

Allocating emissions of fluorinated gases to NACE industries in air emissions accounts

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Glossary

AEA	Eurostat's Air Emissions Accounts
CRF	Common Reporting Framework (UNFCCC)
EEA	European Environment Agency
EU	European Union
F-gases	Fluorinated gases
GHG	Greenhouse gases
GPG	Good Practice Guidance (IPCC guidelines)
HH	Private Households
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
Kyoto protocol	International agreement under the UNFCCC
NACE	Statistical classification of economic activities in the European Community
NF ₃	Nitrogen trifluoride
OECD	Organization for Economic Cooperation and Development
PFCs	Perfluorocarbons
SEEA-CF (United Nations)	System of Environmental Economic Accounting – Central Framework
SF ₆	Sulphur hexafluoride
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction and purpose

Emissions of F-gases arise from a variety of activities and in almost all NACE industries and households. In air emissions accounts (AEA) HFCs, PFCs and SF₆ are included according to requirements of the regulation¹. The estimates of these types of air emissions are compiled by countries and reported to e.g. the UNFCCC. In 2015 also emissions of NF₃ were included in the reporting to the UNFCCC, however these emissions are not yet required in the AEA.

However, distributing emissions of these F-gases to industries and households in accordance with the environmental accounts can be a challenge. Eurostat aim at providing guidance especially on F-gases as the Eurostat manual for air emissions accounts (2015 edition)² provide only limited guidance on how to allocate F-gas emissions to NACE industries.

The purpose of this technical note is to provide an overview on reporting of emissions of F-gases in the AEA (chapter 2) and in UNFCCC greenhouse gas inventories (chapter 3) and to provide a general methodological overview on methods to assign F-gases emissions to NACE industries and households (chapter 4).

As the data availability varies for each country, a unique European approach might not be appropriate, but this paper aims at providing some suggestions on how to approach the area and how to proceed. This document also shares some examples on current practices from countries (chapter 5). By sharing and discussing methodologies used, also those that are not perfect today, it is possible to improve knowledge and allocation methodologies in countries.

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Fluorinated greenhouse gases (F-gases):

F-gases comprise hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). These F-gases typically have very long lifetimes in the atmosphere and high global warming potentials (GWPs). The gases are mostly produced for use in products and equipment in the refrigeration and air conditioning sector, foams, fire protection etc. Emissions take place mainly due to leakage during the use phase or due to failure to fully recover the F-gases at the end of the product/equipment lifetime. Future F-gas emissions are thus largely determined by (i) present day use of F-gases and (ii) measures to prevent leakage and encourage recovery.

¹ Regulation (EU) No 691/2011 of the European Parliament and of the Council of 6 July 2011 on European environmental economic accounts

² <http://ec.europa.eu/eurostat/web/environment/methodology>

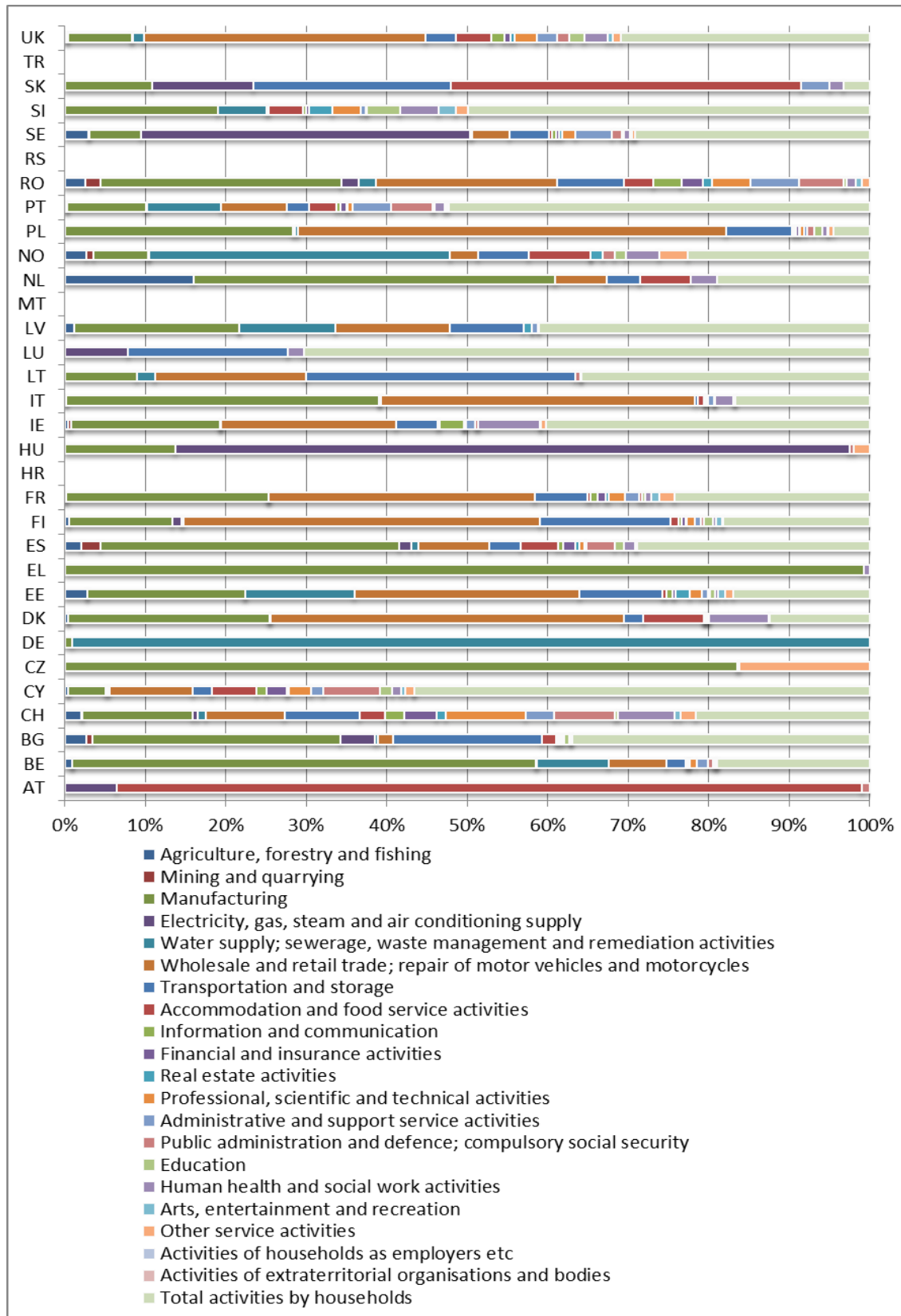
2. Reported F-gases in air emission accounts 2015

Most countries within the European Statistical System have reported emissions of HFCs, PFCs and SF₆ to Eurostat in 2015 and also distributed these emissions to NACE industries and households.³ However, some countries do not report at all or report an incomplete dataset to Eurostat. Eurostat do not gap-fill or model data of F-gases for an EU aggregate the same way as for other emissions due to uncertainties in the estimates. The data is also difficult to interpret across countries, as the distribution of emissions on economic branches and households varies significantly, see- Figure 3. Reported emissions are shown in Table 9, Table 10 and Table 11 in the Appendix. This could be due to different allocation methodologies and/or different distribution of emissions in national greenhouse gas inventories CRF tables (to be discussed in chapter 0).

This project reviewed the AEA quality reports sent with the data in 2015 to verify methodologies and find common traits. Some countries (Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Sweden and Slovakia) have mentioned F-gases in their AEA Quality Report 2015, but the documentation is generally too short to be useful to determine how the allocations to industries and households have been done. Some countries have kindly provided additional documentation on how the allocation of emissions of F-gases has been done in 2016, see chapter 5.

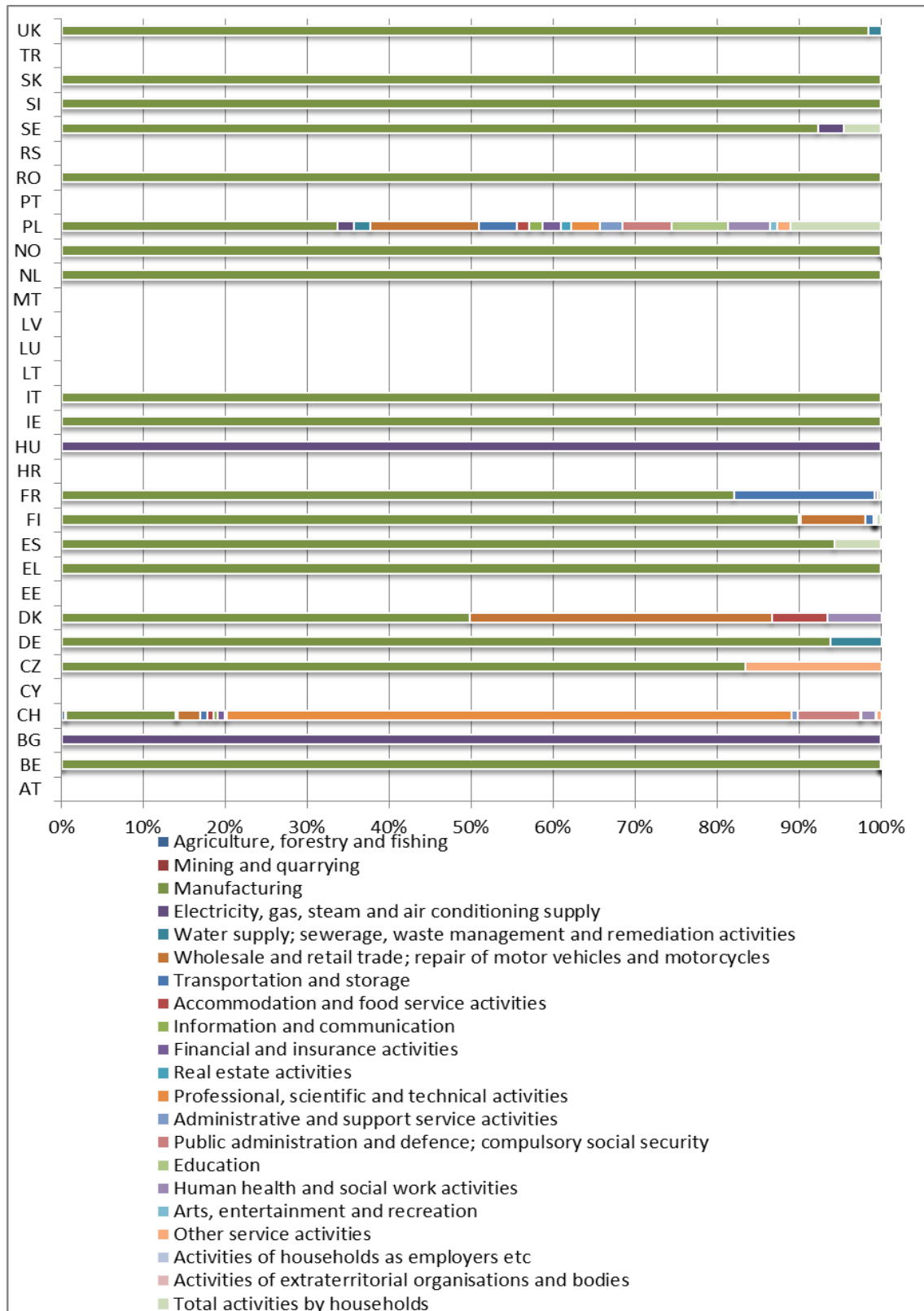
(³) <http://ec.europa.eu/eurostat/web/environment/emissions-of-greenhouse-gases-and-air-pollutants/air-emission-accounts/database>

Figure 1. Emissions of Hydrofluorocarbons 2013.



