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Fluorinated greenhouse gases 2012

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

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European Environment Agency

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Acknowledgements

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Executive summary

Background

Greenhouse gases covered by the UNFCCC Kyoto Protocol include amongst others, three groups of fluorinated greenhouse gases (F-gases): hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). These F-gases have very long lifetimes in the atmosphere and high global warming potentials (GWPs).

In 2011, F-gases accounted for approximately 2 % of the EU-27 overall greenhouse gas emissions ([1]), and this share continues to increase.

The 'F-Gas Regulation' ([2]) is one of the measures implemented at European Union (EU) level to assure the EU-15 target under the UNFCCC Kyoto Protocol to reduce the whole basket of greenhouse gases — including F-gases — by 8 %.

The present report summarises the data reported by companies according to Article 6 of the F-Gas Regulation. This report includes information on the quantities produced, imported and exported, as well as on related data such as the main intended applications of the F-gases. Imports and exports of F-gases contained in products or equipment are not covered by this reporting obligation.

Policy and data review

In 2012, the European Commission made a proposal for a new F-Gas Regulation ([3]), which would reduce F-gas emissions by two-thirds of today's levels by 2030. This proposal was still under negotiation by the co-legislators (European Parliament and Council) at the time of the drafting of this report.

Looking ahead to the likely requirements of a probable new F-gas policy, the Directorate-General for Climate Action of the European Commission (DG CLIMA) organised an independent review of all data reported from 2007 to 2010. The European Environment Agency (EEA) reviewed the 2011 data. This resulted in a number of data corrections, particularly for exports. The data resulting from the review exercises are taken into account for this report. Therefore, the data related to the years from 2007 to 2011 presented in the present report partly differ from the figures contained in the 2012 EEA F-gas report ([4]).

Reporting process

In line with changes in the EU institutional arrangements concerning reporting, a new reporting process for the submission of the reports by companies was established in 2012 via the password-protected online Business Data Repository (BDR) at https://bdr.eionet.europa.eu. From the reporting in 2013 — covering reporting year 2012 — the spreadsheet-based reporting tool was replaced by an online questionnaire available to all companies via the BDR. A number of automated quality checks were implemented in the questionnaire to ensure completeness and consistency of the reported data. This automated quality control process was complemented by some additional manual checks.

These modifications to the reporting process resulted in a reduced administrative burden for companies, the EEA, the European Commission and the Member States concerned. The use of the BDR as one single repository for all the deliveries, including for feedback on the data quality, also provides a

([1]) EEA Greenhouse Gas data viewer: http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer.
([2]) F-Gas Regulation: Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases.
([3]) Proposal for a regulation of the European Parliament and of the Council on fluorinated greenhouse gases, COM(2012) 643.
([4]) *Fluorinated greenhouse gases 2011. Aggregated data reported by companies on the production, import and export of fluorinated greenhouse gases in the EU.* EEA Technical report No 12/2012.

higher degree of transparency and traceability of all data submissions for the stakeholders involved.

The year 2012 was the sixth reporting year under the F-Gas Regulation. Companies were required to submit F-gas reports covering 2012 by 31 March 2013. The 'sales' parameter used in the 2012 report and previous F-gas factsheets published by the European Commission was replaced in the present report by the 'net supply' parameter, in order to more adequately describe the use of (bulk) F-gases by EU industries.

Findings and trends

The assessment of trends is dependent upon the unit used to express the amounts of F-gases, i.e. physical metric tonnes or GWP-weighted tonnes (CO_2-equivalents) ([5]). Statistics in metric tonnes reflects the use patterns of F-gases in absolute terms, while F-gas usage expressed as CO_2-equivalents also reflects the potential relevance for climate change policy.

Most significant findings

The following trends can be observed:

- The number of reporting companies increased to 129 (up 7 % from last year), mostly due to new importers.
- The production in the EU is relatively stable at around 150 Mt expressed in CO_2-equivalents.
- The export of F-gases significantly increased between 2009 and 2011, and then stagnated in 2012. Expressed in CO_2-equivalents, the export of F-gases during the last two years were at their highest levels since reporting started in 2007.
- The import of F-gases decreased sharply between 2011 and 2012 (– 8 % expressed in metric tonnes and – 10 % expressed in CO_2-equivalents). This is in line with the declining trend since the peak year 2010.
- The net supply ([6]) for F-gases expressed in CO_2-equivalents for 2012 is very similar to that for 2011 and 2009, while 2010 was clearly a peak year. A similar trend is seen for the HFC net supply evolution.
- SF_6 significantly contributes to production, export and net supply when expressed in CO_2-equivalents.

Data on the intended applications of F-gases is incomplete. However, the available information shows a number of trends. The following findings on intended applications are expressed in CO_2-equivalents and are organised in order of importance:

- Use in refrigeration and air conditioning (HFCs) is by far the major intended application of F-gases. It remained constant in the last two years and is at the lowest level since the reporting started in 2007.
- Use in electrical equipment (SF_6) remained constant in 2012 after a 50 % increase in 2011. Quantities for 2011 and 2012 are only slightly below the 2008 peak levels.
- Aerosol use (HFCs) showed an almost 40 % year-on-year increase between 2011 and 2012, which brings the quantities to the 2009 level following the drastic decrease between 2010 and 2011.
- Use in fire protection (HFCs) showed a significant year-on-year decrease between 2011 and 2012 of 46 %, but was still above the 2008–2009 levels.
- Use in foams (HFCs) has strongly declined over the years and is now at 27 % of 2007 levels.

([5]) Unless otherwise specified, the GWP values used in this report are those published in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (FAR) (IPPC, 2007). However, a conversion of all GWP-related tables shown in this report into those specified in the F-Gas Regulation, which are in line with the published values in the IPCC's Third Assessment Report (TAR) (IPPC, 2001), is given in Annex 2 to this report.

([6]) 'Net supply' is a parameter that provides information on the actual use of (bulk) F-gases by EU industries. Net supply is calculated by adding reported amounts for production, bulk imports, stocks held on 1 January of the reporting year and 'other amounts collected for reclamation or destruction from within the EU', and then subtracting reported amounts for bulk exports, destruction (on-site by reporting companies and off-site within the EU on reporting companies' behalf), amounts used as feedstock by reporting companies and stocks held on 31 December of the reporting year.

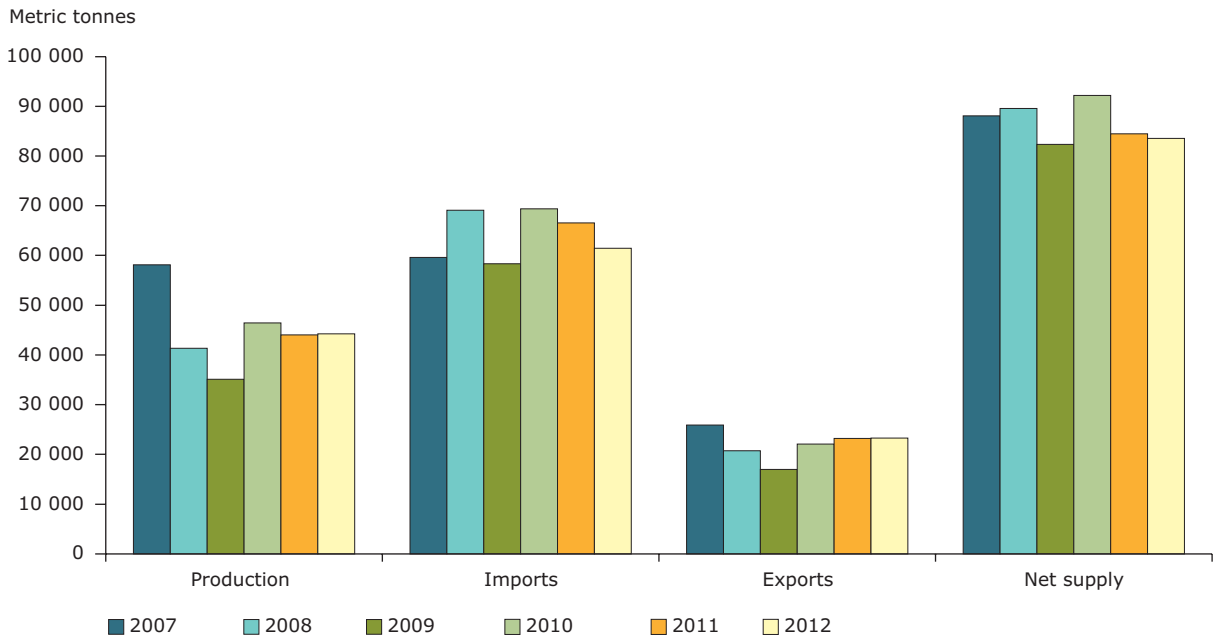
Changes between 2011 and 2012

When expressed in metric tonnes, key parameters for the reporting year 2012 show the following trends: similar production (+ 0.4 %) and export (+ 0.5 %) of F-gases (see Figure ES.1); sharp decrease in imports (– 8 %) and slight decrease in EU net supply (– 1.1 %). When data are expressed in CO_2-equivalents (see Figure ES.2), the picture of trends is only slightly different; a distinct decrease is still observed for imported F-gases (– 10 %), and a slight decrease is evident for net supply (– 1.3 %). Export remains rather constant (– 0.4 %). A visible increase in production is observed compared to 2011 (+ 2.6 %).

Long-term trends

When looking at the long-term trends since 2007, production appears to stabilise after the sharp decline that was observed from 2007 to 2010. In metric tonnes, HFC production is dominant (above 90 %). The share of non-HFC production (i.e. SF_6 and PFC) ([7]), however, is highly relevant when measured in CO_2-equivalents. It has been gaining weight consistently since 2009. Imports of F-gases have been on the decline since 2008, with a dip in the 'economic crisis' year of 2009. Similar to production data, exports (when measured in metric tonnes) appear to stabilise after the sharp decline that was observed from 2007 to 2010. When measured in CO_2-equivalents, however, 2011 and 2012 export levels exceed the 2007 starting point, mainly due to increasing SF_6 exports. Finally, the longer-term trend for EU net supply shows a stabilisation at levels which are close to the 'economic crisis' year 2009. Quantitatively, PFCs are not significant for any of these parameters.

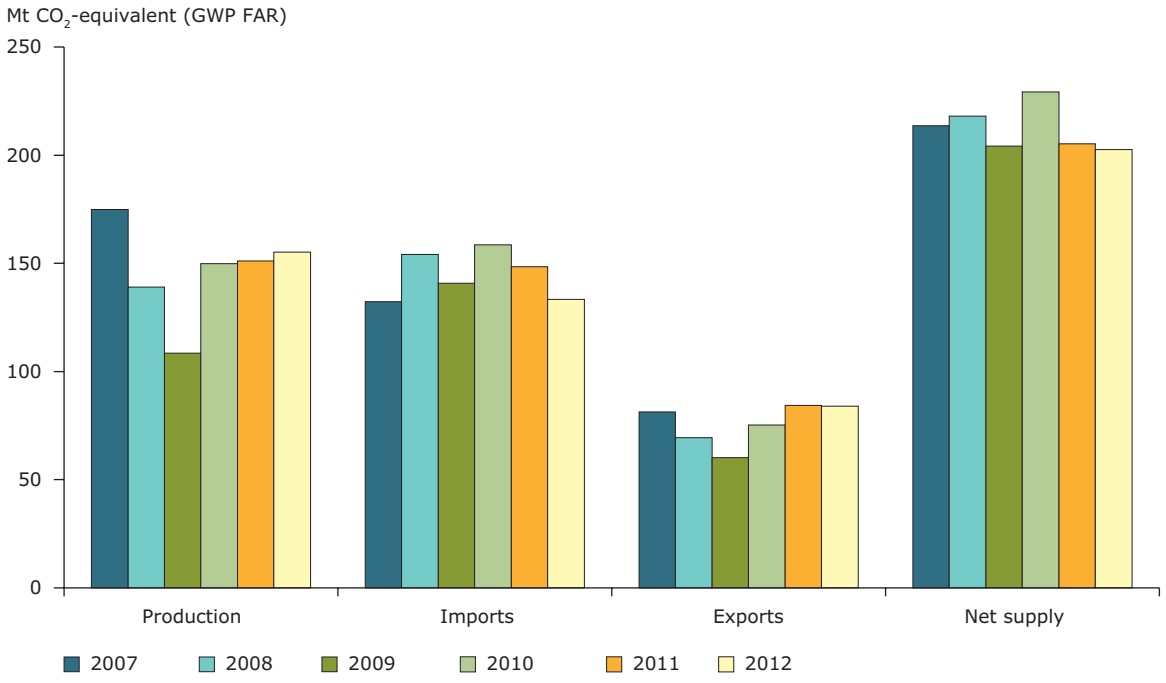
Figure ES.1 Trend in the production, imports, exports and net supply of aggregated F-gases within the European Union (metric tonnes)



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

([7]) SF_6 production cannot be separately disclosed in this report for data confidentiality reasons.

Figure ES.2 Trend in the production, imports, exports and net supply of aggregated F-gases within the European Union (expressed in CO_2-equivalents, GWP FAR)



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Shares of individual F-gases

For individual F-gases, the compounds contributing to the major share of 2012 production, imports, exports and net supply were HFCs.

SF_6 is of relatively minor relevance if expressed in metric tonnes (8 % or less), but its very high GWP increases its contribution to the overall share when expressed in CO_2-equivalents. In GWP-weighted tonnes, SF_6 in 2012 accounts for 55 % of exports, 17 % of net supply and (combined with PFCs) 47 % of production ([8]). Imports were very much HFC-based, with only 6 % being SF_6.

PFCs were of low significance in 2012 for all mentioned parameters (comprising 3 % or less of the total statistics). However, production, exports and imports of PFCs are all clearly on the rise. Overall, the net supply of PFCs is not increasing.

With respect to HFCs in 2012, HFC-134a, HFC-365mfc, HFC-143a and HFC-125 are the substances produced in the largest quantities. HFC imports are focussed on HFC-134a, HFC-125, HFC-152, HFC-143a and HFC-32. When expressed in CO_2-equivalents, however, only imports of HFC-125, HFC-134a and HFC-143a play a major role. 2012 HFC exports mainly consist of HFC-134a and HFC-365mfc, if expressed in metric tonnes. Based on CO_2-equivalents, HFC-134a, HFC-125, HFC-143a and HFC-365mfc are the most significant. HFC net supply is dominated by HFC-134a, HFC-125, HFC-143a, HFC-152a, HFC-32 and HFC-365-mfc when expressed in metric tonnes. When expressed in CO_2-equivalents, however, only HFC-134a, HFC-125 and HFC-143a are of major significance in 2012 HFC net supply. These patterns are similar to the data for previous years.

([8]) SF_6 production cannot be separately disclosed in this report for data confidentiality reasons.

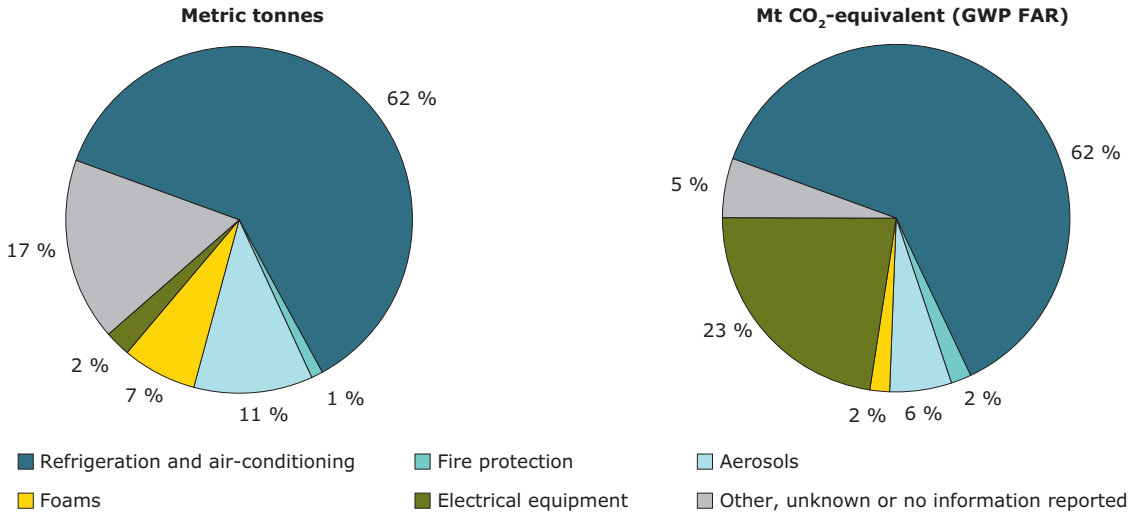
Intended applications of F-gases

The majority of the intended applications in relation to the net supply of F-gases to the EU market in 2012 were for refrigeration and air-conditioning purposes (Figure ES.3), applications that use almost only HFCs. The foams and aerosols sectors are also significant in terms of their use of HFC when expressed in metric tonnes. SF_6 used in electrical equipment contributes a significant share of the intended applications of EU net supply when expressed in terms of CO_2-equivalents, as described above. Despite some data gaps for which no information on intended application is available, the 2007–2012 trends show that there is a strong decrease in the use of F-gases for foams. Refrigeration and air conditioning usage have also declined since 2007, while uses for aerosols and fire protection show a certain volatility in the trend. However, it should be noted that the quantities of F-gases contained in imported and exported equipment are not captured in the reporting data and this may affect the observed trends.

