Source: EEA, 2015a.

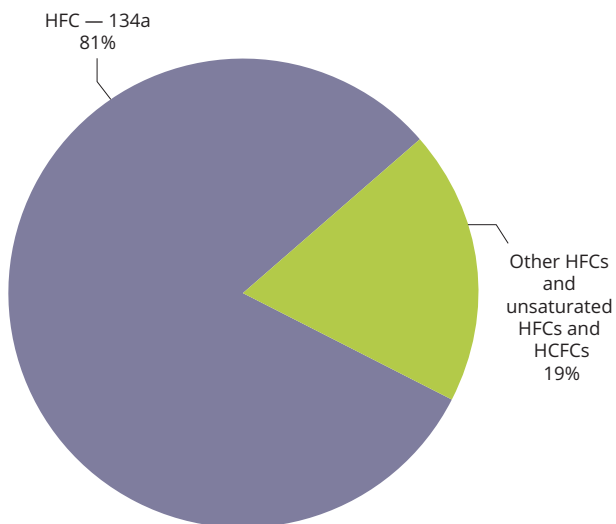
Figure 3.13 Reportable fluorinated gases for foams (% CO₂-equivalent)



Note: Proportions of HFC-143a, HFC-227ea, HFC-245fa and HFC-265mfc cannot be displayed for confidentiality reasons. HCFCs are also unsaturated.

Source: EEA, 2015a.

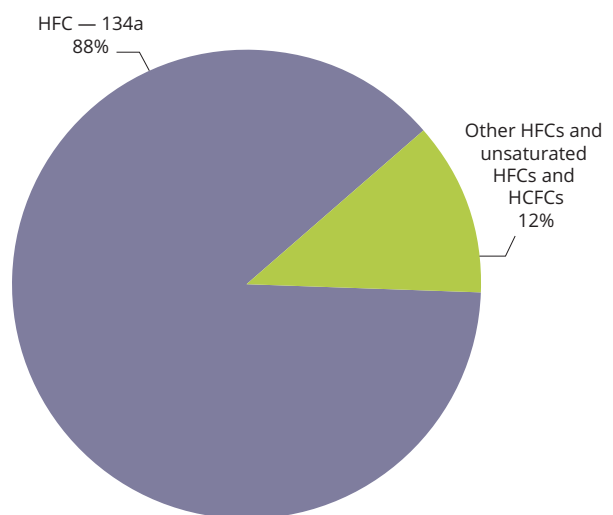
Figure 3.14 Reportable fluorinated gases for aerosol use (% tonnes)



Note: Proportions of HFC-143a, HFC-227ea, HFC-245fa and HFC-265mfc cannot be displayed for confidentiality reasons. HCFCs are also unsaturated.

Source: EEA, 2015a.

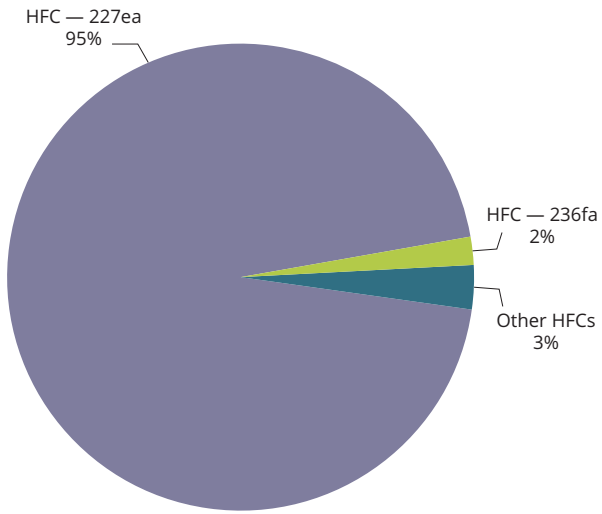
Figure 3.15 Reportable fluorinated gases for aerosol use (% CO₂-equivalent)



Note: Proportions of HFC-143a, HFC-227ea, HFC-245fa and HFC-265mfc cannot be displayed for confidentiality reasons. HCFCs are also unsaturated.

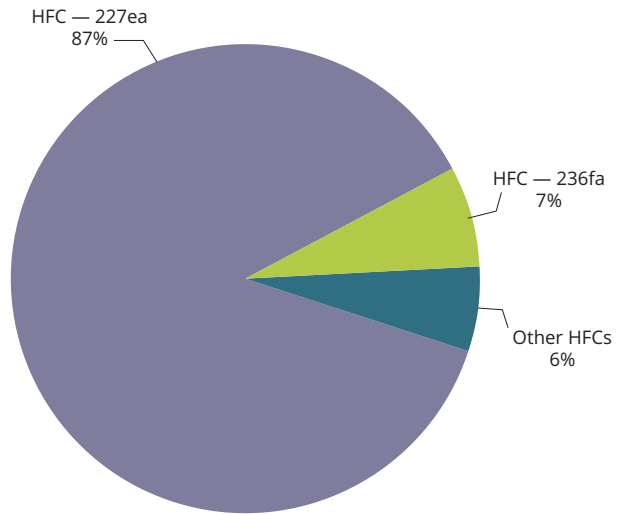
Source: EEA, 2015a.

Figure 3.16 Reportable fluorinated gases for fire protection (% tonnes)



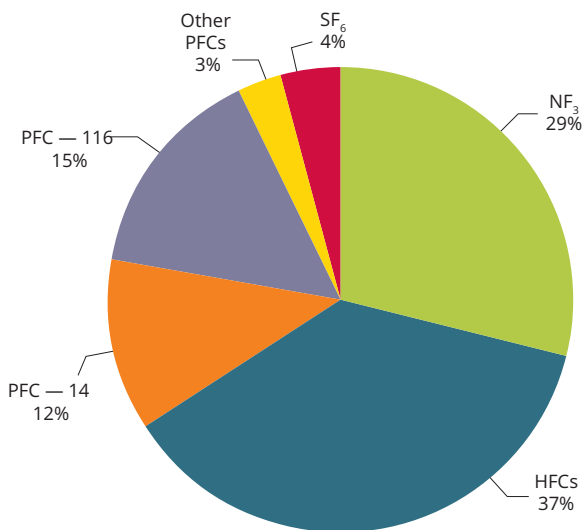
Source: EEA, 2015a.