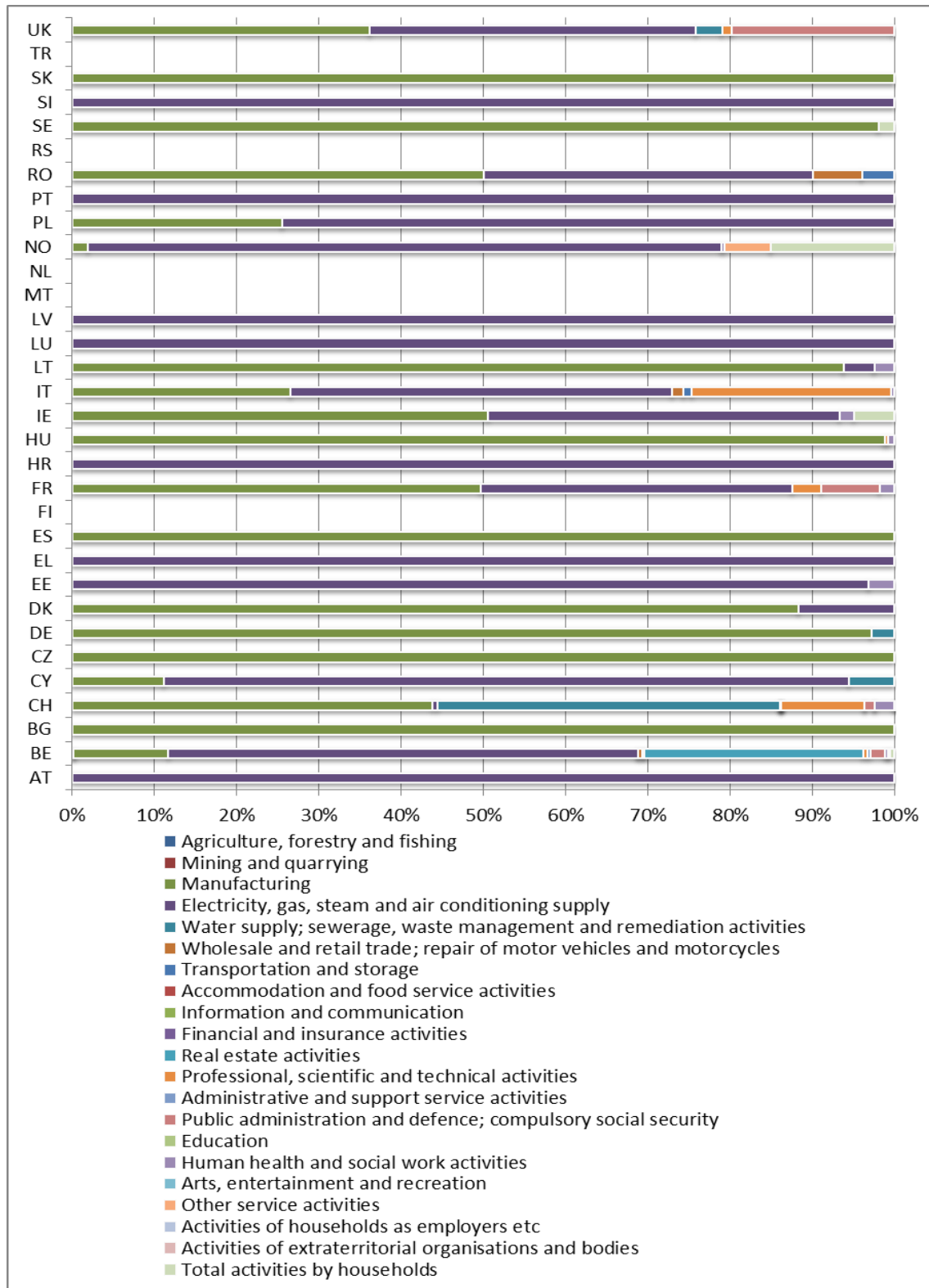
Source: Eurostat. Air emissions accounts by industry and households (NACE Rev. 2) [env_ac_ainah_r2]. Last update 14.03.16

Figure 2. Emissions of Perfluorocarbons 2013.



Source: Eurostat. Air emissions accounts by industry and households (NACE Rev. 2) [env_ac_ainah_r2]. Last update 14.03.16

Figure 3. Emissions of Sulphur hexafluoride 2013.



Source: Eurostat. Air emissions accounts by industry and households (NACE Rev. 2) [env_ac_ainah_r2]. Last update 14.03.1

3. Reported F-gases in greenhouse gas inventories submission 2015

Data on national emissions of F-gases reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism by countries in 2015 was downloaded from the EEA website in June 2016⁴. In this dataset most but not all countries reporting the AEA to Eurostat are included. As it is recommended that the submitted data are used as base data for the AEA it has been reviewed in this paper to verify what is reported and to which codes in the Common Reporting Framework (CRF codes) they have been allocated. The distribution of emissions on CRF categories are shown in Figure 4 to Figure 6. Reported emissions are also shown in Table 12, Table 13 and Table 14 in the Appendix.

Please note that Germany has also reported some emissions as 'Unspecified mix of HFCs and PFCs'. Germany, Finland, France, United Kingdom and Netherlands have reported some emissions of HFCs, PFCs, and SF₆ as classified (C) or Included elsewhere (IE). Finland has reported aggregated emissions in CRF 2.H due to confidentiality issues. This is relevant to take into account when allocating emissions of HFCs, PFCs and SF₆ to NACE industries for these countries.

It could also be noted that some countries⁵ also reported emissions of nitrogen trifluoride (NF₃) to the UNFCCC in submission 2015, but as emissions of NF₃ are currently not formally requested in the AEA⁶ this is not covered by this paper.

Emissions of HFCs (Figure 4) are reported for twelve categories. Most emissions are reported in CRF category 2.F.1 Refrigeration and Air conditioning and the distribution on CRF categories do not differ too much between countries. It seems as the differences between countries in allocation of emissions in the AEA are mainly due to differences in allocation methodologies.

Emissions of PFCs (Figure 5) are reported for nine categories. Reported categories for each country vary significantly due to different industry structure in each country. Because of this, it is to be expected that the allocation of emissions to NACE categories also should vary significantly between countries. However, data reported in CRF tables do not confirm the current allocation of data reported in the AEA. It seems that also for PFCs many differences between countries in allocation of emissions in the AEA are due to differences in allocation methodologies.

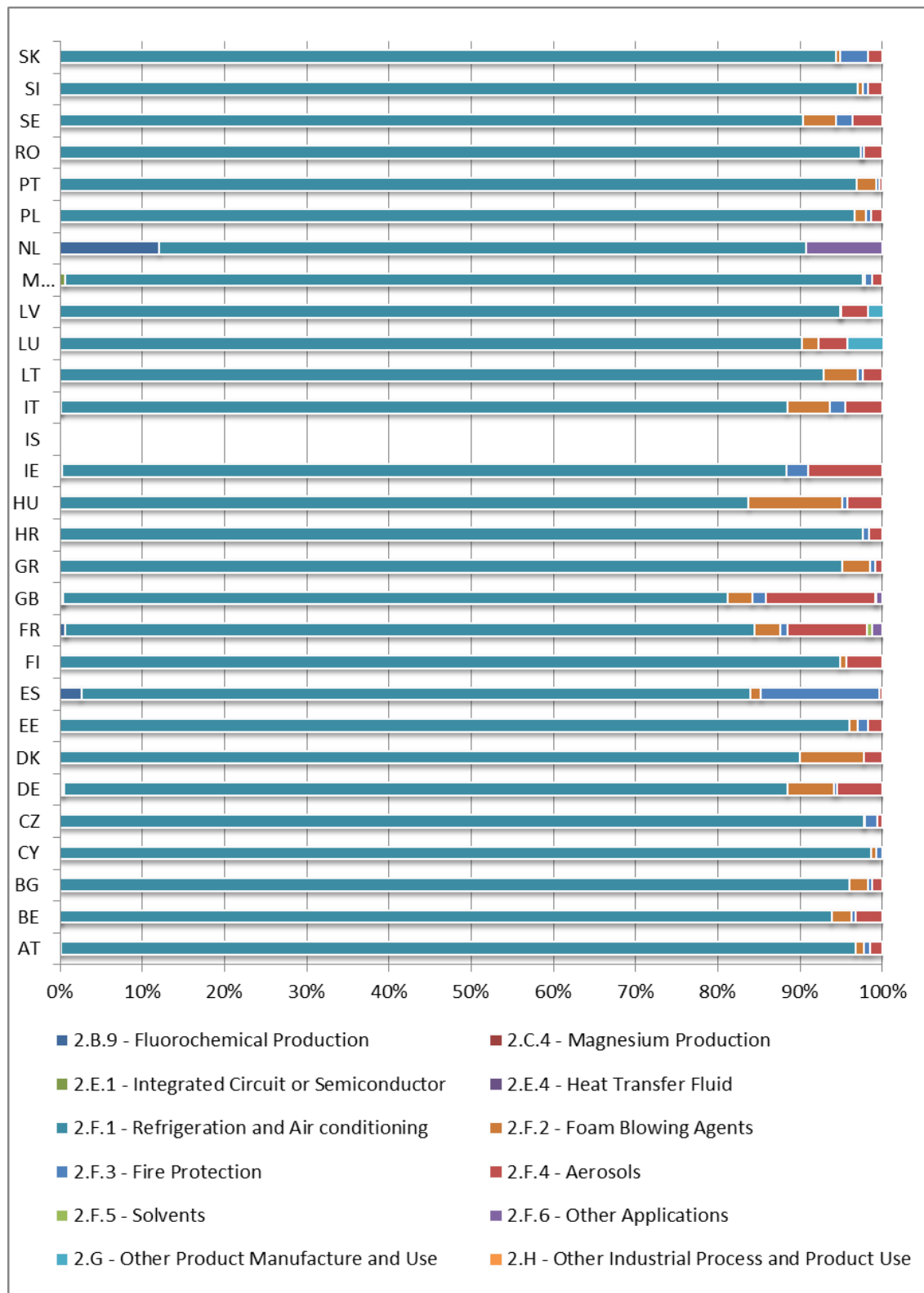
Emissions of SF₆ (Figure 6) are reported for eight categories. What categories included varies somewhat between countries due to differences in industry structure, but many countries report most emissions for CRF category 2.G Other Product Manufacture and Use. It is however difficult to from the CRF tables confirm the current allocation of the data reported in the AEA. It seems that also for SF₆, many differences between countries in allocation of emissions in the AEA are due to differences in allocation methodologies.