Reclamation, destruction and feedstock use of F-gases

For 2007–2012, reclamation of F-gases was reported in low quantities. They represented only 1 % of the net supply when measured in CO_2-equivalents, and even less when measured in metric tonnes. Feedstock use and destruction ([9]) were reported in the order of magnitude of up to 4 % of the net supply when measured in CO_2-equivalents, and considerably less when measured in metric tonnes. However, the information reported by companies regarding the reclamation and destruction of F-gases cannot fully reflect the complete EU activities due to the scope of the reporting obligation. Only producers and importers are namely obliged to report on reclamation, destruction and own feedstock use. For example, the activities of specialised reclamation or destruction companies which only source on the EU market are not covered by the reporting.

Figure ES.3 **Percentage of the main intended applications of EU net supply of F-gases in 2012 as reported by companies in the European Union, expressed in metric tonnes (left) and CO_2-equivalents (right)**



([9]) Data reported on feedstock use and destruction are jointly disclosed in this report for data confidentiality reasons.

1 Introduction

1.1 Background

Greenhouse gases covered by the Kyoto Protocol include, amongst others, three groups of fluorinated greenhouse gases (F-gases): hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). These F-gases have very long lifetimes in the atmosphere and high global warming potentials (GWPs).

Ozone-depleting substances are largely being phased out in the EU in compliance with the Montreal Protocol and Regulation (EC) No 1005/2009 ([10]). Since certain F-gases are used as replacements for ozone-depleting substances and their use is increasing in many different applications, they have considerable growth potential.

F-gases accounted for approximately 2 % of EU-27 overall greenhouse gas emissions in 2010 ([11]), and this share continues to increase.

The EU-15 has a target under the UNFCCC Kyoto Protocol to reduce the whole basket of greenhouse gases — including F-gases — by 8 %. To comply with this target, the European Climate Change Programme (ECCP) identified some cost-effective policies and measures. One of these measures is Regulation (EC) No 842/2006 (the F-Gas Regulation) ([12]).

The F-Gas Regulation follows two tracks of action.

- Firstly, through improving the 'leak-tightness' of equipment containing F-gases. Measures include: labelling of equipment containing F-gases, training and certification of personnel and companies handling this type of gases, containment of F-gases within equipment, and proper recovery of F-gases from equipment that is no longer used.

- Secondly, through avoiding the use of F-gases in some applications where more environmentally superior alternatives are already cost-effective. Measures include restrictions on the use and marketing of F-gases in these cases.

The present report summarises the data reported by companies according to Article 6 of the F-Gas Regulation. Article 6 contains a requirement for each producer, importer and exporter of more than one tonne of F-gases or preparations ([13]) (blends) to report to the European Commission on the quantities produced, imported and exported in each calendar year, and provide related data such as the main intended applications of the F-gases. Reported imports and exports of F-gases should only include those quantities imported from, or exported to, countries outside the EU. Imports and exports of F-gases contained in products or equipment are not covered by this reporting obligation. Commission Regulation (EC) No 1493/2007 ([14]) establishes the format for the reports to be submitted.

([10]) Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer.
([11]) EEA Greenhouse Gas data viewer: http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer, viewed on 29 May 2013.
([12]) Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases.
([13]) Industry often refers to preparations as blends. 'Preparation' is defined by Commission Regulation (EC) No 1493/2007 as 'a mixture composed of two or more substances at least one of which is a fluorinated greenhouse gas, except where the total global warming potential of the preparation is less than 150. The total global warming potential of the preparation shall be determined in accordance with Part 2 of Annex I of Regulation (EC) No 842/2006 on certain fluorinated greenhouse gases.'
([14]) Commission Regulation (EC) No 1493/2007 of 17 December 2007 establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, the format for the report to be submitted by producers, importers and exporters of certain fluorinated greenhouse gases

Box 1.1 Revision of the F-Gas Regulation

Following a review of the adequacy of the F-Gas Regulation — including a public consultation and a stakeholder conference — the European Commission in 2012 made a proposal for a new F-Gas Regulation ([15]). As proposed by the Commission, the revised Regulation would reduce F-gas emissions by two-thirds of today's levels by 2030. The proposal maintains many measures of the existing Regulation, in particular related to leak prevention, recovery and certification of technicians.

Large reductions in F-gas use and emissions are expected from a novel measure, which will progressively cap allowed sales of HFCs on the EU market ('phase-down') as well as from bans of F-gases with a high Global Warming Potential (GWP).

This proposal was still under negotiation by the co-legislators (European Parliament and Council) at the time of the drafting of present report.

1.2 Institutional arrangements

Since 2012, the European Environment Agency (EEA) has taken over the collection, data storage, quality control, and analysis of the companies' F-gas reports, as well as responsibility for the provision of support to the reporting companies. From 2012 onwards, technical support to the F-gas reporting process is provided by the EEA's European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM) ([16]). In previous years, collection, quality control, analysis and support for the F-gas reporting process were performed by consultants in the context of service contracts with the European Commission.

1.3 Report structure

This report contains an explanation of the reporting procedures (Chapter 2) and the methodology for data aggregation (Chapter 3). The key aggregation results are presented in Chapter 4. These include the following F-gas data: production, import, export, net supply, reclamation, destruction and feedstock use. The aggregation of 'sales' data, which was included in previous EU internal reports and factsheets on F-gases, is not included in the present report. 'Sales' has been replaced by the 'net supply' parameter.

1.4 Use of global warming potentials (GWPs)

In order to make different F-gases comparable in terms of their potential impact on climate change, GWPs are used. The multiplication of a quantity of a given F-gas expressed in metric tonnes with its specific GWP leads to the respective quantity expressed in CO_2-equivalents.

The F-Gas Regulation defines a set of GWP values in its Annex I. The GWP values of the F-Gas Regulation are in line with those published in the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report (TAR) (IPCC, 2001). However, another more recent set of GWPs was published by the IPCC in its Fourth Assessment Report (FAR) (IPCC, 2007). The proposed revision of the F-Gas Regulation (cf. Box 1.1) makes use of this more recent set of GWPs.

The present report applies both of these sets of GWPs for its analyses. Firstly, in the main body of the report, the conversion into CO_2-equivalents is given based on the most recent set of GWPs of the IPCC FAR and is referred to as 'GWP FAR'. Furthermore, in Annex 2 to this report, the conversion based on the GWPs of the F-Gas Regulation (equalling the GWPs of the IPCC TAR) is given in order to facilitate comparisons. This second

([15]) Proposal for a regulation of the European Parliament and of the Council on fluorinated greenhouse gases, COM(2012) 643.
([16]) European Topic Centre on Air Pollution and Climate Change Mitigation (ETC/ACM) http://acm.eionet.europa.eu.

conversion is referred to as 'GWP TAR'. On average, the use of GWP FAR compared to GWP TAR values leads to results approximately 4–5 % higher for quantities expressed in CO_2-equivalents. Annex 1 to this report contains the list of F-gases subject to reporting and the GWP TAR and GWP FAR sets for these gases.

1.5 Data used in this report

The report is based on submissions for the reporting year 2012 — the sixth reporting year under the F-Gas Regulation — as received by 31 July 2013. With the official reporting deadline being 31 March 2013, the later cut-off-date for the data in the report allowed for the inclusion of data from companies delivering late as well as for resubmissions of corrected data.

In 2013, data reported in former years were reviewed. Data corrections were incorporated by the European Commission for data from 2007 to 2010, and the EEA for data from 2011. This resulted in a number of data corrections, in particular for exports. The data resulting from the review exercises are taken into account for this report. Therefore, the data related to the years from 2007 to 2011 presented in the present report partly differ from the information contained in the 2012 EEA F-gas report ([17]).

1.6 NIL reports

Companies that consider themselves excluded from Article 6 of the F-Gas Regulation regarding their 2012 transactions were invited to informally communicate this by email to the EEA (NIL report). Furthermore, in 2013 companies were able to submit a NIL report through the web questionnaire in the BDR.

1.7 Confidentiality

Data submitted by companies is commercially confidential. For this reason, only aggregated data is provided in this report. To this end, a 'three companies rule' regarding confidentiality of data is applied; this means that aggregation results consisting of less than three company reports are not disclosed.

However, these confidential amounts on a disaggregated level are included in the aggregated totals of the respective tables. For example, the 'not disclosed confidential aggregation result' for imports of HFC-245fa is included both in the HFC totals and F-gas totals for import.

([17]) EEA Technical report No 12/2012: *Fluorinated greenhouse gases 2011. Data reported by companies on the production, import and export of fluorinated greenhouse gases in the European Union*.

2 Reporting procedure

2.1 Procedures for reporting by companies

In line with the changes in the EU institutional arrangements concerning reporting, a new process for the submission of the reports by companies was established in 2012. Some additional improvements have been implemented for the reporting cycle in 2013.

By the reporting deadline of 31 March 2013 (established by the F-Gas Regulation), the company reports on F-gases in 2012 had to be submitted to the EEA using a newly developed online questionnaire — replacing the spreadsheet-based reporting of previous years — via the password protected online Business Data Repository (BDR) at https://bdr.eionet.europa.eu.

Support to companies included:

- assistance with the new reporting procedures through the BDR, a BDR reporting manual ([18]) and the BDR helpdesk (bdr.helpdesk@eea.europa.eu);
- technical support regarding the F-gas reporting obligations through the FAQ document ([19]), and the F-gas support team. The support team consisted of staff from EEA's ETC/ACM ([20]).

Although submission via the BDR was strongly encouraged, reporting via email was still allowed and therefore did not result in potential non-compliance with the reporting obligation. In the end, all quantitative information (non NIL reports) were uploaded via the BDR and the online questionnaire.

Reporters also had the possibility to (re-)submit reports for previous years — i.e. before 2012.

2.2 Reporting format

The format for the reporting on F-gases by companies in accordance with Article 6 of the F-Gas Regulation is laid down in Commission Regulation (EC) 1493/2007.

For the former reporting cycles, this format was translated into a spreadsheet tool.

The online questionnaire implemented for reporting year 2012 did not request any additional information compared to previous years. However, the lay-out and reporting tables were changed so that companies did not have to report the same information more than once.

2.3 Data quality checking

The implementation of the online questionnaire allowed for the introduction of automatic quality checks.

When submitting the questionnaires, a wide set of automated quality checks on completeness, consistency and plausibility was performed before acceptance of the report. Two types of error messages were defined: 'blocking errors' and 'potential errors'. In the case of 'blocking errors', reporters received an immediate feedback that the submission was not accepted. 'Potential errors' were scrutinised in a post-submission quality control stage by the F-gas support team of the ETC/ACM and discussed with the reporter. In cases of confirmed errors, the reporters were asked to resubmit a corrected dataset. Reporters also had the option to autonomously run the automated quality checking procedure in order to check their questionnaire before submission.

([18]) A detailed BDR reporting manual with a specific manual on the F-gases questionnaire in English is available on the BRD website at https://bdr.eionet.europa.eu/help.
([19]) The FAQ document is available at https://bdr.eionet.europa.eu/help.
([20]) Contact mailbox: f-gases.reporting@eea.europa.eu.

In the cases where the ETC/ACM F-gas support team identified inconsistencies or had additional questions as a result of the data quality control, it contacted the individual companies for further clarifications. If reported information had to be corrected, companies were requested to upload a revised report via the BDR to assure the transparency of the reporting process.

2.4 Timeline for 2013 reporting

On 22 February 2013, the EEA sent an invitation to report to relevant companies, accompanied by an explanation of the new reporting procedures for 2013. The BDR helpdesk provided login and password information valid for the year 2013 to the dedicated contact persons of each individual company. This communication also included information on the revised reporting platform and the use of the online forms.

These actions were followed by reminders on 20 March 2013 and 27 March 2013 to all companies registered in the BDR that had neither submitted a report via the BDR nor sent a NIL report.

After the 31 March reporting deadline, warnings were sent by the European Commission on 5 April 2013 and 12 April 2013 to the registered companies that had not yet submitted either an F-gas report or a NIL report. For companies that did not submit their report by 22 April 2013, the Commission requested the competent authority in the respective Member State to investigate the company's non-compliance with Article 6 of Regulation (EC) No 842/2006.

The data collection process for the preparation of the present report was closed on 31 July 2013.

2.5 Number and distribution of reporting companies

In total, 129 companies submitted an eligible report (excluding the NIL reporters) for the reporting year 2012 by 31 May 2013. Figure 2.1 shows the distribution of 2012 reporters among the Member States. Most reporters are situated in large countries like Germany, Italy, Spain or the United Kingdom, while three Member States do not host any reporting company (Austria, Finland, and Luxembourg).

Table 2.1 shows the distribution of reporting companies by Member State and transaction types (i.e. producers, importers and exporters). Note that the sum of producers, importers and exporters can exceed the number of reporters as a single company may report for more than one transaction type.

Figure 2.1 Number of reporters per Member State

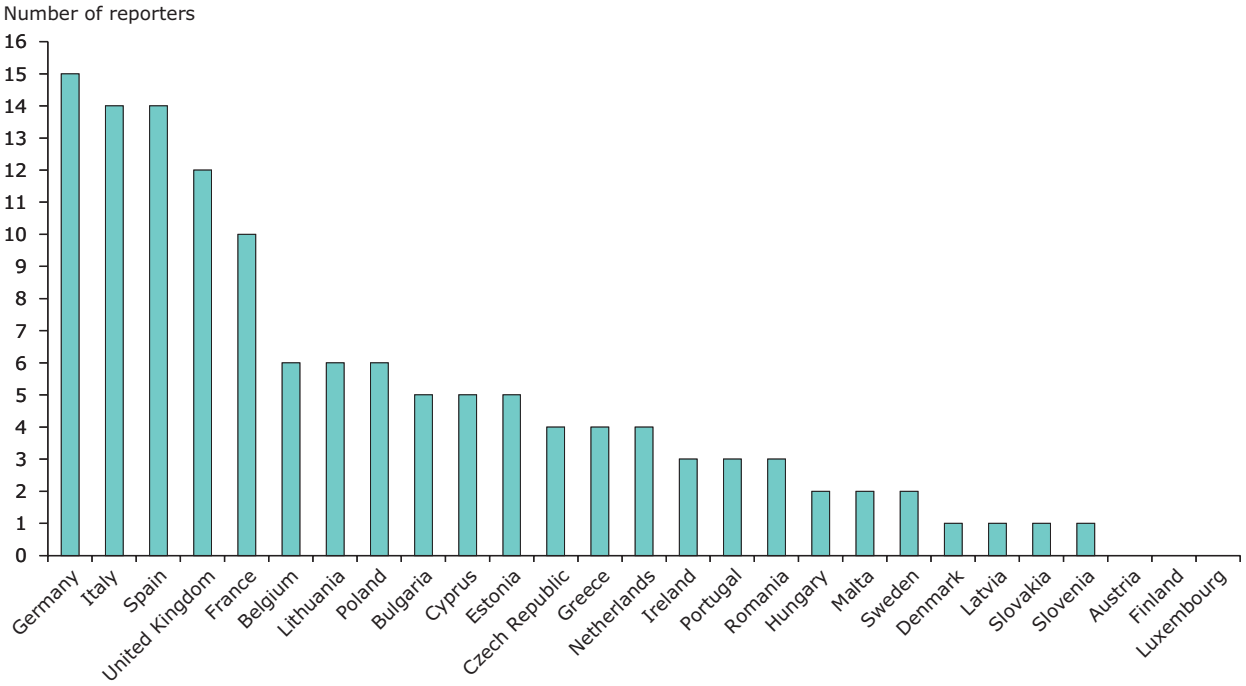


Table 2.2 depicts the timeline of the number of reporters. The number of reporting companies for 2012 increased by 7 % compared to 2011. The increase is mainly due to an increase in importing companies. Possible explanations for changes in the timeline were not investigated for the present report.

2.6 Number of NIL reporters

The companies submitting a NIL report are not included under the 'reporting companies' in Section 2.5. A total of 55 companies submitted a NIL report for 2012, of which 30 submitted their NIL report through the BDR, and 25 companies submitted their NIL report only by email.