Figure 3.17 Reportable fluorinated gases for fire protection (% CO₂-equivalent)



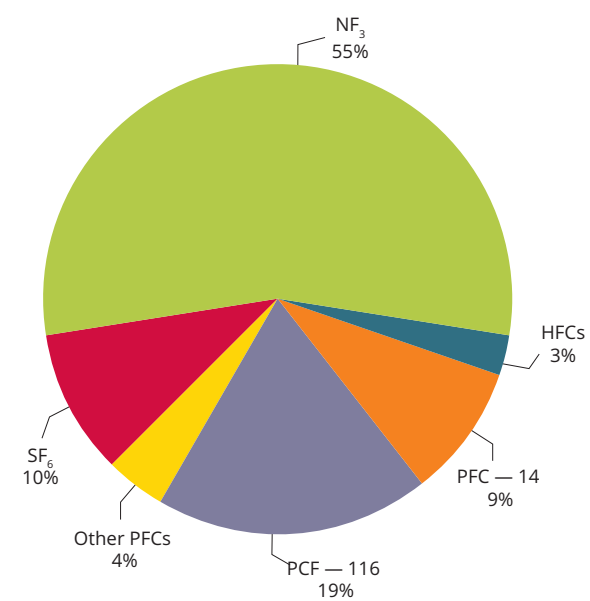
Source: EEA, 2015a.

Figure 3.18 Reportable fluorinated gases for semiconductor, photovoltaics and other electronics manufacture (% tonnes)



Source: EEA, 2015a.

Figure 3.19 Reportable fluorinated gases for semiconductor, photovoltaics and other electronics manufacture (% CO₂-equivalent)



Source: EEA, 2015a.

4 Placing of HFCs on the market

4.1 Policy of HFC phase-down

Starting in 2015, the amount of HFCs that can be placed on the market will be subject to quantitative limits. The cap and phase-down of HFCs will be implemented through a quota system calculated on a CO₂-equivalent basis. Quotas are allocated in accordance with Article 16 and Annexes V and VI of the new F-Gas Regulation 517/2014.

The monitoring of the HFC phase-down relies on a metric called 'placing on the market' (POM). Placing on the market differs from the other supply metrics used in this report, in particular in accounting for exports. POM is only calculated for HFCs. The HFC phase-down scheme under Article 15 of the new F-Gas Regulation 517/2014 refers to 'Placing on the EU market' of HFCs. Article 2 of Regulation 517/2014 provides the definition:

- 'placing on the market' means supplying or making available to another party in the Union for the first time, for payment or free of charge, or using for its own account in the case of a producer, and includes customs release for free circulation in the Union

In relation to compliance with the HFC phase-down, Article 15(2) of the new F-Gas Regulation defines a

number of categories of bulk HFCs placed on the market that are exempted from the phase-down. These include imports for destruction, feedstock use, export, military equipment and semiconductor manufacture. Supply for the manufacture of pharmaceutical metered dose inhalers will be exempted from 2018.

Special rules also apply to HFCs placed on the EU market within products and equipment. HFCs contained in imported refrigeration, air conditioning and heat pump equipment are included in the phase-down from 2017 onwards, whereas HFCs in other products or equipment are not covered at all.

4.2 HFCs placed on the market

The analysis of the 2007–2013 trend for bulk HFC POM (Table 4.1) is based on data reported by companies under the old F-Gas Regulation 842/2006.

The 2007–2013 and the 2014 data are not included in the same table, as the data are based on slightly different metrics. Starting from 2014, the POM parameter relies on more granular data reported under the new regulation. Quantities of HFCs physically placed on the market in 2014, including in equipment, amounted to 291 Mt CO₂-equivalent (Table 4.2).

Table 4.1 HFCs placed on the market 2007–2013

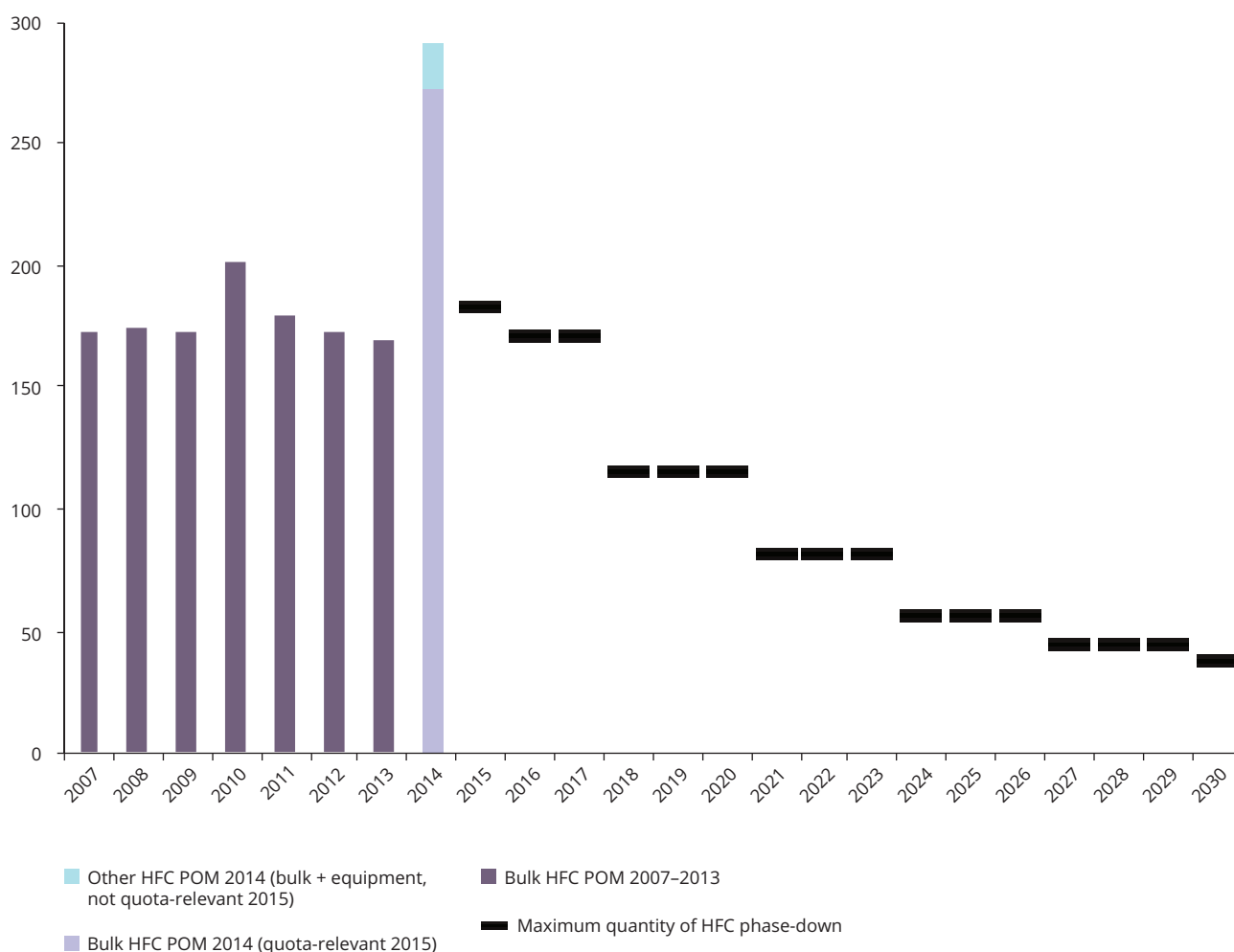
Mt CO ₂ -equivalent	2007	2008	2009	2010	2011	2012	2013
POM of bulk HFCs	173.5	174.9	172.4	200.6	179.0	172.0	169.6