(⁴) <http://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-10>

(⁵) In submission 2015 following countries reported emissions of NF₃: AT, BE, CZ, DE, FR, GB, IE, IT, LT

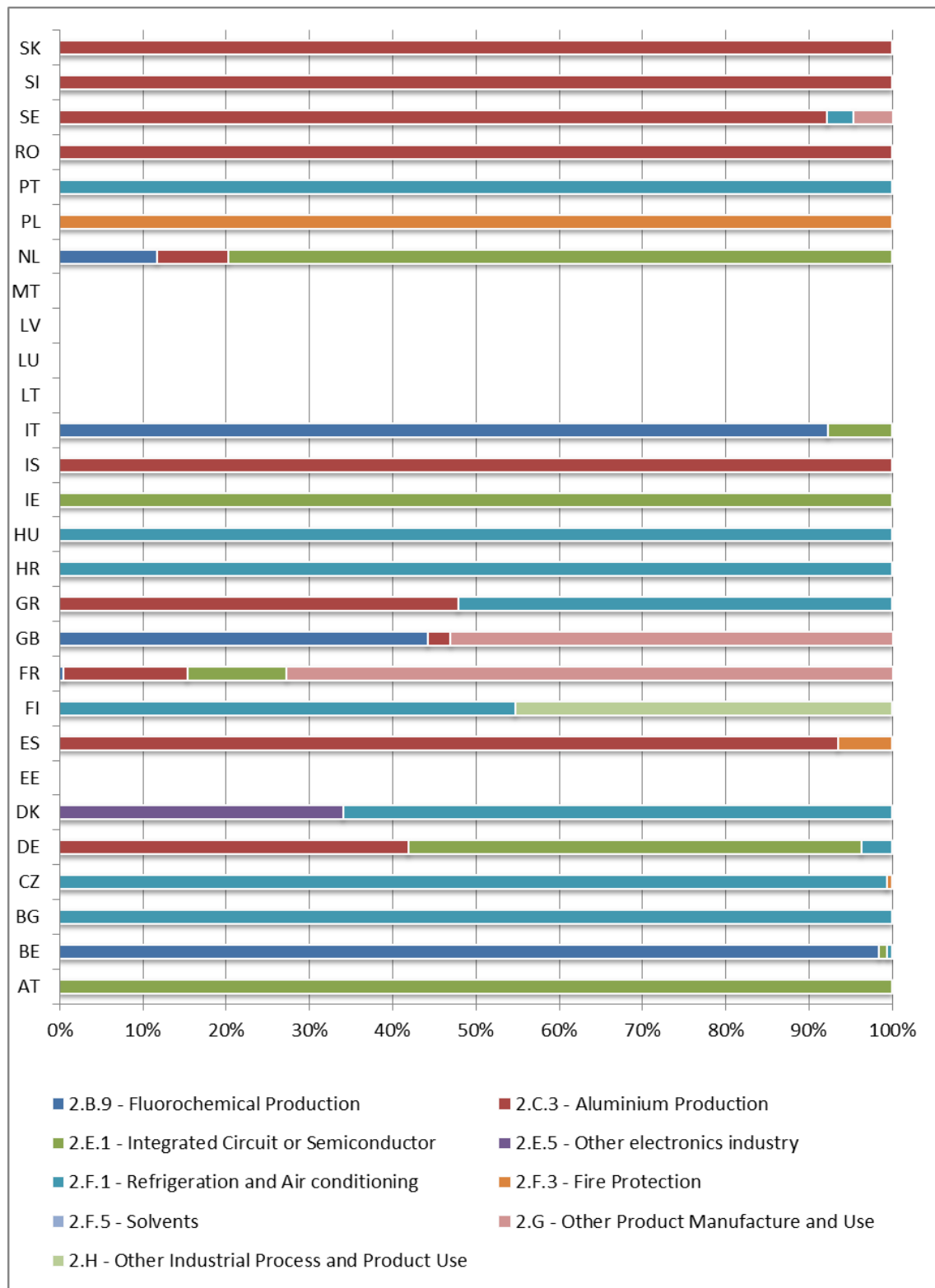
(⁶) Switzerland includes emissions of NF₃ together with emissions of SF₆ to the AEA.

Figure 4. Emissions of Hydrofluorocarbones (HFCs) 2013 reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism by countries in 2015.



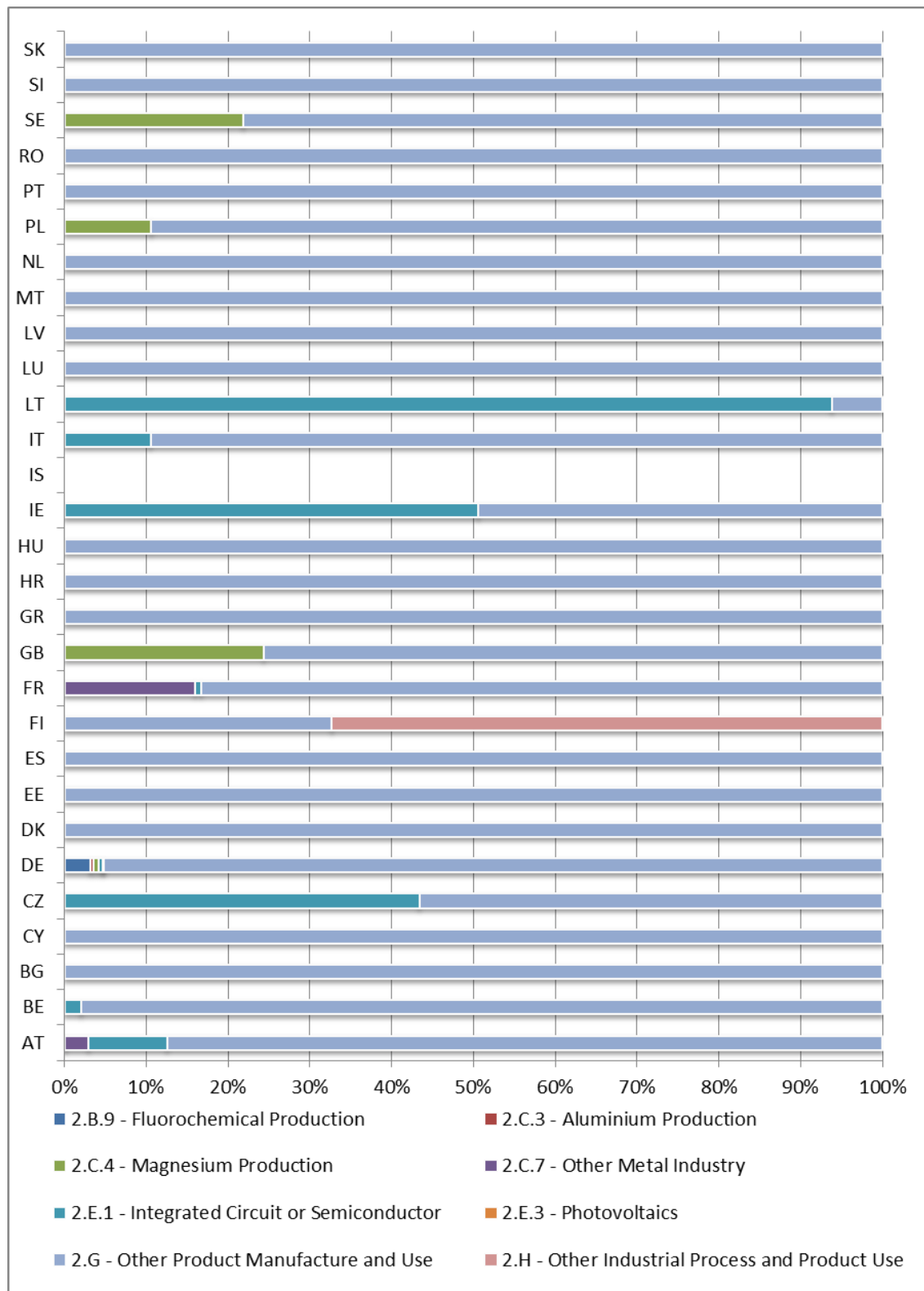
Source: EEA website 2016-06-07, www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-10

Figure 5. Emissions of Perfluorocarbons (PFCs) 2013 reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism by countries in 2015.



Source: EEA website 2016-06-07. www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-10

Figure 6. Emissions of Sulphur hexafluoride (SF6) 2013 reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism by countries in 2015.



Source: EEA website 2016-06-07. www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-10

General information and guidelines on estimating emissions of F-gases is found in Volume 3 of the **2006 IPCC Guidelines** for National Greenhouse Gas Inventories⁷, including specific information on each CRF categories as follows:

CRF category	Section of the 2006 IPCC Guidelines
CRF 2.B Chemical industry	http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_3_Ch3_Chemical_Industry.pdf
CRF 2.C Metal industry	http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_4_Ch4_Metal_Industry.pdf
CRF 2.E Electronics industry	http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_6_Ch6_Electronics_Industry.pdf
CRF 2.F Product uses as substitutes for ODS	http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_7_Ch7_ODS_Substitutes.pdf
CRF 2.G. Other product manufacture and use	http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/3_Volume3/V3_8_Ch8_Other_Product.pdf

Documentation on methodologies used in the national GHG inventories is found in **National Inventory Reports** (NIR) that can be downloaded from the UNFCCC website⁸. Methodologies used for emissions of F-gases are provided in chapter 4 of the NIR where very detailed country-specific information can be found in subheadings Source category description and Methodological issues. Some countries also provide details in Annex of the NIR. NIRs have been studied when producing this paper, however the information is too detailed and specific to be relevant to include in this paper for all countries.