Table 2.1 Number of reporting companies for the reporting year 2012 by Member State and a breakdown over transaction types

Country	Reporters	Producers	Importers	Exporters
European Union	129	9	88	78
Austria	–	–	–	–
Belgium	6	1	4	6
Bulgaria	5	–	5	–
Cyprus	5	–	5	–
Czech Republic	4	–	3	1
Denmark	1	–	–	1
Estonia	5	–	5	–
Finland	–	–	–	–
France	10	3	3	9
Germany	15	1	6	15
Greece	4	–	3	1
Hungary	2	–	1	2
Ireland	3	–	3	1
Italy	14	1	12	7
Latvia	1	–	1	–
Lithuania	6	–	3	5
Luxembourg	–	–	–	–
Malta	2	–	1	1
Netherlands	4	–	3	4
Poland	6	–	5	1
Portugal	3	–	2	1
Romania	3	–	3	1
Slovakia	1	–	1	1
Slovenia	1	–	1	–
Spain	14	1	10	9
Sweden	2	–	–	2
United Kingdom	12	2	8	10

Note: The sum of producers, importers and exporters can exceed the number of reporters as a single company may report for more than one transaction type.

Table 2.2 Number of reporting companies 2007–2012

Number of reporting companies	2007	2008	2009	2010	2011	2012
Total reporters	77	86	90	108	121	129
of which						
Producers	6	11	8	8	9	9
Importers	59	63	55	70	77	88
Exporters	42	48	58	72	77	78

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

2.7 Timeliness of submissions

The full reporting cycle (including the resubmissions) resulted in 159 submitting companies, of which 30 companies submitted a NIL report (in a number of cases after clarification of their situation), and 129 submitted an acceptable data report by 31 July 2013.

Among the 129 eligible data reports accepted by 31 July 2013, 80 reports (62 %) were received by the deadline of 31 March 2013, 44 in April 2013, 4 in May 2013, and the remaining reports in July 2013. Of the 55 companies submitting (voluntarily) a NIL report, 32 (58 %) submitted it by the reporting deadline of 31 March 2013 ([21]).

2.8 Lessons learned from the new reporting procedure

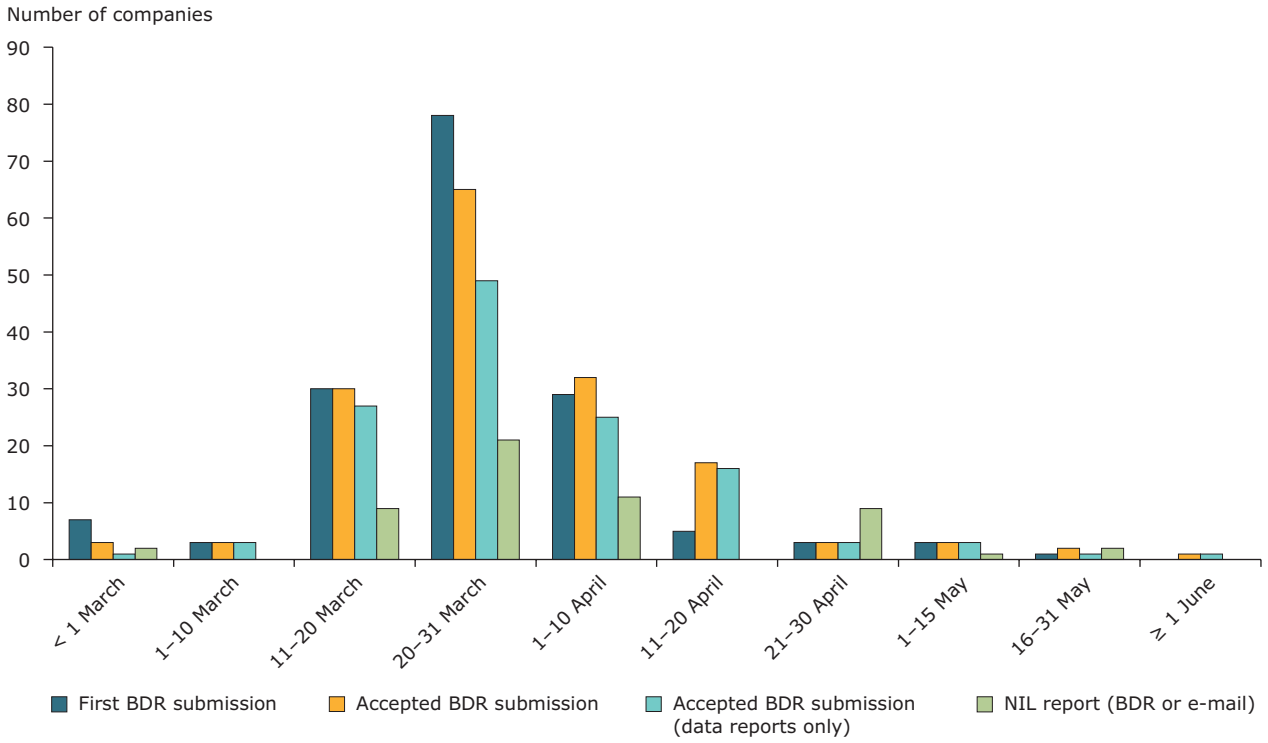
2.8.1 Overall lessons

The online questionnaire had a significantly positive impact on the reporting procedures and the problems encountered by the companies. With the spreadsheet forms, mandatory information (such as name and address of suppliers or export destination countries) was often missing, which necessitated additional investigations by the ETC/ACM. The design of the online questionnaire (mandatory fields) and the automatic quality checks resulted in a much lower proportion of reports submitted with missing or incorrect information. This significantly reduced the number of queries to the companies, resulting in a reduced administrative burden for companies, the EEA, the European Commission and the Member States concerned.

Most companies did not experience problems with the reporting procedure, nor with the newly developed web-based questionnaire.

The introduction of the electronic reporting platform BDR in 2012 and the online reporting questionnaire in 2013 drastically increased the transparency between all stakeholders (companies, Member States, the European Commission and the EEA). The use of one single repository for all the deliveries, including the feedback on the data quality, also provides increased traceability for all data submissions.

Figure 2.2 Timeliness of submission



([21]) Companies are not obliged to submit a NIL report.

3 Methodology for data aggregation

3.1 Information contained in the reporting forms

The reporting format for submitting the F-gas reports is described in European Commission Regulation (EC) 1493/2007. The reported information is contained in the following sets of forms.

- Part 3 of the Reporting Form for Producers, Importers and Exporters of Fluorinated Greenhouse Gases (company information) ([22]). This is to be completed by all companies and includes a statement as to whether the company reports as a producer of F-gases within the EU, is an importer of F-gases into the EU, and/or is an exporter of F-gases out of the EU. For production and import activities, the gas groups HFCs, PFCs and SF_6 need to be differentiated. Based on the choice of F-gas activities, a tailored set of data reporting sheets is offered to the user of the form.

- Co-Producer Forms — specific for HFCs, PFCs and SF_6.
  These are to be completed by producers only. In these forms, purchases from and sales to other producers in the EU are to be reported by substance.

- Producer and Importer Forms — specific for HFCs, PFCs and SF_6.
  These are to be completed by producers and importers. In these forms companies report by substance on:

  - Production (A);
  - Import (B);
  - Export (C);
  - Other amounts collected for reclamation or destruction from within the EU ([23]) (D);
  - Purchases from (E) and sales to (F) EU co-producers (item for producers only, sums of the respective 'Co-Producer Forms');
  - Amounts purchased from other EU sources (G) (item for producers only);
  - Stocks at 1 January (H) and 31 December (I) (for non-producers: covering previously imported quantities only; for producers: full stocks);
  - Amount reclaimed by the reporting company (J);
  - Amount destroyed by the reporting company (on-site) (K);
  - Amount destroyed on behalf of the reporting company (off-site within the EU) (L);
  - Amount used as a feedstock by the reporting company (M).

Of these amounts, a calculated total for the 'net amount available for sale in the EU' is determined according to the formula (A+ B- C+ D+ E- F+ G+ H- I- K- L- M).

Furthermore, reporting companies need to give their best estimates on the intended applications of the amounts 'placed on the EU market for the first time'. The total amount placed on the EU market does not include any quantities previously held by EU importers and/or distributors. Therefore, for non-producing importers, the sum of the figures reported for intended applications should equal the calculated total mentioned above. For producers, the sum of the figures reported for intended applications should equal the calculated total minus any quantities sold on the EU market that were previously purchased from EU importers/distributors in the present reporting year or in previous years.

([22]) Part 3 of the 'Reporting Form for Producers, Importers and Exporters of Fluorinated Greenhouse Gases' (Annex to Commission Regulation (EC) No 1493/2007) was labelled 'company information' within the spreadsheet implementation of the reporting form used up to 2012. The term 'company information' was also used in the implementation of the online questionnaire in the BDR.

([23]) In Regulation (EC) No 842/2006 and Commission Regulation (EC) No 1493/2007, the terms 'European EU', 'EU' and 'EC' are used. In this report, the terminology 'European Union', 'Union' or 'EU' respectively is used, as the European Community has been replaced by the European Union according to the Treaty of Lisbon.

- Importer Form 3: HFC Preparations/HFC Blend Importer Form ([24])
  This form is to be completed by HFC importers. The sheet is structured like the 'producer and importer forms'. However, the producer-specific lines (A, E, F and G above) are missing. Instead of single substances, companies report on HFC preparations.

- Exporter Form
  This form is to be completed by exporters with amounts exported from the EU per substance/preparation. Additionally, the amounts exported for recycling, reclamation or destruction are also to be reported. All substances and preparations (HFCs, PFCs and SF_6) are covered in the 'Exporter Form'.

The form sheets concerning HFCs and PFCs, as well as the 'Exporter Form', offer the possibility to add substances or preparations in addition to those that are predefined. If a reporting company uses this option, the composition of an added preparation has to be stated.

3.2 Thresholds for the obligation to report

Under the F-Gas Regulation, reporting is only required if more than one tonne of F-gases is produced, imported or exported.

In some instances, companies that did not produce, import or export more than one tonne still completed parts of the forms that they were not obliged to. In these cases, the reported non-mandatory data were imported into the EEA's F-gases database (FDB). However, all data contained in the respective non-mandatory sheet of the reporting form were flagged in the FDB as 'non-mandatory' and are not used for aggregations in this report. Other actions taken regarding the data provided are listed below.

- If a company declares itself to be an exporter, and the sum of the masses of all exported F-gases and preparations (i.e. the sum of amounts in the column 'annual total exported from the EU' in the 'Exporter Form') was less than or equal to one tonne, all data contained in the exporter form (total exports and exports for recycling, reclamation or destruction) were flagged as 'non-mandatory'.

- If a company declared itself to be an importer and did not declare itself to be a producer, and the sum of the mass of all imported F-gases and preparations (sum of all rows 'amount imported into the EU' on all 'Producer and Importer Forms' and the 'Importer Form 3: HFC preparation') was less than or equal to one tonne, all data contained in all submitted producer and/or importer sheets were flagged as 'non-mandatory'.

- If a company declared itself to be both importer and producer, and the sum of the mass of all imported F-gases and preparations (sum of all rows 'amount imported into the EU' on all 'Producer & Importer Forms' and the 'Importer Form 3: HFC preparation') was less than or equal to one tonne, only data contained in 'Importer Form 3: HFC preparation' were flagged as 'non-mandatory'.

- If a company declared itself to be a producer, and the sum of the mass of all produced F-gases (sum of rows 'total new production from your facility/ies' in the 'Producer and Importer Form 1: HFCs', 'Producer and Importer Form 2: Other HFCs', 'Producer and Importer: PFCs' and 'Producer and Importer Form: SF_6') is less than or equal to one tonne, this was regarded as not plausible, and the company was contacted to verify the data.

3.3 Treatment of mandatory and non-mandatory substances and preparations

3.3.1 Mandatory substances and preparations

The limited list of single substances to be mandatorily reported is defined by the F-Gas Regulation. Preparations to be reported are defined as mixtures with a GWP above 150 and containing at least one substance that is mandatory to report.

([24]) In part 4 of the 'Reporting Form for Producers, Importers and Exporters of Fluorinated Greenhouse Gases' (Annex to Commission Regulation (EC) No 1493/2007) this form is called 'Importer Form 3: HFC preparations', while it is labelled 'HFC Blends Importer Form' in the spreadsheet implementation of the reporting form. In this report, the names as set in Commission Regulation (EC) No 1493/2007 are used. The term 'blend' is commonly used by industry for 'preparations' as defined in Commission Regulation (EC) No 1493/2007.

In the questionnaire, reporters have the option to select F-gases and preparations from a pre-defined list, as well as to define a new preparation not yet contained in the offered selection. A new preparation was only accepted if it contained at least one substance defined as an F-gas by the F-Gas Regulation.

3.3.2 Storage of data

The following information was stored in the EEA's F-gases database (FDB) on quantities of preparations containing at least one mandatory substance:

a) the mass of the preparation, together with the type of activity (import, export, stocks, intended applications, for destruction, etc.);

b) the composition of the preparation, specifying the weight percentages of mandatory substances. For preparations containing non-mandatory substances, the balance to 100 % was stored as 'other preparation constituents'.

3.3.3 Aggregation of data

In the aggregate reporting, preparations are not accounted for per se. Instead, the amounts of the single mandatory substances contained in the imported/exported preparations are added to the respective sums reported as single substances. No aggregation is made for the non-mandatory constituents of preparations.

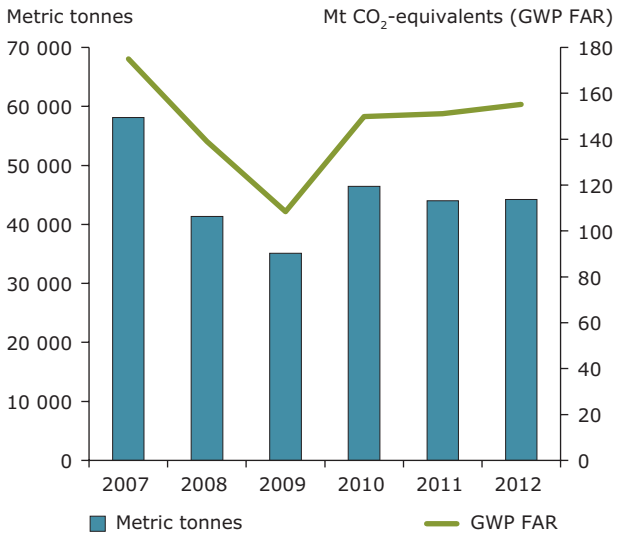
4 Aggregation results

4.1 Production of fluorinated gases

For 2012, companies reported the production of 10 out of the 25 F-gases subject to the reporting obligation (the same set as for 2011). Total production of F-gases remained stable in 2012 at approximately 44.2 kt of F-gases (a year-on-year increase of 0.4 %, Table 4.1). In terms of CO_2-equivalents, however, production rose by 3 % (Table 4.2). This increase is due to a combination of a number of different changes, namely: stagnation in production of low-GWP HFCs, complemented by a 13 % increase of the high-GWP SF_6 and PFC production. Figure 4.1 presents the timelines of total F-gas production, both in metric tonnes and CO_2-equivalents. Figure 4.2 and Figure 4.3 show the development of the split of total F-gases into HFCs and PFCs/SF_6 ([25]), in metric tonnes and CO_2-equivalents respectively.

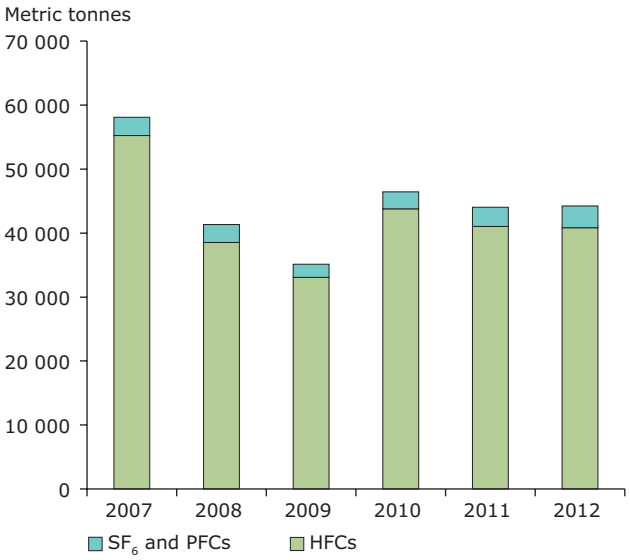
SF_6 and PFCs account for 48 % of 2012 production when measured in CO_2-equivalents (GWP FAR), but only for 8 % when measured in metric tonnes. The remainder of produced F-gases (52 %) consists of HFCs. HFC-143a accounts for 13 % (metric tonnes) or 29 % (GWP FAR) of EU HFC production. The production shares of other HFC species cannot be disclosed for data confidentiality reasons.