Sources: EC, 2011; EEA, 2014

Table 4.2 HFCs placed on the market in 2014

HFC phase-down coverage category	Mt CO ₂ -equivalent
Total HFC POM, quota-relevant under 2015 compliance rules	272.4
Total HFC POM, not quota-relevant under 2015 compliance rules	18.6
Total POM of HFCs	291.0

Source: EEA, 2015a.

Figure 4.1 Outlook for the HFC phase-downPlacing on the market of HFCs (Mt CO₂-equivalent)

Sources: EC, 2011; EU, 2014a; EEA, 2014 and EEA 2015a.

The HFC phase-down will start in 2015, introducing a gradual limitation on bulk HFCs placed on the market to achieve a reduction of 79% by 2030 in line with Annex V of the new F-Gas Regulation 517/2014. The EU-wide maximum quantity of HFCs to be placed on the market under the quota scheme is limited to the average 2009–2012 baseline. Figure 4.1 shows amounts of HFCs placed on the market in previous years alongside the phase-down schedule, starting in 2015.

The amount of bulk HFCs placed on the market saw a steady decline from 2010 until 2013. In 2014, the bulk

HFC POM that would be quota-relevant under 2015 compliance rules was 61% above the 2013 bulk HFC POM amount. This marked increase in the amount of bulk HFC POM is due to a significant increase in bulk HFC imports. The large increase in HFC POM may reflect the fact that 2014 was the last year for HFC importers to place on the market quota-free HFCs and for HFC distributors and HFC consumers to stock up on HFCs that can be marketed and consumed outside the quota restriction in 2015 or in later years. The increase in HFC imports is also discussed in Section 2.2.

Abbreviations

BDR	Business Data Repository of the EEA
CO ₂	carbon dioxide
CO ₂ -eq.	CO ₂ -equivalent
EC	European Commission
DG CLIMA	Directorate-General for Climate Action of the European Commission
EEA	European Environment Agency
ETC/ACM	European Topic Centre for Air Pollution and Climate Change Mitigation
EU	European Union
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
GWP	Global warming potential
HCFCs	Hydrochlorofluorocarbons
HFCs	Hydrofluorocarbons
HFES	Hydrofluoroethers
IPCC	Intergovernmental Panel on Climate Change
kt	Kilotonnes
Mt	Megatonnes
NF ₃	Nitrogen trifluoride
ODS	Ozone-depleting substances
PFCs	Perfluorocarbons
PFPME	Perfluoropolymethylisopropylether
POM	Placing on the market
QA/QC	Quality Assurance/Quality Control
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)
SF ₆	Sulphur hexafluoride
TAR	Third Assessment Report of the IPCC

References

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EC, 2007, Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007.

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EC, 2009, Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer (OJ L 286, 31.10.2009, p. 1–30).

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EEA, 2015b, 'EEA Greenhouse Gas data viewer' (<http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer>) accessed 1 December 2015.

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EU, 2014b, Commission Implementing Regulation (EU) No 1191/2014 of 30 October 2014 determining the format and means for submitting the report referred to in Article 19 of Regulation (EU) No 517/2014 of the European Parliament and of the Council on fluorinated greenhouse gases.

Intergovernmental Panel on Climate Change (IPCC), 2001, Third Assessment Report (TAR) — Climate Change, http://www.grida.no/publications/other/ipcc_tar.

Intergovernmental Panel on Climate Change (IPCC), 2007, Fourth Assessment Report (AR4) — Climate Change, http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html.

Montreal Protocol on Substances that Deplete the Ozone Layer, international treaty, adopted in Montreal on 16 September 1987.

Annex 1 Fluorinated gases under Annex I of Regulation 517/2014 (and GWPs)

'Fluorinated greenhouse gases' means the hydrofluorocarbons, perfluorocarbons, sulphur

hexafluoride and other greenhouse gases that contain fluorine.

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: EC, 2006; EU, 2014.

Annex 2 Other fluorinated gases under Annex II of Regulation 517/2014 (and GWPs)

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

Annex 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 gases were not covered under the old F-Gas Regulation 842/2006.

Source: EU, 2014.

Annex 3 Data tables

Table A3.1 Reporting companies by Member State and activities

Country	Total	thereof:					
		Producers	Importers	Exporters	Feedstock users	Destruction companies	Equipment importers
EU-28 total	449	11	181	96	5	10	232
Austria	4	0	0	0	1	0	3
Belgium	23	1	8	7	0	0	12
Bulgaria	10	0	6	0	0	0	5
Croatia	8	0	4	2	0	0	5
Cyprus	9	0	7	0	0	0	2
Czech Republic	11	0	5	2	0	1	6
Denmark	7	0	2	4	0	0	3
Estonia	12	0	9	1	0	0	3
Finland	9	0	4	0	0	1	5
France	36	3	12	11	1	1	19
Germany	45	2	13	16	1	4	25
Greece	18	0	6	2	0	0	12
Hungary	8	0	3	1	0	0	6
Ireland	3	0	3	0	0	0	0
Italy	60	0	22	12	0	0	35
Latvia	3	0	1	0	0	0	2
Lithuania	7	0	4	3	0	0	2
Luxembourg	0	0	0	0	0	0	0
Malta	4	0	1	1	0	0	2
Netherlands	19	1	5	4	0	1	12
Poland	22	0	11	2	0	0	10
Portugal	12	0	4	2	0	0	7
Romania	10	0	6	1	0	0	5
Slovakia	5	0	4	1	0	0	2
Slovenia	4	0	2	0	0	0	2
Spain	37	1	13	8	1	0	19
Sweden	19	0	6	2	0	1	11
United Kingdom	44	3	20	14	1	1	17
Non-EU	19	n.a.	14	1	n.a.	n.a.	6

Note: Companies may report for more than one activity type; reporting year 2014.
n.a., not applicable (non-EU companies are not eligible to report as producers, feedstock users or destruction companies).