To evaluate the methodology in the greenhouse gas inventory it might also be useful to check the latest **Inventory Review Report** (IRR), also available at the UNFCCC website⁹. IRRs have been studied when producing this paper, however the information is too detailed and specific to be relevant to include in this paper for all countries. *Countries are encouraged to study the IRR of their own country only if they meet difficulties in using the information in NIR.*

⁽⁷⁾ <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol3.html>

⁽⁸⁾ http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/9492.php

⁽⁹⁾ http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/9477.php

4. Allocation of F-gas emissions to NACE industries and households

The task for the air emission accounts is to allocate F-gas emissions to industries (NACE) and households. This section will focus on each CRF subcategory relevant for F-gases, based on information in the 2006 IPCC guidelines, documentation provided by countries (chapter 0) and countries NIR.

- Some general advice:
- For emissions reported in categories 2.F Product uses as substitutes for ODS and 2.G Other product manufacture and use it is necessary to take into account also subcategories reported in the greenhouse gas inventory.
- Emissions of F-gases occur from manufacturing of products, from use of products (stocks) and from disposal of products. As can be seen in chapter 0, some countries use very detailed data clearly distinguishing emissions from manufacturing, from stocks and from disposal. Other countries start with more aggregated data that do not clearly distinguish between manufacturing, stocks and disposal. Of course, the quality of the final allocation depends on what kind of data is used. If no separate detailed background dataset is available, make sure to use all information provided in CRF Table2 (II)B-H (s 1 and 2). In these tables emissions are split on manufacturing, stocks and disposal. Make sure to deduct emissions recovered if applicable.
- Take into account how large emissions are, as percentage of national total and as percentage of total greenhouse gas emission (expressed as CO₂ equivalents, for all F-gases together with CO₂, CH₄ and N₂O). More time and effort should be spent on methodologies for allocating larger emission categories.
- Compilers should focus on sources (CRF codes) with highest quantity of F-gas emissions. Based on the EU28 aggregated figures the biggest volume of the emissions from the three F-gases comes from refrigeration and air conditioning (81% of total F-gas emissions), aerosols (6%) and other product manufacture and use (5%).

Quantitative importance of sources of F-gases, EU-28, year 2014

	HFCs - (CO2 equivalent)	PFCs - (CO2 equivalent)	SF6 - (CO2 equivalent)	3 F-gases - (CO2 equivalent)
2.B - Chemical Industry	389	1 803	95	2 287
2.C - Metal Industry	63	459	227	748
2.E - Electronics Industry	57	542	160	759
2.F.1 - Refrigeration and Air conditioning	98 799	89		98 888
2.F.2 - Foam Blowing Agents	2 907			2 907
2.F.3 - Fire Protection	2 249	17		2 266
2.F.4 - Aerosols	7 271			7 271
2.F.5 - Solvents	273			273
2.F.6 - Other Applications	195			195
2.G - Other Product Manufacture and Use	11	573	5 636	6 219
Total (without LULUCF, without indirect CO2)	112 215	3 486	6 141	121 842

	HFCs - (CO2 equivalent)	PFCs - (CO2 equivalent)	SF6 - (CO2 equivalent)	3 F-gases - (CO2 equivalent)
2.B - Chemical Industry	0%	1%	0%	2%
2.C - Metal Industry	0%	0%	0%	1%
2.E - Electronics Industry	0%	0%	0%	1%
2.F.1 - Refrigeration and Air conditioning	81%	0%		81%
2.F.2 - Foam Blowing Agents	2%			2%
2.F.3 - Fire Protection	2%	0%		2%
2.F.4 - Aerosols	6%			6%
2.F.5 - Solvents	0%			0%
2.F.6 - Other Applications	0%			0%
2.G - Other Product Manufacture and Use	0%	0%	5%	5%
Total (without LULUCF, without indirect CO2)	92%	3%	5%	100%

Source: European Environment Agency, GHG data viewer

- For small flows, even rough, a well-funded simple method is better than no method.
- Methods can always be improved in upcoming years.
- Below suggestions on allocation of emissions is provided. However, if the reported F-gas emissions of your country are very different to what is presented in this paper, please develop a country specific allocation.

CRF 2.B, 2.C and 2.E Chemical, metal and electronics industry

In the chemical industry (CRF 2.B), a large number of fluorine containing greenhouse gases can be produced as by-products of fluorochemical manufacture and emitted into the atmosphere.

In metal industry (CRF 2.C), perfluorocarbons (PFCs) emissions occur during anode effects in primary aluminium production. During electrolysis, alumina (Al₂O₃) is dissolved in a fluoride melt comprising about 80 weight percent cryolite (Na₃AlF₆). Perfluorocarbons (CF₄ and C₂F₆ collectively referred to as PFCs) are formed from the reaction of the carbon anode with the cryolite melt during a process upset condition known as an 'anode effect'. An anode effect occurs when the concentration of alumina in the electrolyte is too low to support the standard anode reaction.

In electronics industry (CRF 2.E), several advanced electronics manufacturing processes utilize fluorinated compounds for plasma etching intricate patterns, cleaning reactor chambers, and temperature control. The specific sectors included are manufacturing of semiconductors, thin-film-transistor flat panel displays (TFT-FPD, LCD) and photovoltaic cells (PV).

Allocation to NACE industries and households is suggested as follows:

Emissions from	From manufacturing	From stocks	From disposal
2.B Chemical industry	C20	C20	C20
2.C Metal industry	C24	C24	C24
2.E Electronics industry	C26	C26	C26

CRF 2.F.1 Refrigeration and air conditioning

Emissions may be calculated using an emission factor approach or a mass balance approach, depending on how large emissions are and the data availability for each country.

Allocation to NACE industries and households is suggested as follows. Please make sure to check what is actually included in your country's CRF subcategories to determine what NACE categories are appropriate for your country.

Emissions from	Description	From manufacturing	From stocks	From disposal
Commercial refrigeration	Different types of equipment, from vending machines to centralised refrigeration systems in supermarkets.	C28	A01, A03, G46-47, I55-56	E38
Domestic refrigeration	Household refrigeration	C27	Household, Other. Consider also including NACE industries for refrigerators in offices etc using distribution key relating to use of refrigerators, for example from National accounts use tables and/or area of premises	E38
Industrial refrigeration	Industrial processes including chillers, cold storage, and industrial heat pumps used in the food, petrochemical and other industries	C28	A01, A03, C10-11, C19-21 and possibly other C group using distribution key relating to use of refrigeration, for example from National accounts use tables	E38
Transport refrigeration	Equipment and systems used in refrigerated trucks, containers, reefers, and wagons	C28	G46-47, H49-53 and possibly also other NACE industries using refrigerated vehicles	E38
Mobile air-conditioning	Mobile air-conditioning systems used in passenger cars, truck cabins, buses, and trains. The sub-application of mobile air conditioning systems is likely to represent the largest share of HFC emissions within the Refrigeration and Air Conditioning application for many countries.	C25, C28	Households – Other and all NACE using distribution key relating to use of mobile air conditioning, for example from National accounts use tables and/or driven distances of vehicles by vehicle type.	E38
Stationary air-conditioning	Air-to-air systems, heat pumps, and chillers for building and residential applications. Comfort air conditioning in large commercial buildings (including hotels, offices, hospitals, universities, etc.) is commonly provided by water chillers coupled with an air handling and distribution system.	C25, C28	Households – Other and all NACE using distribution key relating to use of stationary air conditioning, for example from National accounts use tables and/or area of homes and premises	E38

CRF 2.F.2 Foam blowing agents

HFCs are being used as replacements for CFCs and HCFCs in foams and particularly in insulation applications. The division of foams into open-cell or closed-cell relates to the way in which blowing agent is lost from the products.

For open-cell foam, emissions of HFCs used as blowing agents are likely to occur during the manufacturing process and shortly thereafter. Open-celled foams are used for applications such as household furniture cushioning, mattresses, automotive seating and for moulded products such as car steering wheels and office furniture.

In closed-cell foam, only a minority of emissions occur during the manufacturing phase. Emissions therefore extend into the in-use phase, with often the majority of emission not occurring until end-of-life (de-commissioning losses). Emissions from closed cell foams can occur over a period of 50 years or even longer from the date of manufacture. Closed-cell foams are primarily used for insulating applications where the gaseous thermal conductivity of the chosen blowing agent (lower than air) is used to contribute to the insulating performance of the product throughout its lifetime.

Allocation to NACE industries and households is suggested as follows:

Emissions from	From manufacturing	From stocks	From disposal
Furniture, mattresses etc	C22	Households – Other and all NACE using distribution key relating to use of furniture/mattresses, for example from National accounts use tables or area of homes and premises	E38
Automotive seating, steering wheels etc	C29	Households – Other and all NACE using distribution key relating to transports such as number of vehicles	E38
Insulating applications, polyurethane foam cans	C20	Households – Other and all NACE using distribution key relating to use of insulation applications and PU cans, for example from National accounts use tables or area of homes and premises	F or E38

CRF 2.F.3 Fire protection

There are two general types of fire protection (fire suppression) equipment that use HFCs and/or PFCs as partial replacements for halons: portable (streaming) equipment, and fixed (flooding) equipment. While actual emissions from the fire protection sub-sector are expected to be quite small, the use is normally non-emissive in provision of stand-by fire protection and is growing. This results in an accumulating bank of future potential emissions.

A considerable proportion of net consumption is likely to be targeted at equipment servicing rather than new equipment. The sub-applications are less numerous and more homogeneous than for refrigeration and air conditioning.

Allocation to NACE industries and households is suggested as follows:

Emissions from	Description	From manufacturing	From stocks	From disposal
Fire protection agents and fire protection equipment	Some countries (not all) have manufacture of fire protection agents and fire protection equipment. All countries should have (small) emissions from use and servicing of fire protection equipment.	C20 (agents), C28 (equipment)	C33 (servicing), O84, and Household- other/NACE industries using distribution key relating to use of fire equipment, for example from National accounts use tables or area of homes and premises	E38

CRF 2.F.4 Aerosols

Most aerosol packages contain hydrocarbon (HC) as propellants but, in a small fraction of the total, HFCs and PFCs may be used as propellants or solvents. Emissions from aerosols usually occur shortly after production, on average six months after sale. However, the period between manufacture and sale could vary significantly depending on the sub-application involved. During the use of aerosols, 100 percent of the chemical is emitted.