Figure 4.1 **Timeline of total F-gases production**



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

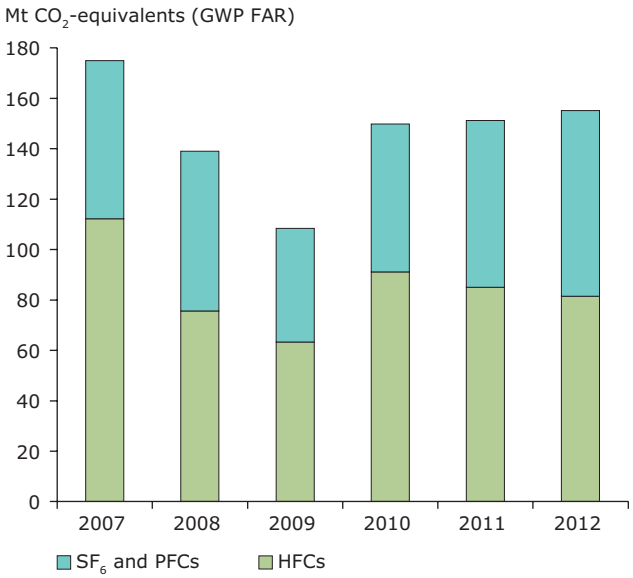
Figure 4.2 **Timeline of production by groups of F-gases (metric tonnes)**



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

([25]) For data confidentiality reasons, SF_6 and PFC totals for production are not separately disclosed.

Figure 4.3 Timeline of production by groups of F-gases (expressed in CO_2-equivalents — GWP FAR)



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table 4.1 Production of F-gases in the period 2007 to 2012 (metric tonnes)

	2007	2008	2009	2010	2011	2012
Gas			**Metric tonnes**			
HFC-32	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-125	6 569	1 757	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134a	31 289	21 328	< 3 comp.	21 457	< 3 comp.	< 3 comp.
HFC-143a	6 160	5 182	< 3 comp.	< 3 comp.	5 122	5 287
HFC-152a	–	< 3 comp.	–	–	–	–
HFC-227ea	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-245fa	–	–	< 3 comp.	–	–	–
HFC-365mfc	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-43-10mee	–	–	–	–	–	–
HFC-23	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-41	–	–	–	–	–	–
HFC-134	–	–	–	–	–	–
HFC-143	–	–	–	–	–	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	–	–	–	–	–	–
HFC-245ca	–	–	–	–	–	–
CF_4	–	–	–	–	–	–
C_2F_6	–	–	–	–	–	–
C_3F_8	< 3 comp.	–	–	< 3 comp.	< 3 comp.	< 3 comp.
C_4F_{10}	< 3 comp.	–	–	< 3 comp.	–	–
C_5F_{12}	–	–	–	–	–	–
C6F14	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	–	–	–	–	–	–
SF_6	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
SF_6 and total PFCs	2 863	2 840	2 016	2 649	2 989	3 366
Total HFCs	55 235	38 519	33 106	43 792	41 040	40 854
Total F-gases	**58 098**	**41 359**	**35 123**	**46 440**	**44 030**	**44 220**

Note: –: no data reported;
< 3 comp.: The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table 4.2 Production of F-gases in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP FAR)

	2007	2008	2009	2010	2011	2012
Gas	**Million tonnes of CO_2-equivalents (GWP FAR)**					
HFC-32	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-125	23.0	6.1	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134a	44.7	30.5	< 3 comp.	30.7	< 3 comp.	< 3 comp.
HFC-143a	27.5	23.2	< 3 comp.	< 3 comp.	22.9	23.6
HFC-152a	–	< 3 comp.	–	–	–	–
HFC-227ea	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-245fa	–	–	< 3 comp.	–	–	–
HFC-365mfc	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-43-10mee	–	–	–	–	–	–
HFC-23	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-41	–	–	–	–	–	–
HFC-134	–	–	–	–	–	–
HFC-143	–	–	–	–	–	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	–	–	–	–	–	–
HFC-245ca	–	–	–	–	–	–
CF_4	–	–	–	–	–	–
C_2F_6	–	–	–	–	–	–
C_3F_8	< 3 comp.	–	–	< 3 comp.	< 3 comp.	< 3 comp.
C_4F_{10}	< 3 comp.	–	–	< 3 comp.	–	–
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	–	–	–	–	–	–
SF_6	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
SF_6 and total PFCs	62.8	63.4	45.2	58.7	66.1	73.7
Total HFCs	112.2	75.6	63.3	91.1	85.0	81.4
Total F-gases	**175.0**	**139.0**	**108.4**	**149.8**	**151.1**	**155.1**
Average GWP	*3 012*	*3 361*	*3 088*	*3 226*	*3 432*	*3 508*

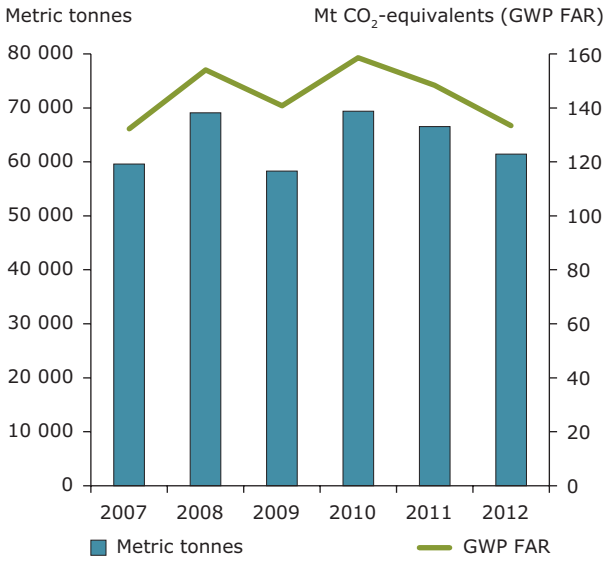
Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

4.2 Imports of fluorinated gases

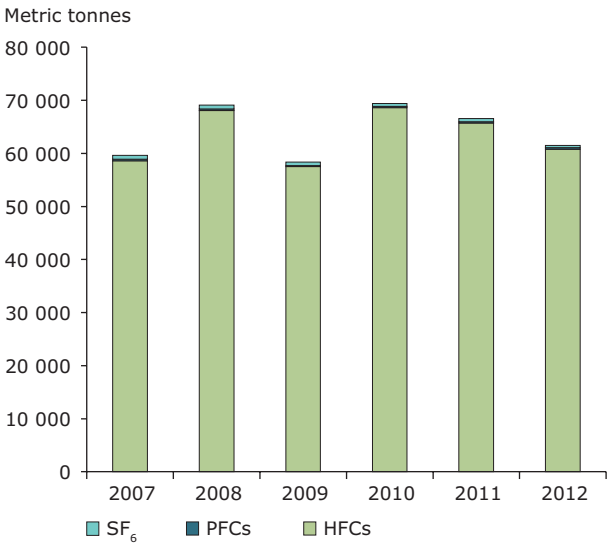
For 2012, imports were reported for 16 of the 25 F-gases subject to the reporting obligation (the same set as for 2011). Total imports of F-gases decreased in 2012 to 61.5 kt of F-gases, compared to 66.5 kt in the year 2011 (a year-on-year decline of 8 %, Table 4.3). In terms of CO_2-equivalents, the decrease of imports is of the same magnitude (– 10 % year-on-year, Table 4.4). Figure 4.4 shows the timelines of total F-gas imports, both in metric tonnes and CO_2-equivalents. Figure 4.5 and Figure 4.6 show the development of the split of total F-gases into HFCs, PFCs and SF_6, in metric tonnes and CO_2-equivalents respectively.

Figure 4.4 Timeline of total F-gas import



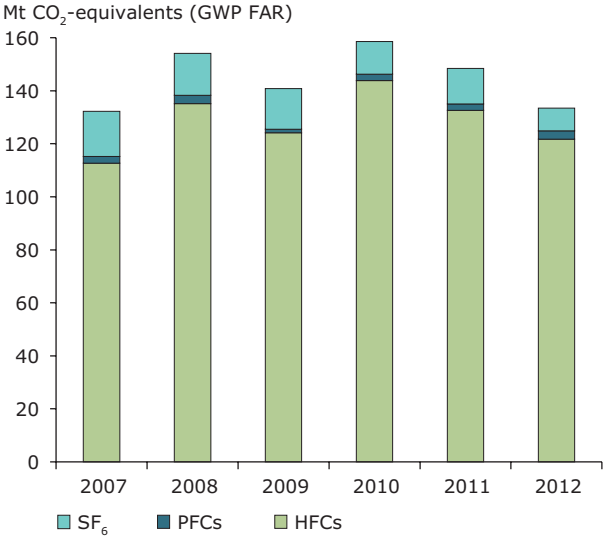
Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Figure 4.5 Timeline of import by groups of F-gases (metric tonnes)



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Figure 4.6 Timeline of import by groups of F-gases (expressed in CO_2-equivalents — GWP FAR)



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Most of the imports are of HFCs. Among HFCs, HFC-134a, HFC-125, HFC-152a and HFC-143a are imported in the largest volumes (expressed in metric tonnes). In terms of CO_2-equivalents (GWP FAR), HFC-125, HFC-134a and HFC-143a are most relevant.

In 2012, SF_6 accounted for 6 % of imports when measured in CO_2-equivalents (GWP FAR) or 1 % when measured in metric tonnes. The share of PFCs in imports is even lower. It should be noted, however, that PFC imports are on the rise both in metric tonnes and CO_2-equivalents.

Table 4.3 Import of F-gases in the period 2007 to 2012 (metric tonnes)

	2007	2008	2009	2010	2011	2012
Gas			**Metric tonnes**			
HFC-32	2 302	2 440	1 930	3 217	3 288	3 119
HFC-125	10 179	10 874	14 669	16 437	13 671	13 479
HFC-134a	34 522	38 261	27 835	33 026	33 239	31 682
HFC-143a	4 444	6 559	5 342	6 032	5 604	4 246
HFC-152a	4 440	6 174	5 262	6 588	6 622	5 490
HFC-227ea	273	1 738	1 229	1 551	1 574	1 017
HFC-245fa	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	–	–	–	–	–	–
HFC-43-10mee	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-23	130	187	124	144	128	136
HFC-41	< 3 comp.	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134	< 3 comp.	–	–	< 3 comp.	–	–
HFC-143	< 3 comp.	–	–	< 3 comp.	–	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	49	< 3 comp.	< 3 comp.	34	51	52
HFC-245ca	–	–	–	–	–	–
CF_4	< 3 comp.	87	37	61	67	101
C_2F_6	112	186	77	150	140	< 3 comp.
C_3F_8	121	26	10	< 3 comp.	< 3 comp.	22
C_4F_{10}	–	–	–	–	–	–
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	–	–	–	–	–	–
c-C_4F_8	< 3 comp.	6	5	< 3 comp.	< 3 comp.	< 3 comp.
SF_6	747	691	671	539	587	373
Total HFCs	58 612	68 077	57 524	68 593	65 720	60 777
Total PFCs	253	306	129	230	238	311
Total F-gases	**59 611**	**69 074**	**58 324**	**69 362**	**66 544**	**61 461**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table 4.4 Import of F-gases in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP FAR)

	2007	2008	2009	2010	2011	2012
Gas	**Million tonnes of CO_2-equivalents (GWP FAR)**					
HFC-32	1.6	1.6	1.3	2.2	2.2	2.1
HFC-125	35.6	38.1	51.3	57.5	47.9	47.2
HFC-134a	49.4	54.7	39.8	47.2	47.5	45.3
HFC-143a	19.9	29.3	23.9	27.0	25.1	19.0
HFC-152a	0.6	0.8	0.7	0.8	0.8	0.7
HFC-227ea	0.9	5.6	4.0	5.0	5.1	3.3
HFC-245fa	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	–	–	–	–	–	–
HFC-43-10mee	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-23	1.9	2.8	1.8	2.1	1.9	2.0
HFC-41	< 3 comp.	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134	< 3 comp.	–	–	< 3 comp.	–	–
HFC-143	< 3 comp.	–	–	< 3 comp.	–	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	0.5	< 3 comp.	< 3 comp.	0.3	0.5	0.5
HFC-245ca	–	–	–	–	–	–
CF4	< 3 comp.	0.6	0.3	0.4	0.5	0.7
C_2F_6	1.4	2.3	0.9	1.8	1.7	< 3 comp.
C_3F_8	1.1	0.2	0.1	< 3 comp.	< 3 comp.	0.2
C_4F_{10}	–	–	–	–	–	–
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	–	–	–	–	–	–
c-C_4F_8	< 3 comp.	0.1	0.0	< 3 comp.	< 3 comp.	< 3 comp.
SF_6	17.0	15.8	15.3	12.3	13.4	8.5
Total HFCs	112.7	135.1	124.1	143.8	132.6	121.7
Total PFCs	2.6	3.2	1.4	2.5	2.5	3.2
Total F-gases	**132.3**	**154.1**	**140.8**	**158.6**	**148.4**	**133.4**
Average GWP	*2 219*	*2 231*	*2 414*	*2 286*	*2 231*	*2 171*

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

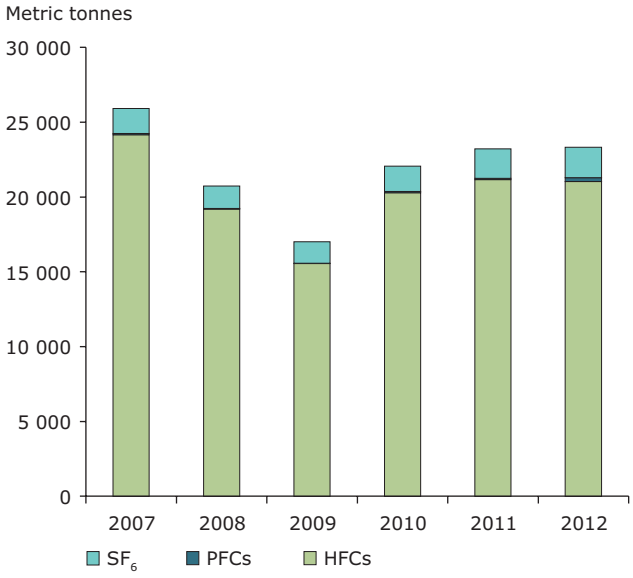
Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

4.3 Exports of fluorinated gases

For 2012, exports were reported for 16 of the 25 F-gases subject to the reporting obligation. Compared to 2011, HFC-236fa and C_4F_{10} disappeared from the list (Table 4.5). Total exports of F-gases slightly increased in 2012 to 23.3 kt of F-gases compared to 23.2 kt in the year 2011 (a 0.5 % year-on-year increase (Table 4.5). However, in terms of CO_2-equivalents, a slight decrease of exports is observed, – 0.4 % year-on-year (Table 4.6). Figure 4.7 shows the timelines of total F-gas exports, both in metric tonnes and CO_2-equivalents. Figure 4.8 and Figure 4.9 show the development of the split of total F-gases into HFCs, PFCs and SF_6, in metric tonnes and CO_2-equivalents respectively.

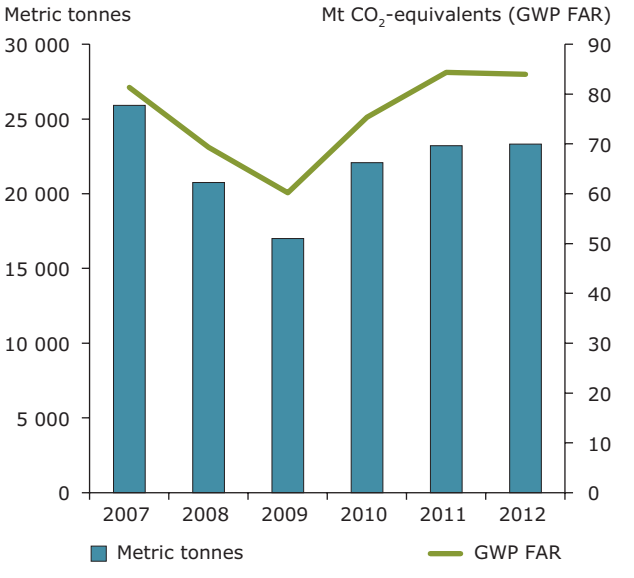
In 2012, SF_6 accounted for 55 % of all exports when measured in CO_2-equivalents (GWP FAR), but for only 9 % when measured in metric tonnes. The remainder of exported F-gases mostly consists of HFCs. The HFCs exported in the largest volumes are HFC-134a, HFC-365mfc, HFC-125, HFC-43a and

Figure 4.8 Timeline of export by groups of F-gases (metric tonnes)



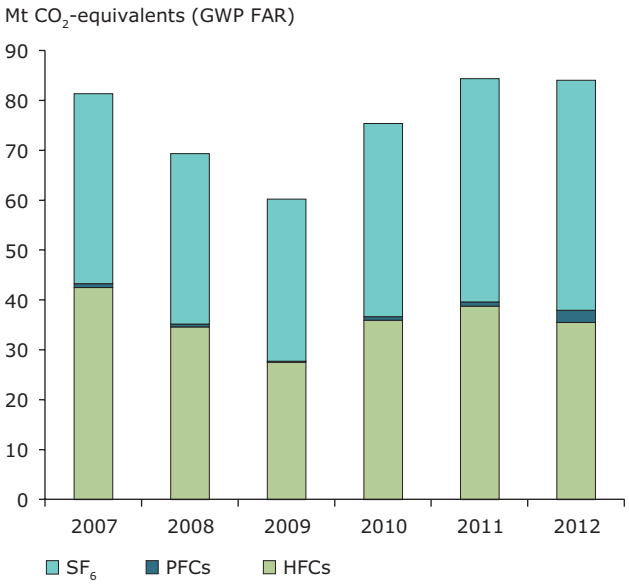
Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Figure 4.7 Timeline of total F-gas exports



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Figure 4.9 Timeline of export by groups of F-gases (expressed in CO_2-equivalents — GWP FAR)



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

HFC-32 (expressed in metric tonnes). Converted into CO_2-equivalents (GWP FAR), HFC exports are dominated by HFC-134a, HFC-125, HFC-143a, HFC-365mfc and HFC-227ea. Even though PFC exports in 2012 approximately doubled compared to 2011, the share of PFCs in exports is still very low (1 % when measured in metric tonnes and 3 % when measured in CO_2-equivalents).