Source: EEA, 2015a.

Table A3.2 Non-EU reporting companies and breakdown of activities

Country	Total	thereof:		
		Importers	Exporters	Equipment importers
Total	19	14	1	6
China	12	12	0	0
the former Yugoslav Republic of Macedonia	1	1	1	0
Japan	2	0	0	2
Switzerland	2	0	0	2
Turkey	1	0	0	1
United States	1	1	0	1

Note: Companies may report for more than one activity type; reporting year 2014.

Source: EEA, 2015.

Table A3.3 Reporting non-EU companies and countries of EU representation

Country	Number of reporting companies
China	12
thereof represented in Ireland	11
thereof represented in Italy	1
the former Yugoslav Republic of Macedonia	1
thereof represented in Greece	1
Japan	2
thereof represented in Belgium	1
thereof represented in Germany	1
Switzerland	2
thereof represented in Spain	1
thereof represented in the United Kingdom	1
Turkey	1
thereof represented in Germany	1
United States	1
thereof represented in the United Kingdom	1

Source: EEA, 2015.

Table A3.4 Total number of reporting companies for 2007–2014

	2007	2008	2009	2010	2011	2012	2013	2014
Total reporters	78	87	91	108	122	129	154	468
of which:								
Producers	6	11	8	8	9	9	9	11
Importers	60	64	56	70	78	88	114	195
Exporters	42	48	58	72	78	78	83	97
Feedstock users	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5
Destruction companies	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	10
Equipment importers	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	238

Note: n.a., not applicable (reporting obligations for feedstock users, destruction companies and equipment importers applied for 2014 for the first time).

Sources: EC, 2011; EEA, 2014 and EEA, 2015a.

Table A3.5 Production of reportable fluorinated gases (tonnes)

Gas group	2007	2008	2009	2010	2011	2012	2013	2014
HFCs	55 235	38 519	33 106	43 792	41 040	40 854	36 717	31 050
PFCs	C	C	C	C	C	C	C	C
SF ₆	C	C	C	C	C	C	C	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-
HFEs and alcohols	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-
Other perfluorinated compounds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-
Total fluorinated gases	58 098	41 359	35 123	46 440	44 030	44 220	39 909	34 049

Notes: C, confidential; -, no data reported; n.a., not applicable (Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013).

Sources: EC, 2011; EEA, 2014 and 2015a.

Table A3.6 Production of reportable fluorinated gases (Mt CO₂-equivalent)

Gas group	2007	2008	2009	2010	2011	2012	2013	2014
HFCs	112	76	63	91	85	81	73	61
PFCs	C	C	C	C	C	C	C	C
SF ₆	C	C	C	C	C	C	C	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-
HFEs and alcohols	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-
Other perfluorinated compounds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	-
Total fluorinated gases	175	139	108	150	151	155	143	127

Notes: C, confidential; -, no data reported; n.a.: not applicable (Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013).

Sources: EC, 2011; EEA, 2014 and 2015a.

Table A3.7 Bulk imports of reportable fluorinated gases (tonnes)

Gas group	2007	2008	2009	2010	2011	2012	2013	2014
HFCs	58 667	68 094	57 612	68 794	65 940	60 778	65 301	122 781
PFCs	C	C	129	230	C	C	C	C
SF ₆	C	C	671	539	C	C	C	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFEs and alcohols	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Other perfluorinated compounds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Total fluorinated gases	59 666	69 091	58 411	69 564	66 765	61 462	65 939	125 986

Notes: C, confidential; -, no data reported; n.a.: not applicable (Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013).

Sources: EC, 2011; EEA, 2014 and 2015a.

Table A3.8 Bulk imports of reportable fluorinated gases (Mt CO₂-equivalent)

Gas group	2007	2008	2009	2010	2011	2012	2013	2014
HFCs	112.7	135.1	124.2	144.2	133.1	121.7	136.4	260.9
PFCs	C	C	1.4	2.5	2.5	C	C	C
SF ₆	C	C	15.3	12.3	13.4	C	C	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFEs and alcohols	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Other perfluorinated compounds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Total fluorinated gases	132.4	154.1	140.9	158.9	148.9	133.4	149.0	279.4

Notes: C, confidential; -, no data reported; n.a.: not applicable (Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013).

Sources: EC, 2011; EEA, 2014 and 2015a.

Table A3.9 Bulk exports of reportable fluorinated gases (tonnes)

Gas	2007	2008	2009	2010	2011	2012	2013	2014
HFC-23	C	C	17	12	8	11	C	3
HFC-32	1 310	771	706	1 534	1 335	883	1 414	840
HFC-41	-	-	-	-	-	-	-	C
HFC-125	2 854	2 038	1 758	2 871	3 521	2 160	1 938	2 048
HFC-134	C	-	-	C	-	-	-	-
HFC-134a	15 999	12 318	9 925	10 703	11 080	12 481	12 102	14 635
HFC-143a	1 352	1 450	937	1 295	1 237	1 076	1 137	1 011
HFC-152a	C	C	C	632	262	186	C	C
HFC-227ea	204	271	187	352	433	460	526	C
HFC-236fa	C	C	C	C	C	C	C	C
HFC-245fa	C	C	C	C	C	C	C	138
HFC-365mfc	C	C	C	C	C	C	C	C
HFC-43-10mee	C	C	C	C	C	C	C	C
PFC-14	C	C	0	C	C	C	C	C
PFC-116	C	C	C	C	C	C	C	C
PFC-218	C	C	C	C	C	C	C	C
PFC-c-318	-	C	C	C	C	C	C	C
PFC-3-1-10	C	C	-	C	C	-	-	C
PFC-5-1-14	C	C	C	C	C	C	C	C
SF ₆	1 670	1 499	1 423	C	C	2 021	1 871	2 522
HCFC-1233zd	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1234yf	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1234ze	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFE-449sl (HFE-7100)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
2,2,3,3,3-pentafluoropropanol	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Nitrogen trifluoride	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
PFPME	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Gas group								
HFCs	24 162	19 187	15 564	20 292	21 162	21 044	21 699	26 239
PFCs	83	57	25	C	C	255	253	91
SF ₆	1 670	1 499	1 423	C	C	2 021	1 871	2 522
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFES and alcohols	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Other perfluorinated compounds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Total fluorinated gases	25 915	20 742	17 012	22 070	23 214	23 320	23 822	29 065

Notes: C, confidential; -, no data reported; n.a.: not applicable (Annex II gases (unsaturated HFCs and HCFCs, HFES and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013).