Allocation to NACE industries and households is suggested as follows:

Emissions from	From manufacturing	From stocks	From disposal
Metered dose inhalers	C21	Household – Other	E38
Personal Care Products (e.g., hair care, deodorant, shaving cream) and household Products (e.g., air-fresheners, oven and fabric cleaners)	C20	Household – Other	E38
Industrial Products (e.g., special cleaning sprays such as those for operating electrical contact, lubricants, pipe-freezers)	C20	NACE C using appropriate distribution key for example from National accounts use tables	E38
Other General Products (e.g., silly string, tyre inflators, klaxons)	C20	According to appropriate distribution key for example from National accounts use tables	E38

CRF 2.F.5 Solvents

HFCs are used in solvent applications to a low extent and PFCs are still only very rarely used. HFC/PFC solvent uses occur mainly in precision cleaning, electronics cleaning, metal cleaning and deposition applications.

HFCs are typically used in the form of an azeotrope or other blend for solvent cleaning.

In general, PFCs have little use in cleaning, as they are essentially inert, have very high GWPs and have very little power to dissolve oils - except for fluoro-oils and fluoro-greases for even deposition of these materials as lubricants in disk drive manufacture.

Allocation of HFC/PFC solvent uses to NACE industries is suggested as follows:

Emissions from	From manufacturing	From stocks	From disposal
Solvent Cleaning	C20 and C24-28 using distribution key relating to use of solvent cleaning, for example from National accounts use tables	C24-28 using distribution key relating to use of solvent cleaning, for example from National accounts use tables	E38
Deposition applications	C26	C26	E38

CRF 2.F.6 Other applications

HFCs and PFCs represent a large range of gases whose properties make them attractive for a variety of other niche applications such as electronics testing, heat transfer, dielectric fluid, medical applications and potentially many new applications not yet developed. There are also some historical uses of PFCs, as well as emerging use of HFCs, in these applications. These applications have leakage rates ranging from 100 percent emissive in year of application to around 1 percent per annum.

For this diverse category, no suggestions on allocation to NACE industries and households can be made. Countries with emissions reported are recommended to develop a country specific allocation based on for example information provided in the NIR.

CRF 2.G.1 Electrical equipment

Sulphur hexafluoride (SF₆) is used for electrical insulation and current interruption in equipment used in the transmission and distribution of electricity. Emissions occur at each phase of the equipment life cycle, including manufacturing, installation, use, servicing, and disposal. Most of the SF₆ used in electrical equipment is used in gas insulated switchgear and substations (GIS) and in gas circuit breakers (GCB), though some SF₆ is used in high voltage gas-insulated lines (GIL), outdoor gas-insulated instrument transformers and other equipment. Both categories of equipment have lifetimes of more than 30 to 40 years. Electrical equipment is the largest consumer and most important use of SF₆, globally. It significantly contributes to worldwide SF₆ emissions. However, the importance of this source varies considerably from region to region and from country to country. The emissions from this category depend not only on the installed (banked) or consumed quantities of SF₆, but also very much on the tightness of the products and the handling processes applied. Regional average emission rates presently vary between far less than 1 percent to more than 10 percent.

Allocation to NACE industries and households is suggested as follows:

Emissions from	From manufacturing	From stocks	From disposal
Transmission and distribution of electricity	C27	D	E38

CRF 2.G.2 SF6 and PFCs from other product use and CRF 2.G.4 Other

These are categories including a wide range of emissions sources. Allocation to NACE industries and households is suggested as follows:

Subcategory	Description	From manufacturing	From stocks	From disposal
Military applications	There is a wide range of military applications using PFCs or SF6.	C26, C27 and possibly more	O	E38
Accelerators	SF6 is used as an insulating gas in university and research operated particle accelerators, in two types of industrial particle accelerators (low and high voltage) and also in medical (cancer therapy) particle accelerators.	C27	Many industries, M72, Q86	C E38
Adiabatic uses	Car tyres	C22	Use distribution key relating to number of car tyres such as number of road transport vehicles	E38
	Sport shoe soles	C15		E38
	Tennis balls	C32	Household other Household other	E38
Sound-proof windows	For double-glazed sound-proof windows, approximately one-third of the total amount of SF6 purchased is released during assembly. For the stock of gas remaining inside the window (capacity), an annual leakage rate of 1 percent is assumed (including glass breakage). Thus, about 75 percent of initial stock remains at the end of its 25-year lifetime. The application of SF6 in windows began in 1975, so disposal is only beginning to occur.	C16, C22, C23, C25	Appropriate distribution key relating to use of windows for example from National accounts use tables or number/area of homes and premises.	E38 and/or F
PFCs used as heat transfer fluids in consumer and commercial applications	PFCs are used as heat transfer fluids in a number of high-power-density commercial and consumer electronic applications. The liquid PFCs are used in closed modules, indicating that most emissions occur during the manufacture, maintenance, and disposal of the product or equipment. Commercial applications include cooling for supercomputer, telecommunication, and airport radar systems, as well as drive units (rectifiers) on high-speed trains. Consumer applications include cooling kits for desktop computers.	C26, C30, C33	C33, J61, S95	E38

Subcategory	Description	From manufacturing	From stocks	From disposal
Cosmetic and medical applications	PFCs with relatively large molecular weights are used in cosmetic and medical applications, exploiting their ability to carry oxygen to living tissue.			
	Cosmetic applications include anti-wrinkle creams and are estimated to consume fairly small amounts.	C20	Household Other	E38
	Current and potential medical applications include storage of pancreatic tissue for transplants, eye surgery, pneumonectomy, use as a contrast agent in ultrasonic and MRI examinations, blood extension, wound healing, and treatment of diseases of the middle ear. All but the first two medical applications involve only small quantities and/or are at the research stage. Storage of pancreatic tissue is a small but growing application. Emissions from medical uses are uncertain but are believed to be small. In all of these applications, the PFC is believed to be emitted into the atmosphere within one year of its purchase.	C20	Q86	E38
Any other uses of SF6 and PFCs	Use as tracers in leak detection, indoor and outdoor tracking of air-masses, and oil recovery	C20	Distribution key relating to use of SF6 and PFCs as tracers, for example from National accounts use tables.	E38
	Production of optical cables (for fluorodoping of glass fibres)	C20	Distribution key relating to use of optical cables, for example from National accounts use tables.	E38
	Other uses	According to country specific data	According to country specific data	According to country specific data

5. Country approaches

This chapter presents some examples of allocation approaches in a number of countries 2016. The documentation is kindly provided by the countries.

5.1. Belgium

5.1.1. Source

Each year, a large table containing several F-gases is delivered to the Federal Planning Bureau. The data are gathered and reported per region and for the whole country. The earliest F-gas reporting is in 1990, but most reportings start in 1997.

Not only had the AEA required F-gases are reported in this table. In total 10 F-gas substance groups are reported (see Table 1), of which of course only HFC, PFC and SF6 are selected for the AEA.

Table 1. Substance groups

CFC	HFC	Other	SF6
Halons	HFO	Other ODS	
HCFC	NF3	PFC	

The F-gases are reported according to the (potential) sources. There are three levels of sources differentiated. A first layer includes all large potential sources of emissions (see Table 2). Of those, only the emissions from stocks, manufacturing and disposal are taken into account when selecting the data for the AEA. The other sources are outside the scope of the AEA.

Table 2. Potential emission sources: layer 1

Source level 1
Emissions from disposal (t)
Emissions from manufacturing (t)
Emissions from stocks (t)
Filled into new manufactured products (t)
In operating systems (average annual stocks) (t)
Remaining in products at decommissioning (t)

A second layer distinguished for each of the sources in level one, which type of process the emission comes from (see Table 3).

Table 3. Potential emission sources: layer 2

Source level 2
Aerosols
Chemical industry
Electronics industry
Fire protection
Foams
Other
Refrigeration & air conditioning

The third layer specifies the origin of the emissions in detail (Table 4).

Table 4. Potential emission sources: layer 3

Source level 3
01. Domestic refrigerating - Coolant
02 Domestic refrigerating - Foam
03. RAC & heat pumps
04. Car aircon
05. Bus & Coach aircon
06. Trucks aircon
07. Refrigerated transport
08. Passenger rail transport
10. Industrial & commercial refrigeration.
11. Closed cell foam
12. PU cans
13. Aerosols MDI
14. Other aerosols
16. Methylbromide
17. SF6 electric Sector
18. SF6 in glass sector

19. Fire Extinguishers

20. Chemical Industry

21. Semiconductors

22. Nike shoes

23. Solvents

5.1.2. HFC

Selecting only the F-gases that can be classified as HFC for Belgium, resulted in a time series 1992-2014 for the emissions sources shown in Table 5. This table also indicates the NACE class the emission is allocated to.

Table 5. HFC emissions sources

Emmissions	Emmissions go to	
Emissions from disposal (t)		
Fire protection		
19. Fire Extinguishers Foams	NACE 37-39	Waste disposal
02. Dom. refrig. - Foam	NACE 37-39	Waste disposal
Refrigeration & air conditioning		
01. Dom. refrig. - Coolant	NACE 37-39	Waste disposal
03. RAC & heat pumps	NACE 37-39	Waste disposal
04. Car airco	NACE 37-39	Waste disposal
05. Bus&Coach airco	NACE 37-39	Waste disposal
06. Trucks airco	NACE 37-39	Waste disposal
07. Refrigerated transport	NACE 37-39	Waste disposal
10. Ind.&comm. refrig.	NACE 37-39	Waste disposal
Emissions from manufacturing (t)		
Aerosols		
14. Other aerosols	NACE 20	Manufacturing of aerosols
Electronics industry		
21. Semiconductors	NACE 26	Emissions in plants
Fire protection		
19. Fire Extinguishers Foams	NACE41-43	Installation of fire protection
11. Closed cell foam	NACE 22	Rubber ed
12. PU cans	NACE 20	Chemicals
Refrigeration & air conditioning		
03. RAC & heat pumps	NACE 28	Production of machines
04. Car airco	NACE 29	Production of vehicles
05. Bus&Coach airco	NACE 29	Production of vehicles

06. Trucks airco	NACE 29	Production of vehicles
10. Ind.&comm. refrig.	NACE 28 or NACE 41-43	Production of machines – installation of frigo
Emissions from stocks (t)		
Aerosols		
13. Aerosols MDI	Household other	Use of medical inhalers
14. Other aerosols	Nace 20 or NACE 21	Specified in the IIR
Chemical industry		
20. Chemical Ind	NACE 20	Emissions in plants
Electronics industry		
21. Semiconductors	NACE 26	Emissions in plants
Fire protection		
19. Fire Extinguishers Foams	NACE 84	Fire department
02. Dom. refrig. - Foam	Households other	Foams in freezers ed
11. Closed cell foam	NACE 22	Rubber ed
12. PU cans	NACE 20	Chemicals
Refrigeration & air conditioning		
01. Dom. refrig. - Coolant	Hh heating	Airco/ cooling
03. RAC & heat pumps	Hh heating	Heating pumps
04. Car airco	All NACE + household transport	Divided according to possession of cars
05. Bus&Coach airco	All NACE + household transport	Divided according to possession of busses
06. Trucks airco	All NACE + household transport	Divided according to possession of HVD
07. Refrigerated transport	All NACES	Monetary use of cooling products
08. Passenger rail transport	NACE 49	
10. Ind.&comm. refrig.	All NACES	Monetary use of cooling products

Emissions from stocks coming from air conditioning from cars, busses and trucks is allocated to the NACEs and household transport category based on an allocation key derived from a database containing data on ownership. The hypothesis is made that per vehicle type, each vehicle emits the same amount of F-gases.