Table 4.5 Export of F-gases in the period 2007 to 2012 (metric tonnes)

	2007	2008	2009	2010	2011	2012
Gas			**Metric tonnes**			
HFC-32	1 310	771	706	1 534	1 335	883
HFC-125	2 854	2 038	1 758	2 870	3 520	2 159
HFC-134a	15 999	12 318	9 925	10 703	11 079	12 480
HFC-143a	1 352	1 450	937	1 295	1 236	1 076
HFC-152a	108	158	< 3 comp.	632	262	186
HFC-227ea	204	271	187	352	433	460
HFC-245fa	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	2 254	2 111	1 932	2 813	3 264	3 755
HFC-43-10mee	< 3 comp.	< 3 comp.	< 3 comp.	48	< 3 comp.	< 3 comp.
HFC-23	11	15	17	12	8	10
HFC-41	–	–	–	–	–	–
HFC-134	< 3 comp.	–	–	< 3 comp.	–	–
HFC-143	–	–	–	–	–	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	–
HFC-245ca	–	–	–	–	–	–
CF_4	< 3 comp.	1	0	11	4	67
C_2F_6	< 3 comp.	< 3 comp.	1	1	< 3 comp.	< 3 comp.
C_3F_8	58	29	15	54	< 3 comp.	66
C_4F_{10}	< 3 comp.	< 3 comp.	–	< 3 comp.	< 3 comp.	–
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
SF_6	1 670	1 499	1 423	1 697	1 964	2 020
Total HFCs	24 162	19 187	15 564	20 291	21 158	21 041
Total PFCs	83	57	25	82	89	256
Total F-gases	**25 915**	**20 742**	**17 012**	**22 070**	**23 210**	**23 317**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table 4.6 Export of F-gases in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP FAR)

	2007	2008	2009	2010	2011	2012
Gas	**Million tonnes of CO_2-equivalents (GWP FAR)**					
HFC-32	0.9	0.5	0.5	1.0	0.9	0.6
HFC-125	10.0	7.1	6.2	10.0	12.3	7.6
HFC-134a	22.9	17.6	14.2	15.3	15.8	17.8
HFC-143a	6.0	6.5	4.2	5.8	5.5	4.8
HFC-152a	0.0	0.0	< 3 comp.	0.1	0.0	0.0
HFC-227ea	0.7	0.9	0.6	1.1	1.4	1.5
HFC-245fa	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	1.8	1.7	1.5	2.2	2.6	3.0
HFC-43-10mee	< 3 comp.	< 3 comp.	< 3 comp.	0.1	< 3 comp.	< 3 comp.
HFC-23	0.2	0.2	0.3	0.2	0.1	0.2
HFC-41	–	–	–	–	–	–
HFC-134	< 3 comp.	–	–	< 3 comp.	–	–
HFC-143	–	–	–	–	–	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	–
HFC-245ca	–	–	–	–	–	–
CF_4	< 3 comp.	0.0	0.0	0.1	0.0	0.5
C_2F_6	< 3 comp.	< 3 comp.	0.0	0.0	< 3 comp.	< 3 comp.
C_3F_8	0.5	0.3	0.1	0.5	< 3 comp.	0.6
C_4F_{10}	< 3 comp.	< 3 comp.	–	< 3 comp.	< 3 comp.	–
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
SF_6	38.1	34.2	32.4	38.7	44.8	46.1
Total HFCs	42.5	34.6	27.5	36.0	38.8	35.5
Total PFCs	0.8	0.5	0.2	0.7	0.8	2.5
Total F-gases	**81.4**	**69.3**	**60.2**	**75.4**	**84.4**	**84.0**
Average GWP	*3 140*	*3 342*	*3 538*	*3 414*	*3 635*	*3 603*

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

4.4 Net supply of fluorinated gases and their intended applications

'Net supply' is a parameter that provides information on the actual use of (bulk) F-gases by EU industries.

Net supply is calculated by firstly adding reported amounts for:

- production;
- imports (bulk imports only, imports contained in products or equipment are not considered in the reporting under the F-Gas Regulation);
- stocks held on 1 January of the reporting year;
- 'other amounts collected for reclamation or destruction from within the EU';

and then subtracting the following reported amounts:

- exports (bulk exports only, exports contained in products or equipment are not considered in the reporting under the F-Gas Regulation);
- destruction (on-site by reporting companies and off-site within the EU on reporting companies' behalf);
- amounts used as feedstock by reporting companies;
- stocks held on 31 December of the reporting year.

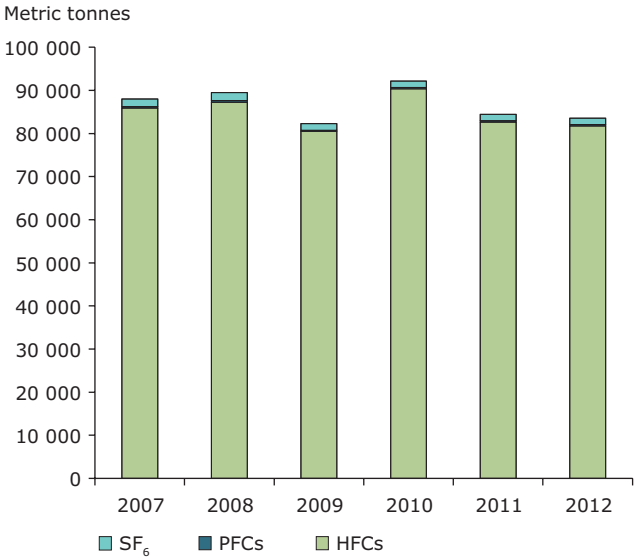
In Section 4.4.1, an overview is given of the total net supply of F-gases, including the timelines from 2007 to 2012. In the subsequent sections, the information reported on the intended applications of the F-gas amounts supplied to the EU market is summarised.

4.4.1 Net supply of fluorinated greenhouse gases

For 2012, net supply can be calculated for 18 out of the 25 F-gases subject to the F-gas reporting obligation. Compared to 2011, C_4F_{10} is disappearing from the list (Table 4.7). Net supply of F-gases decreased by 1 % in 2012 compared to 2011, both in terms of metric tonnes and in terms of CO_2-equivalents (Table 4.7 and Table 4.8). The overall trend in the F-gas net supply is mainly due to a 1 % decrease in HFC net supply (both in metric tonnes and in CO_2-equivalents), complemented by a 3 % (in metric tonnes) year-on-year decline in PFCs/SF_6 net supply (– 2 % when measured in CO_2-equivalents).

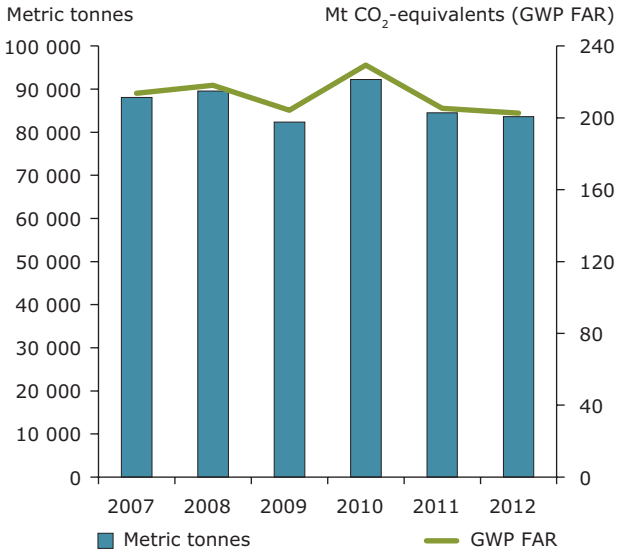
Figure 4.10 shows the timeline of the total F-gas net supply both in metric tonnes and CO_2-equivalents. Figure 4.11 and Figure 4.12 show the development of the split of total F-gases into HFCs, PFCs and SF_6, in metric tonnes and CO_2-equivalents respectively.

Figure 4.11 Timeline of net supply by groups of F-gases (metric tonnes)



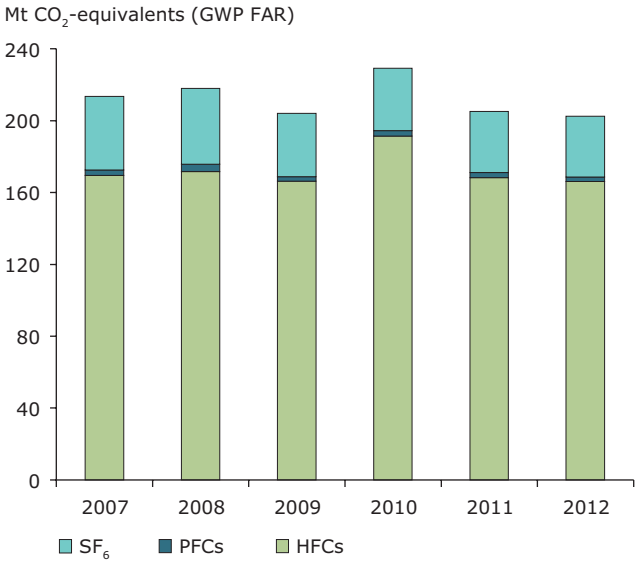
Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Figure 4.10 Timeline of total F-gas net supply



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Figure 4.12 Timeline of net supply by groups of F-gases (expressed in CO_2-equivalents — GWP FAR)



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

In 2012, SF_6 accounted for 17 % of the net supply when measured in CO_2-equivalents (GWP FAR), compared to only 2 % when measured in metric tonnes. The remainder of F-gas net supply mostly consists of HFCs. Among the HFCs, significant contributions are from three gases only, i.e. HFC-134a, HFC-125 and HFC-143a. The share of PFCs in the net supply is very low (1.2 % when measured in CO_2-equivalents, and less than 0.3 % when measured in metric tonnes).

Table 4.7 Net supply of F-gases in the period 2007 to 2012 (metric tonnes)

	2007	2008	2009	2010	2011	2012
Gas			**Metric tonnes**			
HFC-32	3 977	5 074	4 394	5 363	4 903	5 007
HFC-125	12 453	12 522	13 906	18 140	15 237	15 316
HFC-134a	48 919	46 073	41 146	43 375	39 947	39 939
HFC-143a	9 053	9 883	9 575	10 473	8 811	8 969
HFC-152a	3 816	6 151	5 182	5 744	6 130	5 567
HFC-227ea	775	1 780	1 776	2 083	2 038	1 469
HFC-245fa	2 124	1 776	1 248	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	4 478	3 776	3 052	3 547	3 901	3 860
HFC-43-10mee	< 3 comp.	< 3 comp.	50	56	< 3 comp.	< 3 comp.
HFC-23	256	184	190	239	181	106
HFC-41	< 3 comp.	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134	< 3 comp.	< 3 comp.	–	< 3 comp.	–	–
HFC-143	< 3 comp.	–	–	< 3 comp.	< 3 comp.	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	29	37	< 3 comp.	30	43	30
HFC-245ca	–	–	–	–	–	–
CF4	13	86	42	59	56	28
C_2F_6	93	178	113	153	131	< 3 comp.
C_3F_8	112	59	18	23	23	39
C_4F_{10}	< 3 comp.	< 3 comp.	–	< 3 comp.	< 3 comp.	< 3 comp.
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	< 3 comp.	6	< 3 comp.	6	10	< 3 comp.
SF_6	1 805	1 853	1 545	1 519	1 494	1 491
Total HFCs	85 944	87 288	80 544	90 396	82 702	81 842
Total PFCs	299	398	238	303	289	242
Total F-gases	**88 048**	**89 539**	**82 328**	**92 217**	**84 486**	**83 575**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table 4.8 Net supply of F-gases in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP FAR)

	2007	2008	2009	2010	2011	2012
Gas	**Million tonnes of CO_2-equivalents (GWP FAR)**					
HFC-32	2.7	3.4	3.0	3.6	3.3	3.4
HFC-125	43.6	43.8	48.7	63.5	53.3	53.6
HFC-134a	70.0	65.9	58.8	62.0	57.1	57.1
HFC-143a	40.5	44.2	42.8	46.8	39.4	40.1
HFC-152a	0.5	0.8	0.6	0.7	0.8	0.7
HFC-227ea	2.5	5.7	5.7	6.7	6.6	4.7
HFC-245fa	2.2	1.8	1.3	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	3.6	3.0	2.4	2.8	3.1	3.1
HFC-43-10mee	< 3 comp.	< 3 comp.	0.1	0.1	< 3 comp.	< 3 comp.
HFC-23	3.8	2.7	2.8	3.5	2.7	1.6
HFC-41	< 3 comp.	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134	< 3 comp.	< 3 comp.	–	< 3 comp.	–	–
HFC-143	< 3 comp.	–	–	< 3 comp.	< 3 comp.	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	0.3	0.4	< 3 comp.	0.3	0.4	0.3
HFC-245ca	–	–	–	–	–	–
CF_4	0.1	0.6	0.3	0.4	0.4	0.2
C_2F_6	1.1	2.2	1.4	1.9	1.6	< 3 comp.
C_3F_8	1.0	0.5	0.2	0.2	0.2	0.3
C_4F_{10}	< 3 comp.	< 3 comp.	–	< 3 comp.	< 3 comp.	< 3 comp.
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	< 3 comp.	0.1	< 3 comp.	0.1	0.1	< 3 comp.
SF_6	41.1	42.2	35.2	34.6	34.1	34.0
Total HFCs	169.6	171.8	166.5	191.5	168.3	166.2
Total PFCs	3.0	4.0	2.5	3.1	3.0	2.4
Total F-gases	**213.7**	**218.0**	**204.2**	**229.3**	**205.3**	**202.6**
Average GWP	*2 427*	*2 435*	*2 480*	*2 486*	*2 430*	*2 425*

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

4.4.2 Data gaps between the net supply and the intended applications data reported

In their submissions, companies report — per gas or per preparation — on the amounts they place on the market for the first time. In addition, they are obliged to specify (approximations where applicable) the intended applications of those amounts.

In the EU-wide aggregation, these amounts do not total the EU net supply as defined above. This is mainly due to three reasons:

1. **Export correction**
   Exporters who neither import nor produce are not required to report on amounts placed on the market, nor on intended applications. However, their exports are considered in the net supply parameter.

2. **Co-producer correction**
   Producers report on sales to and purchases from other EU producers (called 'co-producers' in Commission Regulation (EC) No 1493/2007) specifically by co-producer. In the reporting form, the balance of these sales and purchases (i.e. purchases minus sales) is added to the amount of F-gases for which the respective producer is obliged to report on intended applications. However, different producers' reports on these co-producer sales and purchases are not always consistent ([26]), so the EU-wide aggregation of purchases from co-producers does not necessarily meet the EU-wide aggregation of sales to co-producers. Thus, this may lead to double-counting or gaps in the EU-wide aggregation of the 'intended application' amounts.

3. **Intended applications correction**
   For importers, the reporting forms demand that intended applications are estimated for exactly the amount of F-gases which is defined as above net supply. In some reports, these figures do not match. This may lead to double counting or gaps.

As a consequence, a difference can be seen between the EU-wide aggregation of the net supply and the EU-wide aggregation of amounts for which intended applications were reported for all reporting years. This difference is accounted for in the following graphs and tables as 'no information reported'.

This difference can change in its arithmetic sign between reporting years. A negative amount supplied to the EU market can be interpreted as a net export. Deviation a) of the list above 'export correction' is always negative and depends on the exported amounts reported by companies which do not produce and import. Deviation b) 'co-producer correction' has gained relevance with the reinforced quality control since the 2011 reporting year and was strongly positive since, outweighing the negative contributions of the export correction. Deviation c) 'intended applications correction' is mostly relevant for 2007–2010, where quality control had been less stringent. In a number of cases, importers' data on intended applications were also reported for amounts which importers had purchased within the EU market, and thus are not part of the net supply. These contributions were mostly negative.