Sources: EC, 2011; EEA, 2014 and 2015a.

Table A3.10 Bulk exports of reportable fluorinated gases (Mt CO₂-equivalent)

Gas	2007	2008	2009	2010	2011	2012	2013	2014
HFC-23	C	C	0	0	0	0	C	0
HFC-32	0.9	0.5	0.5	1.0	0.9	0.6	1.0	0.6
HFC-41	-	-	-	-	-	-	-	C
HFC-125	10.0	7.1	6.2	10.0	12.3	7.6	6.8	7.2
HFC-134	C	-	-	C	-	-	-	-
HFC-134a	22.9	17.6	14.2	15.3	15.8	17.8	17.3	20.9
HFC-143a	6.0	6.5	4.2	5.8	5.5	4.8	5.1	4.5
HFC-152a	C	C	C	0.1	0.0	0.0	C	C
HFC-227ea	0.7	0.9	0.6	1.1	1.4	1.5	1.7	C
HFC-236fa	C	C	C	C	C	C	C	C
HFC-245fa	C	C	C	C	C	C	C	0.1
HFC-365mfc	C	C	C	C	C	C	C	C
HFC-43-10mee	C	C	C	C	C	C	C	C
PFC-14	C	C	0.0	C	C	C	C	C
PFC-116	C	C	C	C	C	C	C	C
PFC-218	C	C	C	C	C	C	C	C
PFC-c-318	-	C	C	C	C	C	C	C
PFC-3-1-10	C	C	-	C	C	-	-	C
PFC-5-1-14	C	C	C	C	C	C	C	C
SF ₆	38.1	34.2	32.4	38.7	C	46.1	42.7	57.5
HCFC-1233zd	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1234yf	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1234ze	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFE-449sl (HFE-7100)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
2,2,3,3,3-pentafluoropropanol	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Nitrogen trifluoride	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
PFPME	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Gas group								
HFCs	42.5	34.6	27.5	36.0	38.8	35.5	36.0	42.4
PFCs	0.8	0.5	0.2	0.7	C	2.4	2.4	0.8
SF ₆	38.1	34.2	32.4	38.7	C	46.1	42.7	57.5
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFEs and alcohols	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Other perfluorinated compounds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Total fluorinated gases	81.4	69.3	60.2	75.4	84.4	84.0	81.1	100.8

Notes: C, confidential; -, no data reported; n.a.: not applicable (Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013).

Sources: EC, 2011; EEA, 2014 and 2015a.

Table A3.11 Bulk supply of reportable fluorinated gases (tonnes)

Gas	2007	2008	2009	2010	2011	2012	2013	2014
HFC-23	247	184	190	299	306	137	73	C
HFC-32	3 987	5 086	4 406	5 378	4 914	5 009	5 334	8 710
HFC-41	C	-	C	C	C	C	C	1
HFC-125	12 429	12 556	13 942	18 218	15 321	15 580	15 147	23 124
HFC-134	C	C	-	-18	-	-	-	-
HFC-134a	49 102	46 196	41 310	43 588	40 095	40 007	39 337	59 813
HFC-143	C	-	-	C	C	-	-	-
HFC-143a	9 066	9 883	9 590	10 552	8 845	9 005	8 853	13 506
HFC-152a	3 816	6 162	5 182	4 468	4 676	4 175	3 657	C
HFC-227ea	789	1 767	1 776	2 082	2 052	1 479	1 610	2 695
HFC-236fa	C	C	C	C	43	30	38	C
HFC-245fa	C	C	C	C	C	C	C	C
HFC-365mfc	C	C	C	C	C	C	C	C
HFC-43-10mee	C	C	C	C	C	C	C	C
PFC-14	C	C	C	59	56	28	2	C
PFC-116	C	178	113	C	C	C	C	157
PFC-218	112	59	21	24	23	40	38	41
PFC-c-318	C	6	C	6	10	9	C	14
PFC-3-1-10	C	C	-	C	C	C	C	C
PFC-5-1-14	C	C	C	C	C	C	C	C
SF ₆	1 810	1 860	1 435	1 522	1 502	1 490	1 535	C
HCFC-1233zd	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1234yf	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1234ze	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1336mzz	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFE-347 mcc3 (HFE-7000)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFE-449sl (HFE-7100)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFE-569sf2 (HFE-7200)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
2,2,3,3,3-pentafluoropropanol	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
bis(trifluoromethyl)-methanol	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
nitrogen trifluoride	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	321
perfluoropolymethylisopropylether (PFPMIE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Gas group								
HFCs	86 148	87 454	80 771	89 564	81 673	80 892	79 293	118 737
PFCs	299	398	241	303	289	243	139	C
SF ₆	1 810	1 860	1 435	1 522	1 502	1 490	1 535	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFEs and alcohols	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Other perfluorinated compounds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Total fluorinated gases	88 257	89 712	82 447	91 389	83 464	82 625	80 967	121 739

Notes: C, confidential; -, no data reported; n.a.: not applicable (Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007–2013).

Sources: EC, 2011; EEA, 2014 and 2015a.