5.1.3. PFC

The table provides PFC emissions as of 1990 and for the emission sources as shown in Table 6.

Table 6. PFC emissions sources

Sum of Emissions ton	PFC	
Emissions from disposal (t)		
Chemical industry		
20. Chemical Ind	NACE 20	Waste during production processes
Other		
	NACE 13	Specific plant information
22. Nike shoes	NACE 37-39	Waste disposal plants
Refrigeration & air conditioning		
07. Refrigerated transport	NACE 37-39	Dismantling
Emissions from manufacturing (t)		
Chemical industry		
20. Chemical Ind	NACE 20	Emissions during production processes
Electronics industry		
21. Semiconductors	NACE 26	Manufacturing of
Refrigeration & air conditioning		
10. Ind.&comm. refrig.	NACE 41-43	Installation of
Emissions from stocks (t)		
Chemical industry		
20. Chemical Ind	NACE 20	Emissions from stocks in chemical plants
Refrigeration & air conditioning		
07. Refrigerated transport	All NACES	Monetary use of cooling products
10. Ind.&comm. refrig.	All NACES	Monetary use of cooling products

5.1.4. SF6

Emissions of SF6 are originated from the sources in

Table 7 and a time series 1990-2014 is available.

Table 7. SF6 emissions sources

Sum of Emissions ton	SF6	
Emissions from disposal (t)		
Other		
17. SF6 electr. Sector	NACE 37-39	Waste plants
18. SF6 in glass sector	NACE 41-43	Dismantling of windows at the scene
22. Nike shoes	NACE 37-39	
Emissions from manufacturing (t)		
Chemical industry		
20. Chemical Ind	NACE 20	Emissions in plants
Electronics industry		
21. Semiconductors	NACE 26	Emissions in plants
Other		
17. SF6 electr. Sector	NACE 35	Emissions in plants
18. SF6 in glass sector	NACE 23	Emissions in plants
Emissions from stocks (t)		
Other		
17. SF6 electr. Sector	NACE 35	Emissions in plants
18. SF6 in glass sector	All NACE and households	Based on expenditures of isolation products

5.2. Netherlands

5.2.1. Source

Yearly we received HFC, PFC en SF6 data from the National Institute for Public Health and Environment (RIVM) of the Ministry of Health, Welfare and Sport. The figures are structured as showed in Table 8 below:

Table 8. F-gases (RIVM) in CO2-eq

		Mton CO2-eq					
DOELGROEP	BRON	SBI	1990	1995	2000	2001	2002
HFCs	Industry/ Agriculture/ Retail, services and others (50%, 25%, 25%)	Cooling	0,00	0,06	0,37	0,47	0,57
HFCs	Transport	Car- airconditioning	0,00	0,01	0,12	0,16	0,21
HFCs	Industry / Construction/ Consumers (5%, 75%, 25% in 2005)	Used HFC's others (can spray, foam, etc)	0,00	0,21	0,69	0,38	0,18
HFCs	Industry	Chemical proces emissions	5,61	7,30	3,53	0,79	0,98
PFC's	Industry	CHEMIE Gebruik					
PFCs	Industry	Basicmetals: Aluminium-Indus	2,63	2,21	1,61	1,54	2,43
PFCs / SF6	Industry	Metalelectronic	0,03	0,07	0,28	0,24	0,17
		HFk tot	5,61	7,58	4,71	1,81	1,93
		PFk tot	2,66	2,28	1,89	1,78	2,60
SF6 TOTAL			0,21	0,27	0,28	0,29	0,24
SF6	Industry	Constructionmaterial					
SF6	Energy sector	Power current					
	TOTAAL		8,48	10,13	6,89	3,88	4,77

These data are also part of the Dutch emission inventory.

5.2.2. Distribution to NACE groups

Emissions are allocated to NACE groups by using expert advice of RIVM:

HFC

HFC - Cooling

- 15 per cent to NACE A01 – Crop and animal production, hunting and related service activities
- 10 per cent to NACE A03 – Fishing and aquaculture
- 50 per cent to NACE C10-C12- Manufacture of food products, beverages and tobacco
- 10 per cent to NACE G47- Retail trade, except of motor vehicles and motorcycles
- 10 per cent to NACE I -Accommodation and food service activities
- 5 per cent to NACE Q86 - Human health activities

HFC's – Car air conditioning

- 20 per cent to NACE H49 - Land transport and transport to pipelines
- 80 per cent to Household air emissions - other

Other used HFC's (industry, construction, consumers (5%, 75%, 25% in 2005))

- 75 per cent to NACE F- Construction
- 25 per cent Household air emissions - other

HFC industry – Chemical process SBI 20.16

- 100 per cent to NACE C20 - Manufacture of chemicals and chemical products

PFC**PFC industry – Chemical process SBI 20.16**

- 100 per cent to NACE C20 - Manufacture of chemicals and chemical products

PFC industry – Basic metal SBI 24.4/ 24.53 and 24.54

- 100 per cent to NACE C24 Manufacture of basic metals

PFC/SF6 industry – Metal electronic SBI 25-33/95

- 100 per cent to NACE 26 - Manufacture of computer, electronic and optical products

SF6

Emissions are not distributed to NACE groups for confidentiality reasons. Only total SF6 is reported. In principle, we keep these percentages constant for each year. Documentation with regard to the methodology for estimating these emissions for F asses can be found on the website from the Dutch emission inventory: <http://www.emissieregistratie.nl/erpubliek/misc/documenten.aspx>

5.3. Norway

HFCs and PFCs in products

1. We obtain information about imported amounts of HFC and PFC (species level) from customs statistics (based on tax on imports of these gases). We also know the name of the importer and in some cases the kind of product it is imported in (nomenclature HS).
2. We distribute the imported amounts to the application categories based on assumptions regarding the companies importing the gases and the information we have on goods.
3. We calculate emissions from production, bank and waste according to UN Guidelines.
4. We distribute the emissions to industries based on assumptions and expert judgments:
 - a. Allocation of emissions from the production phase is assumed to be of good quality.
 - b. Emissions from waste phase is all allocated to NACE 38 (Waste collection, treatment and disposal activities, materials recovery).
 - c. Allocation of emissions from bank is quite uncertain and need further work

See distribution key below. Please be aware that there are uncertainties in the percentages.

Distribution keys for HFC:s and PFCs used in Norwegian Air Emission Accounts

CRF category	Share of emissions from production	Share of emissions from bank	Share of emissions from waste	Allocated to NACE
2.F.1.a.1 Commercial Refrigeration - Stand-alone Commercial Applications			1,00	38
		0,500		47
		0,500		56
2.F.1.a.2 Commercial Refrigeration - Medium and Large Commercial Applications	1,00			28
			1,00	38
		0,224		46
		0,017		47
		0,376		56
		0,383		93
2.F.1.b Domestic Refrigeration			1,00	38
		1,000		PH
2.F.1.c Industrial Refrigeration		0,214		3,2

		0,107	06
		0,143	10.1
		0,143	10.2
		0,071	10.3
		0,036	10.4
		0,179	10.5
		0,071	10.7
		0,036	11
	1,00		28
		1,00	38
2.F.1.d Transport Refrigeration	1,00		28
		1,00	38
		0,140	49,1
		0,430	49,41
		0,430	50

CRF category	Share of emissions from production	Share of emissions from bank	Share of emissions from waste	Allocated to NACE
2.F.1.e Mobile Air-Conditioning		0,020		01
		0,020		02
		0,016		24
		0,016		25
			1,00	38
		0,008		41
		0,001		49.31
		0,009		49.32

		0,891	49.41
		0,021	PH
2.F.1.f Stationary Air-Conditioning	1,00		28
		1,00	38
		0,111	55
		0,111	56
		0,111	68
		0,111	84
		0,111	85
		0,111	86
		0,111	87
		0,111	88
		0,111	PH
2.F.2a Foam - Closed cells		0,049	11
	1,00		22
		1,00	38
		0,109	47
		0,069	49,1
		0,149	49,41
		0,129	50
		0,249	56
		0,049	68
		0,199	PH
2.F.3 Fire protection		0,500	03.1
	1,00		28
		1,00	38
		0,500	50

2.F.4.a Metered Dose Inhalers	1,00	38
	1,000	PH
2.F.4.b Other aerosols	1,00	38
	1,000	PH
2.F.5 Solvents	1,000	26
	1,00	38

SF₆

The following distribution key is used:

Source/level of calculations	CRF allocation	Description	NACE allocation
Production of primary and secondary aluminium ¹	2C3	Aluminium production	24.42
Production of primary and secondary magnesium ¹	2C4	Magnesium production	24.40
Production of semiconductors ²	2E1	Electronics industry: Integrated circuit or semiconductor	26.10
High tension electrical equipment including gas insulated switchgear (GIS) and m�aletransformatorer ³	2G1	Electrical equipment	35.11
Soundproof windows ²	2G2c	Soundproof windows	Private household
Shoes ²	2G2d	Adiabatic properties: Shoes and tyres	Private household
Tracer gas ²	2G2e	Other	72.00
Other minor uses ²	2G2e	Other	72.00
Medical use ²	2G2e	Other	86.00

⁽¹⁾ Reported figures from industrial plants to the Norwegian Environment Agency

⁽²⁾ Estimated emissions based on analysis from 1999

⁽³⁾ Partly reported by major users and partly estimated

5.4. Portugal

Given the classification of F-gases data received (Portuguese National Inventory on greenhouse gases), Statistics Portugal uses the following methodology to allocate F-gases by industry.