As a result, the sum of the amounts of reported intended applications were larger than the net supply in the years 2007–2010. This can mainly be attributed to insufficient quality control and the export corrections for 2007–2010. For the period from 2011 to 2012, the net supply was larger than the sum of the intended applications. In these years, the co-producer correction outweighed the export correction.

4.4.3 Intended applications of F-gas net supply in the period 2007 to 2012

In this section, the F-gas net supply is no longer differentiated by F-gas groups and species (as in Section 4.4.1), but rather differentiated according to the intended applications by EU industries. Figure 4.13 and Figure 4.14 illustrate the intended applications of F-gas net supply in the period from 2007 to 2012 in metric tonnes and CO_2-equivalents. Table 4.9 and Table 4.10 also document the respective amounts.

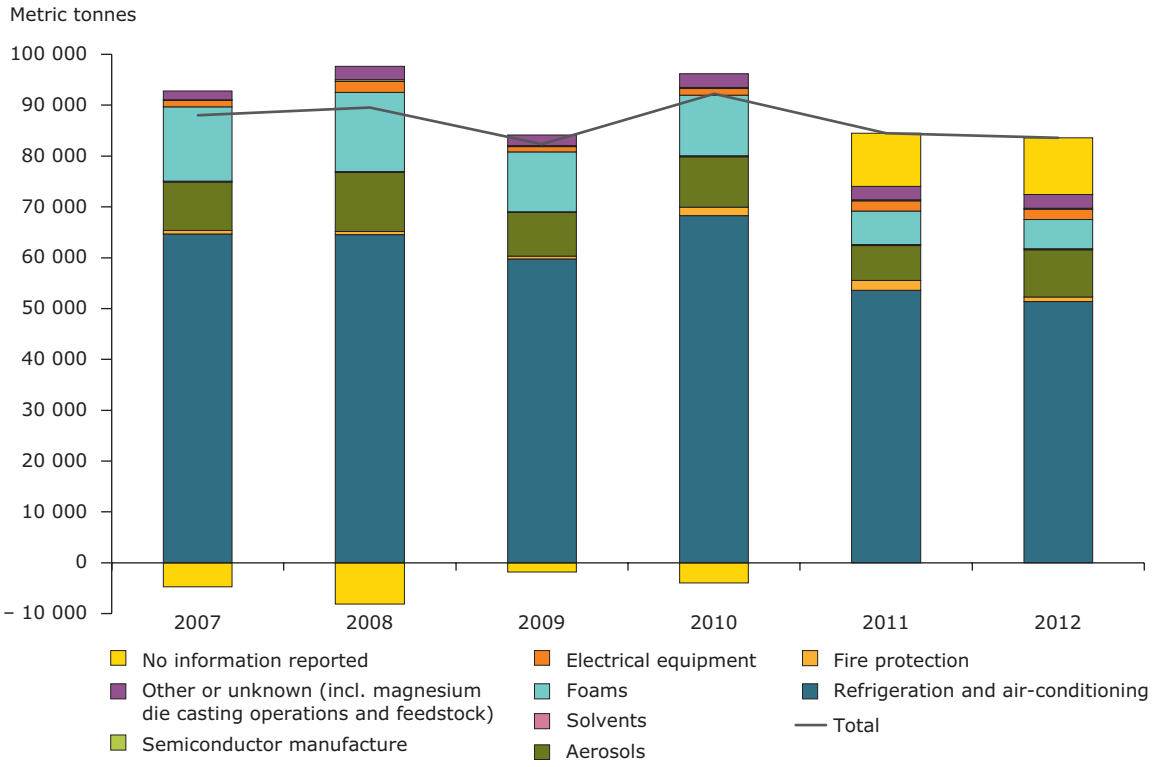
While the overall net supply was relatively constant in 2012 compared to 2011, few trends for major intended applications can be observed:

- refrigeration and air conditioning, the largest group, remained constant in terms of CO_2-equivalents but showed a 4 % decrease in terms of metric tonnes;
- HFC use in aerosols increased by 35 % (metric tonnes) or 39 % (CO_2-equivalents), thus regaining 2010 levels;
- HFC use in foams decreased by 12 % (metric tonnes) or 10 % (CO_2-equivalents);
- the use of SF_6 in electrical equipment remained relatively constant in 2012, following the sharp increase that was observed in 2011 compared to 2010.

A comparison of the trend for intended applications for the entire 2007–2012 period is difficult due to the amounts of 'no information available' reports, which changed from negative amounts ([27]) for 2007–2010 to large positive amounts for 2011–2012.

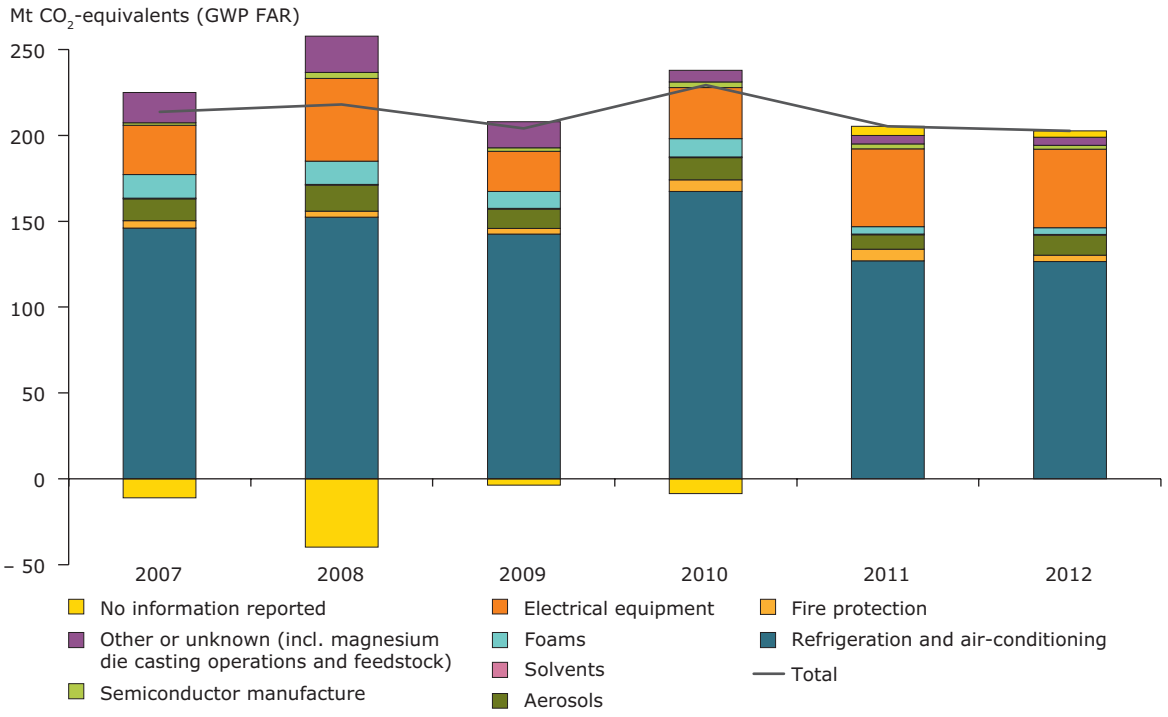
([26]) If company A reports on a co-producer sale of F-gases to company B, the report of company B should consistently contain a purchase of F-gases from company A.
([27]) Negative amounts can be interpreted as net exports.

Figure 4.13 Timeline of intended applications of F-gas net supply (metric tonnes)



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Figure 4.14 Timeline of intended applications of F-gas net supply (expressed in CO_2-equivalents — GWP FAR)



Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table 4.9 Intended applications of F-gas net supply in the period 2007 to 2012 (expressed in metric tonnes)

	2007	2008	2009	2010	2011	2012
Intended application			**Metric tonnes**			
Refrigeration and air-conditioning	64 658	64 569	59 764	68 267	53 606	51 392
Fire protection	685	596	556	1 686	1 938	909
Aerosols	9 545	11 612	8 572	9 927	6 861	9 254
Solvents	209	171	162	205	159	185
Foams	14 579	15 608	11 789	11 861	6 611	5 809
Feedstock	< 3 comp.	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
Electrical equipment	1 253	2 119	1 022	1 310	1 992	2 009
Magnesium die casting operations	< 3 comp.	8	< 3 comp.	< 3 comp.	< 3 comp.	–
Semiconductor manufacture	129	311	184	268	248	178
Other or unknown	1 741	2 688	2 117	2 691	2 607	2 666
No information reported	– 4 752	– 8 144	– 1 838	– 3 999	10 465	11 172
Total	**88 048**	**89 539**	**82 328**	**92 217**	**84 486**	**83 575**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table 4.10 Intended applications of F-gas net supply in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP FAR)

	2007	2008	2009	2010	2011	2012
Intended application			**Million tonnes of CO_2-equivalents (GWP FAR)**			
Refrigeration and air-conditioning	146.0	152.4	142.5	167.3	126.8	126.5
Fire protection	4.2	3.4	3.3	6.7	7.0	3.8
Aerosols	12.9	15.3	11.4	12.9	8.4	11.7
Solvents	0.4	0.4	0.3	0.4	0.4	0.5
Foams	13.8	13.5	9.9	10.7	4.1	3.7
Feedstock	< 3 comp.	-	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
Electrical equipment	28.6	48.3	23.3	29.9	45.4	45.8
Magnesium die casting operations	< 3 comp.	0.2	< 3 comp.	< 3 comp.	< 3 comp.	–
Semiconductor manufacture	1.5	3.3	2.1	3.1	2.9	2.2
Other or unknown	17.5	21.1	15.2	6.8	4.8	4.8
No information reported	– 11.2	– 39.8	– 3.8	– 8.7	5.4	3.6
Total	**213.7**	**218.0**	**204.2**	**229.3**	**205.3**	**202.6**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

4.4.4 Overview of intended applications of F-gas net supply in 2012

Figure 4.15 and Figure 4.16 illustrate the shares of the different intended applications of the total F-gas net supply in 2012, measured in metric tonnes and CO_2-equivalents respectively. Refrigeration and air-conditioning is the most relevant application sector, accounting for 62 % of the 2012 total F-gas net supply, both in metric tonnes and in CO_2-equivalents. The SF_6-specific applications (mostly electrical equipment) make up a significant share when measured in CO_2-equivalents (24 %).

Table 4.11 and Table 4.12 provide a detailed documentation of the intended applications of 2012 F-gas net supply for each single gas species, measured in metric tonnes and CO_2-equivalents (GWP FAR) respectively. The negative figures that appear for a few F-gases are plausible. Companies with a net export situation for a given F-gas species are required to report a negative amount placed on the market. 'Missing information' data may be negative as well, e.g. in cases of exports unaccounted for in the intended applications questionnaire.

Figure 4.15 2012 shares of intended applications of total F-gas net supply (metric tonnes)

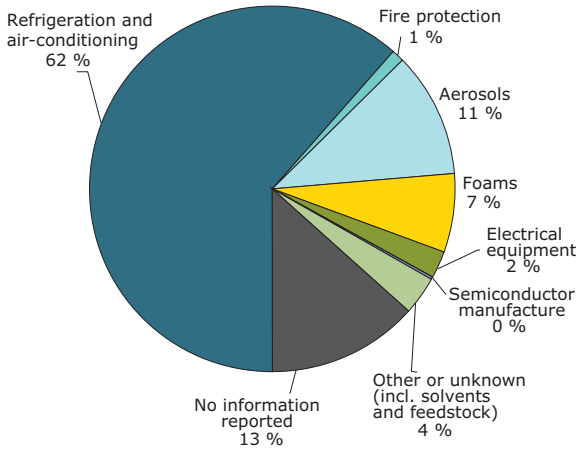


Figure 4.16 2012 shares of intended applications of total F-gas net supply (expressed in CO_2-equivalents — GWP FAR)

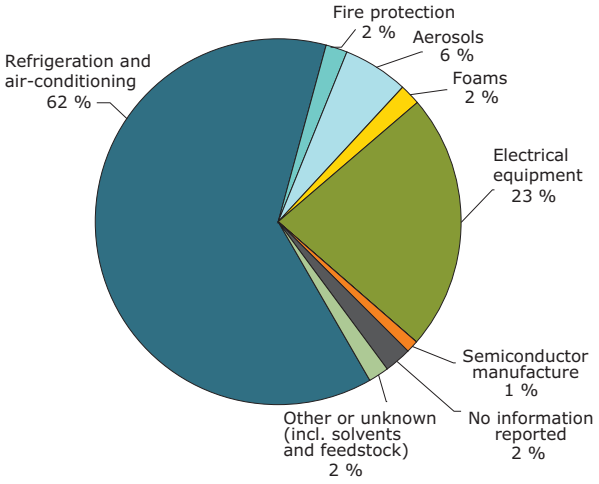


Table 4.11 Intended applications of 2012 F-gas net supply by F-gas species (metric tonnes)

	Refrigeration and air-conditioning	Fire protection	Aerosols	Foams	Electrical equipment	Magnesium die casting operations	Semiconductor manufacture	Other or unknown (incl. Solvents and Feedstock)	No information reported	Net Supply
Gas	**Metric tonnes**									
HFC-32	4 667	–	–	–	–	–	–	– 16	357	5 007
HFC-125	13 938	< 3 comp.	–	–	–	–	–	< 3 comp.	1 405	15 316
HFC-134a	23 689	–	8 043	611	–	–	–	687	6 910	39 939
HFC-143a	8 989	–	–	–	–	–	–	– 44	24	8 969
HFC-152a	57	–	< 3 comp.	2 668	–	–	–	1 710	– 80	5 567
HFC-227ea	< 3 comp.	776	–	< 3 comp.	–	–	–	9	581	1 469
HFC-245fa	< 3 comp.	–	< 3 comp.	< 3 comp.	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	–	–	–	1 155	–	–	–	< 3 comp.	2 656	3 860
HFC-43-10mee	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-23	26	< 3 comp.	–	–	–	–	–	< 3 comp.	–0	106
HFC-41	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134	–	–	–	–	–	–	–	–	–	–
HFC-143	–	–	–	–	–	–	–	–	–	–
HFC-236cb	–	–	–	–	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–	–	–	–	–
HFC-236fa	< 3 comp.	25	–	–	–	–	–	< 3 comp.	0	30
HFC-245ca	–	–	–	–	–	–	–	–	–	–
CF_4	–	–	–	–	–	–	< 3 comp.	< 3 comp.	– 5	28
C_2F_6	< 3 comp.	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
C_3F_8	< 3 comp.	–	–	–	–	–	25	15	–0	39
C_4F_{10}	–	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.
C_5F_{12}	–	–	–	–	–	–	–	–	–	–
C_6F_{14}	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	–	–	–	–	–	–	< 3 comp.	–	< 3 comp.	9
SF_6	–	–	–	–	2 009	–	26	132	– 677	1 491
Total HFCs	51 392	909	9 254	5 809	–	–	–	2 624	11 853	81 842
Total PFCs	– 1	–	–	–	–	–	152	95	– 5	242
Total F-gases	**51 392**	**909**	**9 254**	**5 809**	**2 009**	**–**	**178**	**2 851**	**11 172**	**83 575**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Table 4.12 Intended applications of 2012 F-gas net supply by F-gas species (expressed in CO_2-equivalents — GWP FAR)

	Refrigeration and air-conditioning	Fire protection	Aerosols	Foams	Electrical equipment	Magnesium die casting operations	Semiconductor manufacture	Other or unknown (incl. solvents and feedstock)	No information reported	Net supply
Gas	**Million tonnes of CO_2-equivalents (GWP FAR)**									
HFC-32	3.2	–	–	–	–	–	–	– 0.0	0.2	3.4
HFC-125	48.8	< 3 comp.	–	–	–	–	–	< 3 comp.	4.9	53.6
HFC-134a	33.9	–	11.5	0.9	–	–	–	1.0	9.9	57.1
HFC-143a	40.2	–	–	–	–	–	–	– 0.2	0.1	40.1
HFC-152a	0.0	–	< 3 comp.	0.3	–	–	–	0.2	– 0.0	0.7
HFC-227ea	< 3 comp.	2.5	–	< 3 comp.	–	–	–	0.0	1.9	4.7
HFC-245fa	< 3 comp.	–	< 3 comp.	< 3 comp.	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	–	–	–	0.9	–	–	–	< 3 comp.	2.1	3.1
HFC-43-10mee	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-23	0.4	< 3 comp.	–	–	–	–	–	< 3 comp.	– 0.0	1.6
HFC-41	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134	–	–	–	–	–	–	–	–	–	–
HFC-143	–	–	–	–	–	–	–	–	–	–
HFC-236cb	–	–	–	–	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–	–	–	–	–
HFC-236fa	< 3 comp.	0.2	–	–	–	–	–	< 3 comp.	0.0	0.3
HFC-245ca	–	–	–	–	–	–	–	–	–	–
CF_4	–	–	–	–	–	–	< 3 comp.	< 3 comp.	– 0.0	0.2
C_2F_6	< 3 comp.	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
C_3F_8	< 3 comp.	–	–	–	–	–	0.2	0.1	– 0.0	0.3
C_4F_{10}	–	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.
C_5F_{12}	–	–	–	–	–	–	–	–	–	–
C_6F_{14}	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	–	–	–	–	–	–	< 3 comp.	–	< 3 comp.	0.1
SF_6	–	–	–	–	45.8	–	0.6	3.0	– 15.4	34.0
Total HFCs	126.5	3.8	11.7	3.7	–	–	–	1.2	19.1	166.2
Total PFCs	– 0.0	–	–	–	–	–	1.6	0.9	– 0.0	2.4
Total F-gases	**126.5**	**3.8**	**11.7**	**3.7**	**45.8**	**–**	**2.2**	**4.8**	**3.6**	**202.6**
Average GWP	*2 461*	*4 202*	*1 259*	*642*	*22 800*	*–*	*12 340*	*1 690*	*327*	*2 425*

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

4.4.5 Intended applications of HFC net supply in 2012

Figure 4.17 and Figure 4.18 illustrate the shares of the intended applications of HFC net supply in 2012, measured in metric tonnes and CO_2-equivalents respectively. The major share of HFCs (63 % when measured in metric tonnes, 76 % when measured in CO_2-equivalents (GWP FAR)) is intended for refrigeration and air-conditioning. However, it is likely that these shares are higher, taking into account the relatively large amounts for which no information in intended applications was reported (15 % when expressed in metric tonnes and 11 % when expressed in CO_2-equivalents).