Table A3.12 Bulk supply of reportable fluorinated gases (Mt CO₂-equivalent)

Gas	2007	2008	2009	2010	2011	2012	2013	2014
HFC-23	3.7	2.7	2.8	4.4	4.5	2.0	1.1	C
HFC-32	2.7	3.4	3.0	3.6	3.3	3.4	3.6	5.9
HFC-41	C	-	C	C	C	C	C	0.0
HFC-125	43.5	43.9	48.8	63.8	53.6	54.5	53.0	80.9
HFC-134	C	C	-	-0.0	-	-	-	-
HFC-134a	70.2	66.1	59.1	62.3	57.3	57.2	56.3	85.5
HFC-143	C	-	-	C	C	-	-	-
HFC-143a	40.5	44.2	42.9	47.2	39.5	40.3	39.6	60.4
HFC-152a	0.5	0.8	0.6	0.6	0.6	0.5	0.5	C
HFC-227ea	2.5	5.7	5.7	6.7	6.6	4.8	5.2	8.7
HFC-236fa	C	C	C	C	0.4	0.3	0.4	C
HFC-245fa	C	C	C	C	C	C	C	C
HFC-365mfc	C	C	C	C	C	C	C	C
HFC-43-10mee	C	C	C	C	C	C	C	C
PFC-14	C	C	C	0.4	0.4	0.2	0.0	C
PFC-116	C	2.2	1.4	C	C	C	C	1.9
PFC-218	1.0	0.5	C	0.2	0.2	0.4	0.3	0.4
PFC-c-318	C	0.1	0.0	0.1	0.1	0.1	C	0.1
PFC-3-1-10	C	C	-	C	C	C	C	C
PFC-5-1-14	C	C	C	C	C	C	C	C
SF ₆	41.3	42.4	32.7	34.7	34.2	34.0	35.0	C
HCFC-1233zd	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1234yf	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1234ze	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFC-1336mzz	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFE-347 mcc3 (HFE-7000)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFE-449sl (HFE-7100)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFE-569sf2 (HFE-7200)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
2,2,3,3,3-pentafluoropropanol	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
bis(trifluoromethyl)-methanol	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
nitrogen trifluoride	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.5
perfluoropolymethylisopropylether (PFPMIE)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Gas group								
HFCs	169.7	172.0	166.9	193.2	170.7	167.7	164.0	248.0
PFCs	3.0	4.0	2.5	3.1	3.0	2.4	1.4	C
SF ₆	41.3	42.4	32.7	34.7	34.2	34.0	35.0	C
Unsaturated HFCs and HCFCs	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
HFEs and alcohols	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	C
Other perfluorinated compounds	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.5
Total fluorinated gases	214.0	218.5	202.1	231.0	207.9	204.2	200.4	274.1

Notes: C, confidential; -, no data reported; n.a.: not applicable (Annex II gases (unsaturated HFCs and HCFCs, HFEs and alcohols and 'other' perfluorinated compounds) were not subject to reporting for the years 2007-2013).

Sources: EC, 2011; EEA, 2014 and 2015a.

Table A3.13 Bulk supply of reportable fluorinated gases by intended application (tonnes)

	2007	2008	2009	2010	2011	2012	2013	2014
Intended application								
Refrigeration, air conditioning and heating, and other heat transfer fluids	64 712	64 586	59 851	68 475	53 845	51 392	53 766	92 958
Foams, incl. pre-blended polyols	14 579	15 608	11 789	11 861	6 611	5 809	5 415	14 469
Aerosols	9 545	11 612	8 572	9 927	6 861	9 254	8 394	9 246
Fire protection *	C	596	556	C	1 870	909	1 066	2 068
Solvents	209	171	162	205	159	185	136	421
Electrical equipment	1 253	2 119	1 022	1 310	1 551	1 676	1 806	1 006
Semiconductor, photovoltaics and other electronics manufacture	129	311	184	268	248	178	169	1 074
Other or unknown applications *	2 417	2 696	2 115	3 037	1 153	1 274	793	6 089
Reporting inconsistencies	- 4 588	- 7 989	- 1 804	- 3 694	11 167	11 947	9 422	- 5 591
Total bulk supply	88 257	89 712	82 447	91 389	83 464	82 625	80 967	121 739

Notes: C, confidential.

Starting from 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 bulk supply.

* 'Other or unknown applications' includes fire protection for 2007 and 2010.

Sources: EC, 2011; EEA, 2014 and 2015a.

Table A3.14 Bulk supply of reportable fluorinated gases by intended application (Mt CO₂-equivalent)

	2007	2008	2009	2010	2011	2012	2013	2014
Intended application								
Refrigeration, air conditioning and heating, and other heat transfer fluids	146.1	152.5	142.6	167.7	127.4	126.5	130.2	211.1
Foams, incl. pre-blended polyols	13.8	13.5	9.9	10.7	4.1	3.7	3.5	13.1
Aerosols	12.9	15.3	11.4	12.9	C	11.7	10.8	12.2
Fire protection *	C	3.4	3.3	C	6.7	3.8	3.1	7.2
Solvents	0.4	0.4	0.3	0.4	0.4	0.5	0.4	0.6
Electrical equipment	28.6	48.3	23.3	29.9	35.4	38.2	41.2	22.9
Semiconductor, photovoltaics and other electronics manufacture	1.5	3.3	2.1	3.1	2.9	2.2	2.2	9.8
Other or unknown applications *	21.6	21.3	15.2	13.0	13.0	4.6	4.3	16.0
Reporting inconsistencies	- 10.9	- 39.4	- 5.9	- 6.7	17.9	13.0	4.7	- 18.9
Total bulk supply	214.0	218.5	202.1	231.0	207.9	204.2	200.4	274.1

Notes: C, confidential.

Starting from 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 bulk supply.

* 'Other or unknown applications' includes fire protection for 2007 and 2010, and aerosols for 2011.

Sources: EC, 2011; EEA, 2014 and 2015a.

Annex 4 Measures to protect confidential data

The new F-Gas Regulation maintains the confidentiality provisions of the earlier regulation, and the EEA continues to take appropriate steps to protect confidentiality and prevent the publication of commercially sensitive information. Article 19(8) of the new F-Gas Regulation states that the Commission must take appropriate measures to protect the confidentiality of the information reported. Hence, the EEA, in agreement with the European Commission, has applied a number of measures to prevent the deduction of commercially sensitive information. These include:

- a **three-company group rule**, whereby the data presented in the report must be the result of reporting by at least three company groups (i.e. corporate groups);
- a **5% significance rule**, whereby company groups whose reported data add up to less than 5% of the total amount reported for any data-point represented in the report are ignored for counting under the 3-company group rule;
- additional measures preventing the deduction of sensitive information.

All measures apply both to amounts reported in metric tonnes and amounts in GWP tonnes. Each of the measures is explained in more depth below. These measures have been applied consistently for all the data presented in this report, thus covering the period 2007–2014.