Refrigeration and Air Conditioning Equipment

Refrigeration:

- In assembly the allocation is made to the industries 28 (domestic and commercial) and 29 (transport).
- In disposal the allocation is made to the industry 38 (waste), as a working assumption.
- In operation:
 - Domestic (fridges) is allocated to households;
 - Commercial (supermarkets, ...) is allocated according to National Accounts data on GFCF by industry of the product 28.25 (non-domestic cooling and ventilation equipment);
 - Transport (refrigerated trucks) is allocated according to National Accounts data on the product 29.1 GFCF (Manufacture of motor vehicles) by industry;
 - Laboratorial refrigeration is allocated according to National Accounts data on the product 28.25 GFCF (non-domestic cooling and ventilation equipment) to the industries that probably have laboratories.

Stationary and mobile Air Conditioning:

- In assembly the allocation is made to the industries 28 (stationary) and 29 (mobile).
- In disposal the allocation is made to the industry 40 (waste), as a working assumption.
- In operation:
 - Stationary Air Conditioning: using data of the inventory (on Annual Stock of Domestic Stationary Air Conditioning Equipments and Annual Stock of Industrial Stationary Air Conditioning Equipments) provided by the Portuguese Environmental Agency, Statistics Portugal allocates the domestic to the households and the industrial to the industries (according to National Accounts data on GFCF by industry of the product 28.25 (non-domestic cooling and ventilation equipment)).
 - Mobile Air Conditioning (vehicles):
 - Using data provided by the Portuguese Environmental Agency on Fleet of Vehicles equipped with AC systems (by Passenger Cars; Light Duty Vehicles; Heavy Duty Vehicles; Buses and Coaches), these kind of emissions are allocated considering the type of vehicle:
 - Passenger Cars equipped with AC systems: emissions are distributed by all industries according to the structure of National Accounts SUT product 1922 – unleaded gasoline;
 - Heavy commercial vehicles: the allocation is made to industry 49.3 (Other passenger land transport);

- Heavy passenger vehicles: the allocation is made to industry 49.2 (Freight rail transport).

Aerosols/Metered Dose Inhalers (medicines):

- In assembly: no data.
- In disposal: no data.
- In operation (medicines normally used by households): the allocation is made to households.

Electrical Equipment:

- In assembly: no data.
- In disposal: no data.
- In operation: the allocation is made to industry 35.1 (electricity). Note: this is not totally correct since other industries (chemical, metallurgical, ...) also use electrical equipment, but there is no available data. This issue needs further research.

Fire Extinguishers:

- In assembly: no data.
- In disposal: no data.
- In operation: the allocation is made according to National Accounts data on Intermediate consumption by industry of the product 20.59 (other chemical products, n.e.). Note: this is a limitation since this product contains other items besides fire extinguishers.

Foam blowing:

- In assembly: the allocation is made to industry 22.
- In disposal: no data.
- In operation: the allocation is made according to National Accounts data on Intermediate consumption by industry of the product 22.22 (other products to packaging, of plastic materials).

5.5. Sweden

This is the allocation developed in 2015 and currently used. It needs to be improved coming years.

CRF 2.C.3: Emissions are allocated to NACE 24.4-5.

CRF 2.C.4: Emissions are allocated to NACE 24.4-5 and 28 using plant level data from the GHG inventory.

CRF 2.F.1 Refrigeration and air conditioning

2.F.1.a Commercial refrigeration: Emissions are allocated to NACE 35.3 as indicated by background data in the GHG inventory. The allocation is to be verified and possibly revised.

2.F.1.b Household refrigeration: Emissions are allocated to households.

2.F.1.c Industrial refrigeration: No data.

2.F.1.d Transport refrigeration: Emissions are allocated to most likely NACE using expert judgment supported by value added:

Share	NACE	Industries assumed to use transport refrigeration
5%	01	Hunting
5%	03	Fishing
7%	10.1	Meat production
7%	10.2-3	Fish, seafood, fruit, vegetables
7%	10.4-5	Fat, dairy, ice cream
7%	10.6-7	Bakery etc.
6%	10.8-9	Other, animal food
6%	11	Drinks
20%	46	Wholesale
20%	47	Retail
10%	56	Restaurants and catering

2.F.1.e Mobile air-conditioning: Emissions from mobile air condition are distributed using the same distribution key as for road traffic (cars, buses, trucks), to all NACE and households.

2.F.1.f Stationary air-conditioning: No data.

CRF 2.F.2: Foam blowing agents. Emissions are allocated to NACE 22

CRF 2.F.3: Fire protection. Emissions are allocated to NACE 84 and household, 50% each. It is difficult to find any data for better allocation. Also, these are very small emissions.

CRF 2.F.4:

- Metered dose inhalers are allocated to households.
- Technical aerosols are allocated to NACE 81 based on information in NIR: “used as propellant gas in aerosols, but also as the actual product e.g. in cleaning sprays.” This is a simplification, but emissions are very small so it should be acceptable.

CRF 2.G.1: Electrical equipment. Emissions are allocated to NACE 27.1-4+27.9

CRF 2.G.2:

- Manufacture of windows: Emissions are allocated to NACE 16.2 and 23 based on plant level data from the GHG inventory.
- Emissions from shoes are allocated to households.

5.6. Switzerland

CRF 2.C.3 Aluminium production

Relevance % of Total F-Gas: 1990-2014: 2,7%, 1990: 45,9%, 2014: 0%
Gas: C2F6, CF4, SF6

Emissions are allocated to NACE 24 *Manufacture of basic metals*.

CRF 2.C.4 Magnesium production

Relevance % of Total F-Gas: 1990-2014: 2,5%, 1990: 0%, 2014: 2,7%,
Gas: SF6

Emissions are allocated to NACE 24 *Manufacture of basic metals*.

CRF 2.E Electronics industry

CRF 2.E.1 *Integrated circuit or semiconductor*

Relevance % of Total F-Gas: 1990-2014: 1,0%, 1990: 0%, 2014: 0,8%,

Gas: C2F6, C3F8, C4F8, CF4, HFC 23, SF6

Emissions are allocated to NACE 26 *Manufacture of computer, electronic and optical products*.

CRF 2.E.3 *Photovoltaics*

Relevance % of Total F-Gas: 1990-2014: 0,1%, 1990: 0%, 2014: 0,02%,
Gas: NF3

Emissions are allocated to NACE 26 *Manufacture of computer, electronic and optical products*.

CRF 2.E.5 *Other (CH code: 2 E 4)*

Relevance % of Total F-Gas: 1990-2014: 0,03%, 1990: 0%, 2014: 0%,
Gas: C6F14

Emissions are allocated to NACE 26 *Manufacture of computer, electronic and optical products*.

CRF 2.F.1 Refrigeration and air conditioning

2.F.1.a (CH code: 2 F 1 2) *Commercial refrigeration*

Relevance % of Total F-Gas: 1990-2014: 41,9%, 1990: 0%, 2014: 41,2%,
Gas: C2F6, C3F8, CF4, HFC 125, HFC 134a, HFC 143a, HFC 152a, HFC 23, HFC 236fa,
HFC 245fa, HFC 32

Note: Industrial refrigeration is also included in this position.

From manufacturing

Emissions are allocated to NACE 28 *Manufacture of machinery and equipment n.e.c.*

From stocks

First, based on share observed in France, Germany and Austria, 70% of the emissions are allocated to Commercial and 30% to Industrial refrigeration.

Second, Commercial refrigeration is allocated to NACE 01, 10, 13, 20, 46, 47, 55, 56, 61, 72, 84, 85, 86, 87, 93 and 96 based on detailed information provided by the inventory compilers.

Finally, Industrial refrigeration is allocated to NACE 01, 03, 10, 11, 20, 21, 72, 93 based on their

respective number of full-time job equivalents (note: for the number of jobs, only NACE positions at 6 digits needing refrigeration were included. Moreover a weight of 2 was given to jobs in 10 and 11 and a weight of 0.5 for 93 (ice rinks, winter sport facilities)).

From disposal

Emissions are allocated to NACE 38 Waste collection, treatment and disposal activities; materials recovery

2.F.1.b (CH code 2 F 1 1) Domestic refrigeration

Relevance % of Total F-Gas: 1990-2014: 0,3%, 1990: 0%, 2014: 0,3%,

Gas: HFC 134a

From manufacturing

Emissions are allocated to NACE 28 *Manufacture of machinery and equipment n.e.c.*

From stocks

70% of emissions are allocated to households and the remaining 30% are allocated to all NACEs according to their respective number of full-time job equivalents. This is based on expert judgement. The assumption is made that a part of the “domestic” fridges are in enterprises offices.

From disposal

Emissions are allocated to NACE 38 Waste collection, *treatment and disposal activities; materials recovery*

2.F.1.c Industrial refrigeration

Included in Commercial refrigeration

2.F.1.d (CH code 2 F 1 3) Transport refrigeration

Relevance % of Total F-Gas: 1990-2014: 1,5%, 1990: 0%, 2014: 1,6%,

Gas: C3F8, HFC 125, HFC 134a, HFC 143a

From manufacturing

Emissions are allocated to NACE 28 *Manufacture of machinery and equipment n.e.c.*

From stocks

The subcategories below are those of the model used by inventory compilers to estimate the emissions.

A. Train Emissions are allocated to NACE 49 *Land transport and transport via pipelines.*

B. Trucks (HDT)/Van (LDT)

Emissions are allocated based on a survey on frigorific heavy trucks activities. Because the subcategory frigorific heavy trucks represent only few samples within the survey and therefore confidence interval of the estimates are big, the allocations percentages are based on a mean of two surveys (2013 and 2014). NACE representing less than 5% are eliminated and values are rounded:

NACE	Share
10 Manufacture of food products	10%
46 Wholesale trade, except of motor vehicles and motorcycles	30%
47 Retail trade, except of motor vehicles and motorcycles	30%
49 Land transport and transport via pipelines	30%

From disposal

Emissions are allocated to NACE 38 *Waste collection, treatment and disposal activities; materials recovery*

2.F.1.e (CH code: 2 F 1 6) Mobile air-conditioning

Relevance % of Total F-Gas: 1990-2014: 18,8%, 1990: 0%, 2014: 23,6%, Gas: HFC 125, HFC 134a, HFC 143a

From manufacturing

Emissions are allocated to NACE 28 *Manufacture of machinery and equipment n.e.c.*

From stocks

The subcategories below are those of the model used by inventory compilers to estimate the emissions.