A similar pattern is shown in Figure 4.19 for HFC-134a ([28]), which is one of the most common HFCs. Refrigeration and air conditioning is reported as the intended application for 59 % of 2012 HFC-134a net supply (72 % when ignoring the 17 % 'no information reported' amounts).

For the two other most-used HFCs, i.e. HFC-125 and HFC-143a, the share of refrigeration in terms of the intended use is close to 100 %.

Figure 4.18 2012 shares of intended applications of HFC net supply (expressed in CO_2-equivalents — GWP FAR)

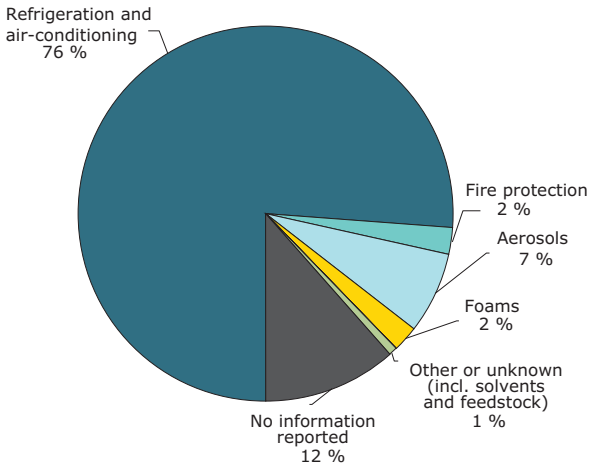


Figure 4.17 2012 shares of intended applications of HFC net supply (metric tonnes)

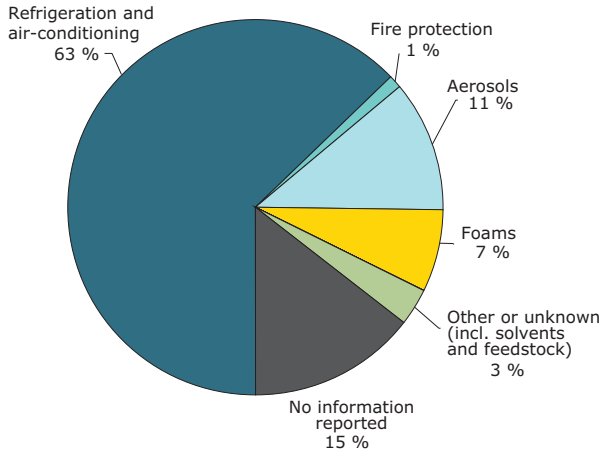
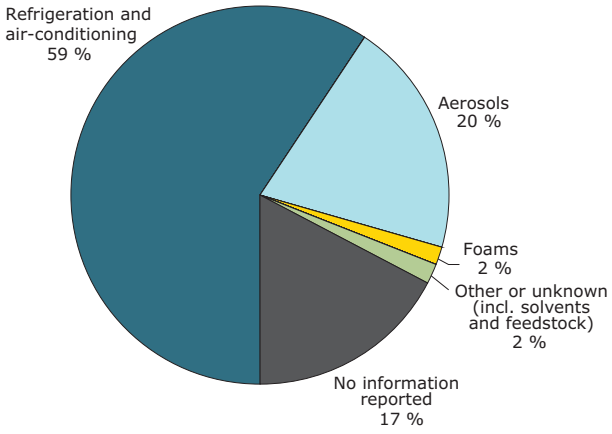


Figure 4.19 2012 shares of intended applications of HFC-134a net supply



([28]) As this graph covers a single gas species, the percentages do not depend on the metric (metric tonnes or CO_2-equivalents). The same is true for SF_6.

4.4.6 *Intended applications of PFC net supply in 2012*

Figure 4.20 and Figure 4.21 illustrate the shares of the intended applications of PFC net supply in 2012, measured in metric tonnes and CO_2-equivalents respectively. The major share of PFCs (more than 60 %) is directed to 'semiconductor manufacture'. However, in absolute quantities, the PFC net supply is nearly insignificant when compared to HFCs and SF_6 (1 % of net supply, measured in CO_2-equivalents).

4.4.7 *Intended applications of SF_6 net supply in 2012*

Figure 4.22 illustrates the shares of the intended applications of SF_6 net supply in 2012. The major share of SF_6 (93 %) is intended for electrical equipment.

Figure 4.21 2012 shares of intended applications of PFC net supply (expressed in CO_2-equivalents — GWP FAR)

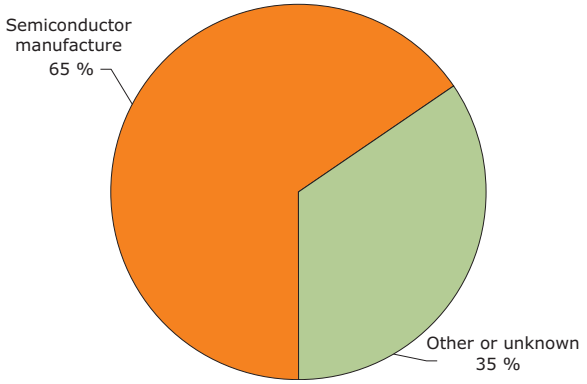


Figure 4.20 2012 shares of intended applications of PFC net supply (metric tonnes)

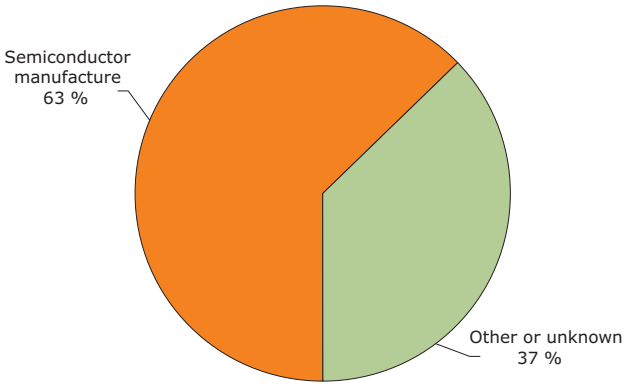
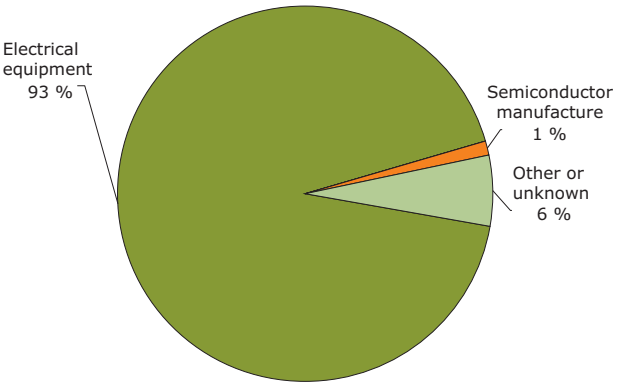


Figure 4.22 2012 shares of intended applications of SF_6 net supply



Note: The negative amount for 'no information reported' is not reflected in this graph.

4.5 Quantities reclaimed, destroyed or used as feedstock

This section summarises the information reported by companies regarding their own feedstock use, reclamation and destruction of F-gases. It also summarises information on the destruction of F-gases on behalf of companies off-site within the EU, as well as companies' exports of F-gases for reclamation, recycling and destruction.

However, the reported amounts cannot fully reflect complete EU activities due to the scope of the reporting obligation: only producers and importers are obliged to report on reclamation, destruction and own feedstock use. For example, the activities of specialised reclamation or destruction companies which entirely source on the EU market are not covered by the reporting.

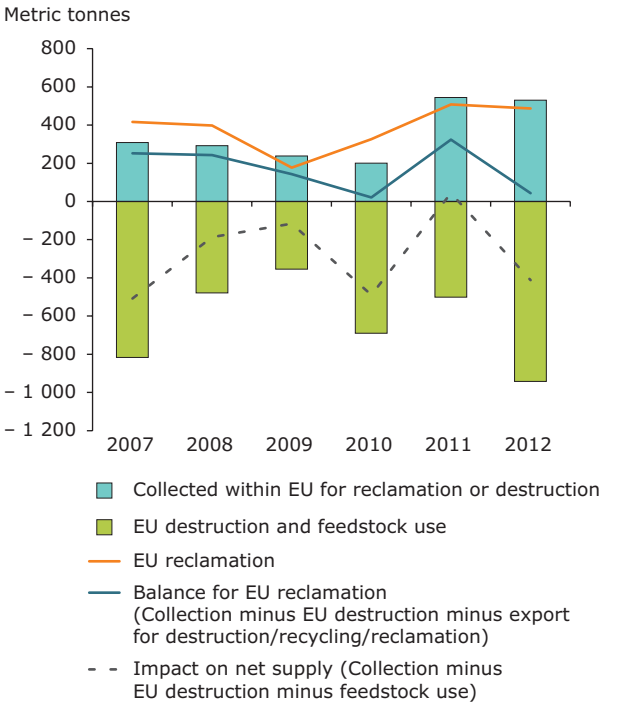
Figure 4.23 and Figure 4.24 (as well as Table 4.13 and Table 4.14) show the timelines for reclamation, destruction and feedstock use ([29]) of F-gases, measured in metric tonnes and CO_2-equivalents respectively. Two additional aggregate parameters were calculated based on these data in order to facilitate cross-checks:

1. **Impact on net supply**
   The quantities of F-gases collected in the EU for reclamation or destruction, as well as quantities on reporting companies' own feedstock use and destruction ([30]), are taken into account in the calculation of the EU net supply (cf. Section 4.4). The balanced impact of these quantities on the net supply (i.e. EU collection for reclamation or destruction minus EU destruction minus feedstock use) is summarised in the 'impact on net supply' parameter.

2. **Balance for EU reclamation**
   The quantity of F-gases collected in the EU for reclamation or destruction can be compared with the quantity actually reported for destruction in the EU and the quantities exported for recycling, reclamation and destruction. This balance (i.e. EU collection for reclamation or destruction, minus EU destruction, minus export for destruction/recycling/reclamation), reflects the F-gas quantities for reclamation in the EU that should be available for the reporting companies. This calculated balance can be compared with the quantity of reported own reclamation by reporting companies.

Generally very few companies report on the activities considered here; reported amounts for reclamation and destruction are very low.

Figure 4.23 Timeline for reclamation, destruction and feedstock use of F-gases (metric tonnes)

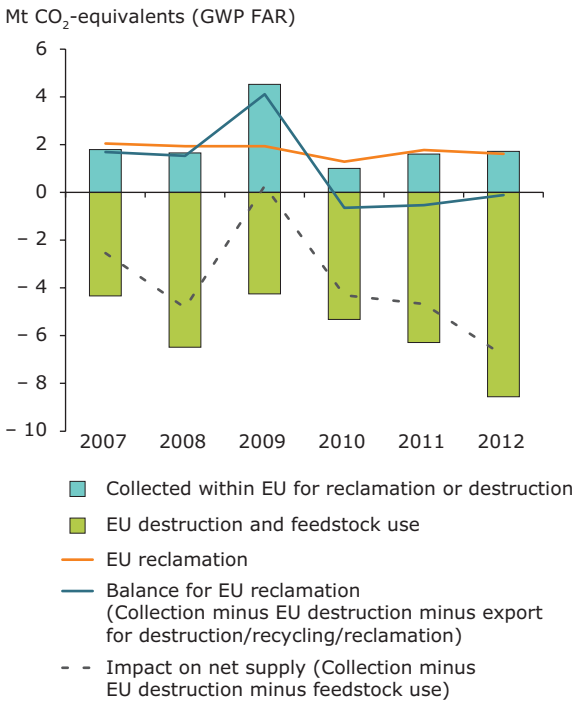


Note: The amounts reported for EU destruction and reporters' own feedstock use, are displayed with a negative sign. Export for destruction, recycling or reclamation is not displayed for data confidentiality reasons.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

([29]) Data on destruction within the EU and the reporters' own feedstock uses were aggregated for data confidentiality reasons.
([30]) A reporting company's own destruction includes destruction happening on-site and off-site within the EU on the reporting company's behalf.

Figure 4.24 Timeline for reclamation, destruction and feedstock use of F-gases (GWP FAR)



Note: The amounts reported for EU destruction and reporters' own feedstock use, are displayed with a negative sign. Export for destruction, recycling or reclamation is not displayed for data confidentiality reasons.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

The 'impact on net supply' of the quantities reported here is highly variable between the years and actually switches in its arithmetic sign. It has mostly been negative, dominated by reporters' own feedstock use and own (on-site) destruction. However, the calculated contribution to net supply turned positive in 2009 (when measured in metric tonnes) and in 2011 (when measured in CO_2-equivalents) due to amounts collected for reclamation and destruction, outweighing the reported destruction and feedstock use.

The comparison of the 'balance for EU reclamation' with the reported amounts of reporters' own reclamation reveals that for most years, the amounts reported as reclaimed are significantly higher than the calculated balance. This implies that the underlying data is incomplete.

As a result, it seems evident that the data related to reclamation and destruction is incomplete and therefore not very reliable.

Table 4.13 Timeline for feedstock use, reclamation and destruction of total F-gases (metric tonnes)

	2007	2008	2009	2010	2011	2012
Intended application			**Metric tonnes**			
Collected within EU for reclamation or destruction	309	292	238	201	545	530
EU destruction and feedstock use	817	479	355	690	501	943
Export for reclamation	–	–	–	< 3 comp.	–	–
Export for recycling	< 3 comp.	46	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
Export for destruction	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
EU reclamation	417	398	177	326	508	487
Impact on net supply (Collection minus EU destruction minus feedstock use)	**– 508**	**– 187**	**– 116**	**– 490**	**44**	**– 412**
Balance for EU reclamation (Collection minus EU destruction minus export for destruction/recycling/ reclamation)	**252**	**243**	**143**	**21**	**324**	**43**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table 4.14 Timeline for feedstock use, reclamation and destruction of total F-gases (expressed in CO_2-equivalents — GWP FAR)

	2007	2008	2009	2010	2011	2012
Intended application	**Million tonnes of CO_2-equivalents (GWP FAR)**					
Collected within EU for reclamation or destruction	1.8	1.7	4.5	1.0	1.6	1.7
EU destruction and feedstock use	4.3	6.5	4.2	5.3	6.3	8.6
Export for reclamation	–	–	–	< 3 comp.	–	–
Export for recycling	< 3 comp.	0.1	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
Export for destruction	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
EU reclamation	2.1	1.9	1.9	1.3	1.8	1.6
Impact on net supply (Collection minus EU destruction minus feedstock use)	**– 2.5**	**– 4.8**	**0.3**	**– 4.3**	**– 4.7**	**– 6.8**
Balance for EU reclamation (Collection minus EU destruction minus export for destruction/recycling/ reclamation)	**1.7**	**1.5**	**4.1**	**– 0.6**	**– 0.5**	**– 0.1**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals (Balance for EU reclamation).