The three-company group rule

This measure concerns the treatment of data reported by different legal entities across the EU that belong to the same company group. For the purposes of applying this rule, company groups are defined as 'one or more companies legally belonging to the same corporate group'. The agreed principle is that companies belonging to the same company group need to be seen as a single entity when it comes to confidentiality rules. During the 2015 reporting round on 2104 activities, companies were invited to identify affiliates and thus increase the protection level of their data. Wherever affiliations were confirmed by both companies, those companies were considered to belong to the same company group. Information on 2014 affiliations was also applied for the period 2007–2013. Once company groups were thus determined, at least three of them had to contribute to each reported value.

The 5% significance rule

As a second measure, company groups were only counted for the above measure if they contribute significantly to the reported value. That meant that the smallest contributors up to an accumulated proportion of 5% were not considered when applying the three-company group rule. This ensured that at least three corporate entities contributed significantly to each reported transaction value.

Box 7.1 Applying the three-company group rule and the 5% significance rule

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

Step 1: all values reported by companies of a given company group for a given transaction year are summed for a given transaction and substance or substance group:

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

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 ($|\sum X_i|$) across company groups is calculated.

Step 3: the percentage share of (2) in relation to (3) is calculated for each company group:

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

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

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

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

Where the count is one or two, the full aggregated value across company groups is hidden as confidential. Where the count is three or more, the full aggregated value across company groups is reported and thus not confidential.

Preventing deduction of sensitive data

Additional measures were applied to prevent deduction of confidential data.

All transactions

Deduction might be possible in cases where transaction data for certain substances or substance groups (i.e. HFCs or PFCs) remain confidential, yet data for other substances or substance groups along with a total for the transaction in question were published. Confidential data that could potentially be deduced in this way were protected by treating additional data as confidential — although these additional values had been identified as non-confidential — so that at least values for three (or none) of the substances or substance groups were confidential in the published data for that transaction.

Aggregated transactions

Transaction data were hidden where other confidential transaction data could be inferred from their publication. To understand this additional measure, it should be remembered that bulk supply of fluorinated gases is a calculated transaction that involves production, import, export and other data for each substance or substance group. This rather complicated calculation can be simplified as:

$$\text{Bulk Supply} = \text{Production} + \text{Import} - \text{Export} + \text{Remainder}$$

The remainder may appear irrelevant, but, using this value, a confidential value for, for example, production might be deductible based on non-confidential information on consumption, import and export. In such cases, data are published only where the remainder equalled or exceeded 5% of the bulk supply. In cases where the remainder was less than 5% and one term (i.e. bulk supply, production, import or export) of the above equation was confidential according to the three-company rule and the 5% significance rule, a second term of the above equation was treated as confidential to prevent deduction.

Annex 5 Calculation methods

The codes [1A], [2A] etc. used in the following paragraphs refer to the codes of reportable transactions as shown in the reporting questionnaire. The reporting questionnaire is the online rendering of the format and means reporting specified by the Implementing Regulation (EU) No 1191/2014. Companies submit their report using the electronic reporting tool provided by the EEA, accessible from the F-gas portal (<https://webgate.ec.europa.eu/ods2>) on the website of the European Commission. The electronic reporting tool is part of the EEA's Business Data Repository (BDR) (<http://bdr.eionet.europa.eu>).

A5.1 Calculation of EU supply

A5.1.1 Total supply

'EU total supply' is a parameter that provides information on the actual use of reportable gases by EU industries. 'EU total supply' is the sum of 'EU bulk supply' and 'EU supply in products/equipment'.

A5.1.2 Bulk supply

The 'bulk supply' metric is focused on emission-relevant supplies of bulk gases to EU industries and thus does not cover EU supplies intended for feedstock or destruction. The formula for calculating bulk supply (BS) based on data reported under Article 19 of Regulation 517/2014 reads as follows (the codes [1A], [2A], etc. used in the following paragraphs refer to the codes of reportable transactions):

$$\text{bulk supply (BS)} = (\text{net production [1E = 1A-1D]} + \text{full imports [2A]} - \text{full exports [3A]} + \text{1st January stocks from own import/production [4B]} - \text{31st December stocks from own import/production [4G]} + \text{reclamation [4K]} - \text{intended application: destruction [6B]} - \text{feedstock use [7A]})$$

Note that the calculation of 'EU bulk supply' is closely analogous to that of the 'net supply' metric that was used in previous EEA reports on F-gases. The calculation is based on 2007–2013 data reported under Article 6

of the 'old' F-Gas Regulation (842/2006). Thus, for bulk supply, a time series back to 2007 has been established.

A5.1.3 EU supply in products/equipment

The 'EU supply in products/equipment' (SPE) metric covers the amount of reportable gases that are imported into the EU within products or equipment and placed on the market. As exports of reportable gases within products and equipment are systematically not reported under the 'new' F-Gas Regulation (517/2014), no such exports are subtracted for the SPE metric. Thus the SPE metric covers only imports, and it is not intended to cover the net flows of reportable 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.

In accordance with the logic of the supply metrics used in this report, gases contained in exported products or equipment are part of the gas demand of EU industries and are thus included in the EU total supply metric.

As reporting on imported products and equipment has been established with the 'new' F-Gas Regulation 517/2014 for the first time, no time series for the years prior to 2014 can be established for SPE. Thus, no data for total supply for the period 2007–2013 cannot be calculated.

A5.1.4 Intended applications of bulk supply

In Section 6 of the reporting questionnaire, companies report on the intended applications of (bulk) gases supplied to the EU market [6X] in 22 categories. These bulk amounts [6X] are calculated as follows within the questionnaire:

$$6X = (\text{net production [1E = 1A-1D]} + \text{full imports [2A]} - \text{re-exports within products of own bulk imports [2B]} - \text{bulk re-exports of own imports [3B]} + \text{1st January stocks from own import/production [4B]} - \text{31st December stocks from own import/production [4G]} + \text{reclamation [4K]})$$

Thus, the formulae for calculating 'EU bulk supply' and '[6X] amounts supplied to the EU market' differ in the way they account for re-exports and for amounts intended for destruction and feedstock.

For the present aggregation report, however, the intended applications of EU bulk supply are of interest. As the data reported by companies on intended applications do not fully match the scope of bulk supply, a residual amount of bulk supply is calculated for which no information on intended applications is available from the reporting data. This residual amount may turn out to be either positive or negative and occurs in cases in which reporting on (re-)exports, destruction and feedstock use is not fully consistent between companies' reports⁽¹³⁾.