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

5 Abbreviations and glossary

BDR	Business Data Repository of the EEA
Blend	Preparation (blend) containing F-gases
CO_2	Carbon dioxide
ECCP	European Climate Change Programme
EEA	European Environment Agency
ETC/ACM	European Topic Centre for Air Pollution and Climate Change Mitigation
EU	European Union
EU-15	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom
EU-27	In 2012, the European Union consisted of the following 27 Member States: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom.
DG CLIMA	Directorate-General for Climate Action of the European Commission
FAQ	Frequently Asked Questions
FAR	Fourth Assessment Report of the IPCC
FDB	EEA's F-gases database
F-gases	Fluorinated gases
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
kt	Kilotonnes
Mt	Megatonnes
NIL report	No transactions above the thresholds happened in that reporting year according to the company concerned
PFCs	Perfluorocarbons
QA/QC	Quality assurance/quality control
SF_6	Sulphur hexafluoride
TAR	Third Assessment Report of the IPCC
VAT	Value added tax

References

EEA, 2012, *Fluorinated greenhouse gases 2011*, EEA Technical report No 12/2012, European Environment Agency

EC, 2006, Regulation (EC) No 842/2006 of the European Parliament and of the Council of 17 May 2006 on certain fluorinated greenhouse gases.

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

EC, 2007, Commission Regulation (EC) No 1493/2007 of 17 December 2007, establishing, pursuant to Regulation (EC) No 842/2006 of the European Parliament and of the Council, the format for the report to be submitted by producers, importers and exporters of certain fluorinated greenhouse gases.

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 Commission Regulation (EC) No 1493/2007.

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 Global warming potentials for substances listed in Annex I of the F-Gas Regulation

Table A1.1 Global warming potentials for substances listed in Annex I of the F-Gas Regulation (expressed in GWP TAR and GWP FAR)

Fluorinated greenhouse gas	Chemical formula	Global warming potential as listed in Annex I of the F-Gas Regulation (GWP TAR)	Global warming potential based on the IPCC Fourth Assessment Report (GWP FAR)
Sulphur hexafluoride	SF_6	22 200	22 800
Hydrofluorocarbons (HFCs):			
HFC-23	CHF_3	12 000	14 800
HFC-32	CH_2F_2	550	675
HFC-41	CH_3F	97	92
HFC-43-10mee	$C_5H_2F_{10}$	1 500	1 640
HFC-125	C_2HF_5	3 400	3 500
HFC-134	$C_2H_2F_4$	1 100	1 100
HFC-134a	CH_2FCF_3	1 300	1 430
HFC-152a	$C_2H_4F_2$	120	124
HFC-143	$C_2H_3F_3$	330	353
HFC-143a	$C_2H_3F_3$	4 300	4 470
HFC-227ea	C_3HF_7	3 500	3 220
HFC-236cb	$CH_2FCF_2CF_3$	1 300	1 340
HFC-236ea	CHF_2CHFCF_3	1 200	1 370
HFC-236fa	$C_3H_2F_6$	9 400	9 810
HFC-245ca	$C_3H_3F_5$	640	693
HFC-245fa	$CHF_2CH_2CF_3$	950	1 030
HFC-365mfc	$CF_3CH_2CF_2CH_3$	890	794
Perfluorocarbons (PFCs):			
Perfluoromethane	CF_4	5 700	7 390
Perfluoroethane	C_2F_6	11 900	12 200
Perfluoropropane	C_3F_8	8 600	8 830
Perfluorobutane	C_4F_{10}	8 600	8 860
Perfluoropentane	C_5F_{12}	8 900	9 160
Perfluorohexane	C_6F_{14}	9 000	9 300
Perfluorocyclobutane	$c\text{-}C_4F_8$	10 000	10 300

Annex 2 Reported amounts expressed in CO_2-equivalents using the global warming potentials of the IPCC Third Assessment Report (GWP TAR)

Table A2.1 Production of F-gases in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP TAR)

	2007	2008	2009	2010	2011	2012
Gas	**Million tonnes of CO_2-equivalents (GWP TAR)**					
HFC-32	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-125	22.3	6.0	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134a	40.7	27.7	< 3 comp.	27.9	< 3 comp.	< 3 comp.
HFC-143a	26.5	22.3	< 3 comp.	< 3 comp.	22.0	22.7
HFC-152a	–	< 3 comp.	–	–	–	–
HFC-227ea	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-245fa	–	–	< 3 comp.	–	–	–
HFC-365mfc	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-43-10mee	–	–	–	–	–	–
HFC-23	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-41	–	–	–	–	–	–
HFC-134	–	–	–	–	–	–
HFC-143	–	–	–	–	–	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	–	–	–	–	–	–
HFC-245ca	–	–	–	–	–	–
CF_4	–	–	–	–	–	–
C_2F_6	–	–	–	–	–	–
C_3F_8	< 3 comp.	–	–	< 3 comp.	< 3 comp.	< 3 comp.
C_4F_{10}	< 3 comp.	–	–	< 3 comp.	–	–
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	–	–	–	–	–	–
SF_6	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
SF_6 and total PFCs	61.1	61.7	44.0	57.1	64.3	71.7
Total HFCs	106.0	70.5	59.3	86.0	80.5	76.8
Total F-gases	**167.1**	**132.3**	**103.3**	**143.1**	**144.8**	**148.6**
Average GWP	*2 877*	*3 198*	*2 940*	*3 081*	*3 290*	*3 360*

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table A2.2 Import of F-gases in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP TAR)

	2007	2008	2009	2010	2011	2012
Gas	**Million tonnes of CO_2-equivalents (GWP TAR)**					
HFC-32	1.3	1.3	1.1	1.8	1.8	1.7
HFC-125	34.6	37.0	49.9	55.9	46.5	45.8
HFC-134a	44.9	49.7	36.2	42.9	43.2	41.2
HFC-143a	19.1	28.2	23.0	25.9	24.1	18.3
HFC-152a	0.5	0.7	0.6	0.8	0.8	0.7
HFC-227ea	1.0	6.1	4.3	5.4	5.5	3.6
HFC-245fa	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	–	–	–	–	–	–
HFC-43-10mee	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-23	1.6	2.2	1.5	1.7	1.5	1.6
HFC-41	< 3 comp.	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134	< 3 comp.	–	–	< 3 comp.	–	–
HFC-143	< 3 comp.	–	–	< 3 comp.	–	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	0.5	< 3 comp.	< 3 comp.	0.3	0.5	0.5
HFC-245ca	–	–	–	–	–	–
CF_4	< 3 comp.	0.5	0.2	0.3	0.4	0.6
C_2F_6	1.3	2.2	0.9	1.8	1.7	< 3 comp.
C_3F_8	1.0	0.2	0.1	< 3 comp.	< 3 comp.	0.2
C_4F_{10}	–	–	–	–	–	–
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	–	–	–	–	–	–
c-C_4F_8	< 3 comp.	0.1	0.0	< 3 comp.	< 3 comp.	< 3 comp.
SF_6	16.6	15.3	14.9	12.0	13.0	8.3
Total HFCs	105.6	127.4	117.8	136.3	125.4	114.9
Total PFCs	2.5	3.0	1.3	2.3	2.3	3.0
Total F-gases	**124.7**	**145.7**	**133.9**	**150.6**	**140.8**	**126.1**
Average GWP	*2 092*	*2 110*	*2 296*	*2 171*	*2 116*	*2 052*

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table A2.3 Export of F-gases in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP TAR)

	2007	2008	2009	2010	2011	2012
Gas	**Million tonnes of CO_2-equivalents (GWP TAR)**					
HFC-32	0.7	0.4	0.4	0.8	0.7	0.5
HFC-125	9.7	6.9	6.0	9.8	12.0	7.3
HFC-134a	20.8	16.0	12.9	13.9	14.4	16.2
HFC-143a	5.8	6.2	4.0	5.6	5.3	4.6
HFC-152a	0.0	0.0	< 3 comp.	0.1	0.0	0.0
HFC-227ea	0.7	0.9	0.7	1.2	1.5	1.6
HFC-245fa	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	2.0	1.9	1.7	2.5	2.9	3.3
HFC-43-10mee	< 3 comp.	< 3 comp.	< 3 comp.	0.1	< 3 comp.	< 3 comp.
HFC-23	0.1	0.2	0.2	0.1	0.1	0.1
HFC-41	–	–	–	–	–	–
HFC-134	< 3 comp.	–	–	< 3 comp.	–	–
HFC-143	–	–	–	–	–	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	–
HFC-245ca	–	–	–	–	–	–
CF_4	< 3 comp.	0.0	0.0	0.1	0.0	0.4
C_2F_6	< 3 comp.	< 3 comp.	0.0	0.0	< 3 comp.	< 3 comp.
C_3F_8	0.5	0.2	0.1	0.5	< 3 comp.	0.6
C_4F_{10}	< 3 comp.	< 3 comp.	–	< 3 comp.	< 3 comp.	–
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
SF_6	37.1	33.3	31.6	37.7	43.6	44.8
Total HFCs	40.0	32.7	26.0	34.2	37.1	33.8
Total PFCs	0.7	0.5	0.2	0.7	0.8	2.3
Total F-gases	**77.8**	**66.5**	**57.8**	**72.5**	**81.4**	**80.9**
Average GWP	*3 003*	*3 206*	*3 398*	*3 287*	*3 507*	*3 472*

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table A2.4 Net supply of F-gases in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP TAR)

	2007	2008	2009	2010	2011	2012
Gas	**Million tonnes of CO_2-equivalents (GWP TAR)**					
HFC-32	2.2	2.8	2.4	2.9	2.7	2.8
HFC-125	42.3	42.6	47.3	61.7	51.8	52.1
HFC-134a	63.6	59.9	53.5	56.4	51.9	51.9
HFC-143a	38.9	42.5	41.2	45.0	37.9	38.6
HFC-152a	0.5	0.7	0.6	0.7	0.7	0.7
HFC-227ea	2.7	6.2	6.2	7.3	7.1	5.1
HFC-245fa	2.0	1.7	1.2	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	4.0	3.4	2.7	3.2	3.5	3.4
HFC-43-10mee	< 3 comp.	< 3 comp.	0.1	0.1	< 3 comp.	< 3 comp.
HFC-23	3.1	2.2	2.3	2.9	2.2	1.3
HFC-41	< 3 comp.	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134	< 3 comp.	< 3 comp.	–	< 3 comp.	–	–
HFC-143	< 3 comp.	–	–	< 3 comp.	< 3 comp.	–
HFC-236cb	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–
HFC-236fa	0.3	0.3	< 3 comp.	0.3	0.4	0.3
HFC-245ca	–	–	–	–	–	–
CF_4	0.1	0.5	0.2	0.3	0.3	0.2
C_2F_6	1.1	2.1	1.3	1.8	1.6	< 3 comp.
C_3F_8	1.0	0.5	0.2	0.2	0.2	0.3
C_4F_{10}	< 3 comp.	< 3 comp.	–	< 3 comp.	< 3 comp.	< 3 comp.
C_5F_{12}	–	–	–	–	–	–
C_6F_{14}	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	< 3 comp.	0.1	< 3 comp.	0.1	0.1	< 3 comp.
SF_6	40.1	41.1	34.3	33.7	33.2	33.1
Total HFCs	159.7	162.4	157.7	181.7	159.7	157.7
Total PFCs	2.9	3.8	2.3	3.0	2.8	2.3
Total F-gases	**202.6**	**207.3**	**194.3**	**218.4**	**195.7**	**193.1**
Average GWP	*2 301*	*2 315*	*2 360*	*2 368*	*2 316*	*2 310*

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table A2.5 Intended applications of F-gas net supply in the period 2007 to 2012 (expressed in CO_2-equivalents — GWP TAR)

	2007	2008	2009	2010	2011	2012
Intended application	**Million tonnes of CO_2-equivalents (GWP TAR)**					
Refrigeration and air-conditioning	137.5	143.9	134.6	158.5	119.9	119.8
Fire protection	3.8	3.1	3.1	6.8	7.0	3.9
Aerosols	11.8	14.0	10.5	11.9	7.7	10.6
Solvents	0.4	0.4	0.3	0.4	0.4	0.5
Foams	13.4	13.1	9.7	10.5	4.0	3.7
Feedstock	< 3 comp.	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
Electrical equipment	27.8	47.0	22.7	29.1	44.2	44.6
Magnesium die casting operations	< 3 comp.	0.2	< 3 comp.	< 3 comp.	< 3 comp.	–
Semiconductor manufacture	1.5	3.1	2.0	3.0	2.7	2.1
Other or unknown	17.0	21.1	15.2	6.6	4.6	4.6
No information reported	– 10.6	– 38.7	– 3.6	– 8.4	5.1	3.4
Total	**202.6**	**207.3**	**194.3**	**218.4**	**195.7**	**193.1**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

Table A2.6 Intended applications of 2012 F-gas net supply by F-gas species (expressed in CO_2-equivalents — GWP TAR)

	Refrigeration and air-conditioning	Fire protection	Aerosols	Foams	Electrical equipment	Magnesium die casting operations	Semiconductor manufacture	Other or unknown (incl. solvents and feedstock)	No information reported	Net supply
Gas	**Million tonnes of CO_2-equivalents (GWP TAR)**									
HFC-32	2.6	–	–	–	–	–	–	– 0.0	0.2	2.8
HFC-125	47.4	< 3 comp.	–	–	–	–	–	< 3 comp.	4.8	52.1
HFC-134a	30.8	–	10.5	0.8	–	–	–	0.9	9.0	51.9
HFC-143a	38.7	–	–	–	–	–	–	– 0.2	0.1	38.6
HFC-152a	0.0	–	< 3 comp.	0.3	–	–	–	0.2	– 0.0	0.7
HFC-227ea	< 3 comp.	2.7	–	< 3 comp.	–	–	–	0.0	2.0	5.1
HFC-245fa	< 3 comp.	–	< 3 comp.	< 3 comp.	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-365mfc	–	–	–	1.0	–	–	–	< 3 comp.	2.4	3.4
HFC-43-10mee	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-23	0.3	< 3 comp.	–	–	–	–	–	< 3 comp.	– 0.0	1.3
HFC-41	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
HFC-134	–	–	–	–	–	–	–	–	–	–
HFC-143	–	–	–	–	–	–	–	–	–	–
HFC-236cb	–	–	–	–	–	–	–	–	–	–
HFC-236ea	–	–	–	–	–	–	–	–	–	–
HFC-236fa	< 3 comp.	0.2	–	–	–	–	–	< 3 comp.	0.0	0.3
HFC-245ca	–	–	–	–	–	–	–	–	–	–
CF_4	–	–	–	–	–	–	< 3 comp.	< 3 comp.	– 0.0	0.2
C_2F_6	< 3 comp.	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
C_3F_8	< 3 comp.	–	–	–	–	–	0.2	0.1	– 0.0	0.3
C_4F_{10}	–	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.
C_5F_{12}	–	–	–	–	–	–	–	–	–	–
C_6F_{14}	–	–	–	–	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
c-C_4F_8	–	–	–	–	–	–	< 3 comp.	–	< 3 comp.	0.1
SF_6	–	–	–	–	44.6	–	0.6	2.9	– 15.0	33.1
Total HFCs	119.8	3.9	10.6	3.7	–	–	–	1.1	18.4	157.7
Total PFCs	– 0.0	–	–	–	–	–	1.5	0.9	– 0.0	2.3
Total F-gases	**119.8**	**3.9**	**10.6**	**3.7**	**44.6**	**–**	**2.1**	**4.6**	**3.4**	**193.1**
Average GWP	*2 331*	*4 234*	*1 146*	*632*	*22 200*	*–*	*11 756*	*1 606*	*304*	*2 310*

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Table A2.7 Timeline for feedstock use, reclamation and destruction of total F-gases (expressed in CO_2-equivalents — GWP TAR)

	2007	2008	2009	2010	2011	2012
Intended application	**Million tonnes of CO_2-equivalents (GWP TAR)**					
Collected within EU for reclamation or destruction	1.7	1.6	4.4	1.0	1.5	1.6
EU destruction and feedstock use	– 3.5	– 5.3	– 3.5	– 4.4	– 5.1	– 7.1
Export for reclamation	–	–	–	< 3 comp.	–	–
Export for recycling	< 3 comp.	–0.1	< 3 comp.	< 3 comp.	< 3 comp.	< 3 comp.
Export for destruction	–	–	–	< 3 comp.	< 3 comp.	< 3 comp.
EU reclamation	2.0	1.9	1.9	1.2	1.7	1.5
Impact on net supply (Collection minus EU destruction minus feedstock use)	**– 1.8**	**– 3.7**	**0.9**	**– 3.4**	**– 3.6**	**– 5.5**
Balance for EU reclamation (Collection minus EU destruction minus export for destruction/ recycling/reclamation)	**1.6**	**1.5**	**4.0**	**– 0.4**	**– 0.2**	**– 0.1**

Note: '–': no data reported;
'< 3 comp.': The data concerned is reported by less than three companies. For data confidentiality reasons the amount are only included in the relevant totals.

Sources: 2007–2010: European Commission (DG CLIMA); 2011–2012: EEA.

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