A5.2 Calculation of placing on the market

The HFC phase-down scheme under Article 15 of the 'new' F-Gas Regulation 517/2014 relates to 'Placing on the EU market' of HFCs. Article 2 of Regulation 517/2014 provides the definition:

'placing on the market' means supplying or making available to another party in the Union for the first time, for payment or free of charge, or using for its own account in the case of a producer, and includes customs release for free circulation in the Union'

POM can be differentiated between bulk POM (Sections 1.2.1 and 1.2.2) and POM within products and equipment (Section 1.2.3). In this report, POM is calculated only for HFCs.

When calculating a time series for amounts placed on the EU market in bulk, different approaches need to be used for the years 2014 and onwards on the one hand and the years 2007–2013 on the other. That is because of the differing data sets to be reported by companies under the 'new' and the 'old' F-Gas Regulations, respectively. It should be noted that the algorithm for bulk POM calculation for the years from 2014 onwards (Section 1.2.1) is thus different from the approach used for the years 2007–2013 (Section 1.2.2).

A5.2.1 Bulk placing on the market for years 2014 and onwards (bulk POM 2014)

When calculating the POM of HFCs in order to track the progress of the HFC phase-down, several steps have to be taken based on data reported under the 'new' F-Gas Regulation:

- 1 The amount (physically) placed on the EU market for the first time is calculated in section [4M] of the reporting questionnaire as follows⁽¹⁴⁾:

physical POM [4M] = (net) production [1E = 1A–1D] + full imports [2A] – re-exports within products of own bulk imports [2B] – bulk re-exports of own imports [3B] + 1st January stocks from own import/production (previously not placed on the market) [4C] – 31st December stocks from own import/production (previously not placed on the market) [4H]

- 2 For the purpose of compliance with the HFC phase-down, however, according to Article 15(2) of Regulation 517/2014, quota-exempted amounts need to be subtracted from the physical POM:

Quota-relevant physical POM [5] = physical POM [4M = 5H] – quota-exempted supply [5I]

In this context it should be noted that HFC supplies to producers of metered-dose inhalers for the delivery of pharmaceutical ingredients are not considered quota-exempted until 2018 (Article 18(2)(e) of Regulation 517/2014).

- 3 Finally, and also to comply with the HFC phase-down, quota authorised by producers and importers under Article 18(2) of Regulation 517/2014 needs to be considered as placed on the market. Quotas are measured in units of CO₂ equivalents. However, the first two steps in the calculation can be performed on units of metric tonnes of HFCs. Therefore, the final calculation step takes place after converting metric tonnes of HFCs into CO₂ equivalents by means of the GWPs:

⁽¹³⁾ For example, company A imports 100 t of HFC-134a (reports 100 t in [2A]) and sells 50 t to a foam-blowing company and 30 t to car repair shops for refilling into air conditioning (AC) systems. 20 t are sold to company B, which specialises in servicing AC systems on ships. Company A reports each 50 t HFC-134a for the intended applications 'refrigeration, air conditioning and heating' [6D] and 'foams' [6F]. Company B, however, sells 10 t HFC-134a to ships within the EU. Without company A knowing, the other 10 t are used by company B for servicing sea-going vessels in maritime ports. Technically this qualifies as export. Thus, company B reports 10 t exports in [3A]. The car repair shops and the foam-blowing company do not report at all as they neither import nor export. The sum of both reports result in a bulk supply of 90 t HFC-134a (100 t imports minus 10 t exports). The available information for the intended applications of the bulk supply amounts to 50 t for foams, 50 t for refrigeration, air conditioning and heating, and a negative residual amount of – 10 t for which no information is available.

⁽¹⁴⁾ The physical POM [4M] differs from the 'amount supplied to the EU market' [6X] in accounting for reclaimed amounts [4K] and for 1 January and 31 December stocks from own import/production that had previously been placed on the market ([4B] vs [4C] and [4G] vs [4H]).

quota-relevant POM [9F] = quota-relevant physical POM [5J] = 9E] + issued authorisations of quota [9A]

However, this step in the calculation does not apply for POM in 2014, as the phase-down had not started.

A5.2.2 Bulk placing on the market for years 2007–2013 (bulk POM 2007–2013)

As indicated above, POM 2007–2013 is calculated using a different algorithm, as the data set reported by companies under the 'old' F-Gas Regulation was less differentiated. In particular, the following are of relevance:

- The reporting on exports: For exports in the period 2007–2013, there is no clear distinction regarding whether or not quantities had been placed on the EU market prior to export.
- The reporting on stocks: 1 January and 31 December stocks for 2007–2013 were not differentiated into quantities already placed on the EU market and quantities not yet placed on the EU market.

Thus, for the years 2007–2013, quota-relevant physical POM based on data reported by companies under the 'old' F-Gas Regulation was calculated.

A5.2.3 Placing on the market within products and equipment

For POM within products and equipment, only those amounts of gases that have not previously been placed

on the market in bulk form are considered: gas charges in products or equipment manufactured within the EU are not considered, as the gases have been placed on the EU market in bulk for the first time by the gas producers or importers. Thus, the gas charges contained in imported products and equipment are considered for this metric only once these products or equipment have been placed on the market by the importer.

Therefore HFC POM within products and equipment is identical to the HFC SPE, as defined in (Section 1.1). For 2007–2013, POM within equipment cannot be calculated, as no respective had been subject to reporting under the 'old' F-Gas Regulation 842/2006.

In the context of the HFC phase-down it makes sense to differentiate between the HFC POM in refrigeration, air-conditioning and heat pump (RACHP) equipment and the HFC POM in other products or equipment, as RACHP equipment will be included in the scope of the HFC phase-down starting in 2017.

POM in RACHP equipment equals the amounts reported in section [11G] of the reporting questionnaire:

$$POM_{RACHP} = [11G]$$

POM in other products or equipment is calculated by subtracting the POM in RACHP equipment from the EU supply in products/equipment (SPE):

$$\begin{aligned} POM_{\text{other products/equipment}} &= SPE - POM_{RACHP} \\ &= [11Q] - [11G] \\ &= [11H] + [11I] + [11J] + [11K] + [11L] + [11M] + [11N] \\ &\quad + [11O] + [11P] \end{aligned}$$

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