- A. Train Emissions are allocated to NACE 49 *Land transport and transport via pipelines.*
- B. Trucks (HDT) Same distribution key as for road traffic subcategory HDT.
- C. Van (LDT) Same distribution key as for road traffic subcategory LDT.
- D. Buses Same distribution key as for road traffic subcategory Buses.
- E. Cars Same distribution key as for road traffic subcategory Cars

From disposal

Emissions are allocated to NACE 38 *Waste collection, treatment and disposal activities; materials recovery*

2.F.1.f (CH code: 2 F 1 5) Stationary air-conditioning

Relevance % of Total F-Gas: 1990-2014: 7,6%, 1990: 0%, 2014: 11,1%,

Gas: HFC 125, HFC 134a, HFC 143a, HFC 32

From manufacturing

Emissions are allocated to NACE 28 *Manufacture of machinery and equipment n.e.c.*
From stocks

The subcategories below are those of the model used by inventory compilers to estimate the emissions.

- A. Direct and indirect cooling

Emissions are allocated to all NACE according to their respective number of full-time job equivalents (assumption for households: such machine are not signification by households).

B. Heat pumps and tumbler/dryers

Emissions are allocated using the same key than for heat pumps in the PEFA (this key is based on a the renewable energy statistics and employment figures).

From disposal

Emissions are allocated to NACE 38 Waste collection, treatment and disposal activities; materials recovery

CRF 2.F.2.1 Foam blowing agents

Relevance % of Total F-Gas: 1990-2014: 6,0%, 1990: 0%, 2014: 1,8%,

Gas: HFC 134a, HFC 152a, HFC 227ea, HFC 365mfc

From manufacturing

Emissions are allocated to NACE 20 Manufacture of chemicals and chemical products.

From stocks

Emissions are allocated to all NACEs and households based on stationary energy consumption (assumption: who has to heat, has also isolated buildings). Moreover based on detailed figures provided by the inventory compilers a part is allocated to NACE 43 Specialised construction activities.

From disposal

Emissions are allocated to NACE 38 Waste collection, treatment and disposal activities; materials recovery

CRF 2.F.4 Aerosols

CRF 2.F.4.1 Aerosols – Metered dose inhalers

Relevance % of Total F-Gas: 1990-2014: 1,6%, 1990: 0%, 2014: 1,2%,

Gas: HFC 134a, HFC 227ea

From manufacturing

Emissions are allocated to NACE 21 Manufacture of basic pharmaceutical products and pharmaceutical preparations.

From stocks

Emissions are allocated to households.

From disposal

Emissions are allocated to NACE 38 Waste collection, treatment and disposal activities; materials recovery

CRF 2.F.4.2 Aerosols – Other non-medical aerosols

Relevance % of Total F-Gas: 1990-2014: 0,04%, 1990: 0%, 2014: 0,1%,

Gas: HFC 134a, HFC 152a, HFC 227ea

From manufacturing

Emissions are allocated to NACE 20 Manufacture of chemicals and chemical products.

From stocks

Emissions are allocated to NACE 10 to 43 according to their respective number of full-time job equivalents.

From disposal

Emissions are allocated to NACE 38 Waste collection, treatment and disposal activities; materials recovery

CRF 2.F.5 Solvents

Relevance % of Total F-Gas: 1990-2014: 0,02%, 1990: 0%, 2014: 0,04%,

Gas: HFC 43-10mee

From manufacturing

Emissions are allocated to NACE 24 to 28 according to their respective number of full-time job equivalents.

CRF 2.G.1 Electrical equipment

Relevance % of Total F-Gas: 1990-2014: 6,9%, 1990: 24,1%, 2014: 1,9%,
Gas: SF6

From manufacturing
Emissions are allocated to NACE 27 Manufacture of electrical equipment.

From stocks
Emissions are allocated to NACE 35 Electricity, gas, steam and air conditioning supply.

From disposal
Emissions are allocated to NACE 38 Waste collection, treatment and disposal activities; materials recovery

CRF 2.G.2 Others (SF6 and PFCs from Other Product Use)**CRF 2.G.2.b Accelerators**

Relevance % of Total F-Gas: 1990-2014: 0,6%, 1990: 0,0%, 2014: 0,4%,

Gas: SF6

Emissions are allocated to NACE 25 Manufacture of fabricated metal products, except machinery and equipment.

CRF 2.G.2.c Soundproof windows

Relevance % of Total F-Gas: 1990-2014: 4,2%, 1990: 29,2%, 2014: 6,1%,

Gas: SF6

From manufacturing

Emissions are allocated to NACE 23 Manufacture of other non-metallic mineral products.

From stocks

Same as 2.F.2.1 Foam blowing agents (based on stationary energy)

From disposal

Emissions are allocated to NACE 38 Waste collection, treatment and disposal activities; materials recovery

CRF 2.G.2.e Other research and analysis

Relevance % of Total F-Gas: 1990-2014: 2,9%, 1990: 0,7%, 2014: 4,7%,

Gas: C3F8, C4F10, C6F14, CF4, SF6

Emissions are allocated to NACE 72 Scientific research and development.

CRF 2.G.4 Other

Relevance % of Total F-Gas: 1990-2014: 1,2%, 1990: 0%, 2014: 2,6%. Gas: HFC 134a

Emissions are allocated to NACE 72 Scientific research and development.

APPENDIX:

Emissions of fluorinated gases reported in air emissions accounts and UNFCCC greenhouse gas inventories

Please note that methods provided by countries above refer to data reported in 2016 and thus might differ from methods used to produce data in 2015 in the below tables.

Table 9. Reported emissions of Hydrofluorocarbons 2013 in air emission accounts 2015, by country. (Kilotonne CO2 equivalent)

	AT	BE	BG	CH	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	TR	UK
Total - All NACE activities	: 2 084	: 572	: 1 211	: 246	: 2 667	: 10 742	: 685	: 172	: 5 645	: 6 930	: 1 274	: 14 935	: 1 279	: 780	: 9 667	: 206	: 66	: 1 886	: 882	: 9 188	: 956	: 1 299	: 611	: 139	: 517	: 11 249	: 611	: 139	: 517	: 11 249		
Agriculture, forestry and fishing	: 21	: 23	: 30	: 2	: 0	: 0	: 3	: 6	: 0	: 180	: 7	: 14	: 0	: 5	: 15	: 0	: 0	: 1	: 341	: 31	: 0	: 4	: 30	: 24	: 0	: 4	: 30	: 24	: 0	: 0	: 43	
Mining and quarrying	: 0	: 7	: 2	: 0	: 0	: 0	: 0	: 0	: 202	: 0	: 2	: 0	: 5	: 1	: 0	: 0	: 0	: 0	: 0	: 10	: 4	: 0	: 21	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 10	
Manufacturing	: 1 349	: 272	: 195	: 24	: 1 342	: 93	: 194	: 39	: 5 409	: 3 228	: 196	: 4 974	: 175	: 229	: 4 301	: 27	: 0	: 21	: 958	: 78	: 2 653	: 174	: 352	: 53	: 53	: 57	: 53	: 53	: 57	: 1 251		
Electricity, gas, steam and air conditioning supply	: 80	: 0	: 37	: 9	: 1	: 0	: 0	: 0	: 0	: 128	: 17	: 7	: 1 072	: 0	: 1	: 0	: 4	: 0	: 0	: 0	: 28	: 1	: 25	: 337	: 0	: 67	: 337	: 0	: 67	: 23		
Water supply; sewerage, waste management and remediation activities	: 209	: 3	: 15	: 1	: 0	: 10 649	: 1	: 27	: 0	: 76	: 3	: 3	: 0	: 1	: 23	: 7	: 0	: 12	: 0	: 430	: 30	: 163	: 25	: 3	: 17	: 0	: 3	: 17	: 0	: 217		
Wholesale and retail trade; repair of motor vehicles and motorcycles	: 169	: 17	: 139	: 54	: 0	: 0	: 341	: 56	: 0	: 767	: 6 542	: 0	: 269	: 4 305	: 57	: 0	: 15	: 136	: 40	: 4 950	: 143	: 265	: 38	: 0	: 0	: 38	: 0	: 0	: 0	: 5 520		
Transportation and storage	: 57	: 163	: 133	: 12	: 0	: 0	: 19	: 21	: 0	: 344	: 247	: 1 292	: 0	: 64	: 53	: 101	: 11	: 9	: 88	: 72	: 772	: 49	: 98	: 41	: 1	: 131	: 41	: 1	: 131	: 602		
Accommodation and food service activities	: 1 162	: 4	: 15	: 46	: 29	: 0	: 0	: 58	: 1	: 0	: 395	: 16	: 71	: 0	: 3	: 76	: 0	: 0	: 136	: 89	: 20	: 60	: 43	: 4	: 12	: 232	: 4	: 12	: 232	: 678		
Information and communication	: 3	: 1	: 34	: 6	: 0	: 0	: 1	: 2	: 0	: 63	: 5	: 162	: 0	: 37	: 17	: 0	: 0	: 0	: 0	: 0	: 25	: 9	: 41	: 4	: 1	: 0	: 4	: 1	: 0	: 266		
Financial and insurance activities	: 4	: 1	: 57	: 13	: 0	: 0	: 0	: 1	: 0	: 122	: 8	: 216	: 0	: 0	: 11	: 0	: 0	: 0	: 0	: 29	: 13	: 32	: 3	: 1	: 0	: 3	: 1	: 0	: 0	: 112		
Real estate activities	: 1	: 2	: 16	: 1	: 0	: 0	: 0	: 4	: 0	: 46	: 2	: 72	: 0	: 1	: 8	: 0	: 0	: 1	: 0	: 18	: 16	: 2	: 13	: 3	: 8	: 0	: 3	: 8	: 0	: 83		
Professional, scientific and technical activities	: 18	: 2	: 141	: 14	: 4	: 0	: 1	: 3	: 0	: 54	: 15	: 386	: 0	: 3	: 21	: 0	: 0	: 0	: 0	: 0	: 45	: 11	: 56	: 14	: 10	: 0	: 14	: 10	: 0	: 444		
Administrative and support service activities	: 33	: 2	: 51	: 8	: 0	: 0	: 1	: 2	: 0	: 26	: 11	: 359	: 0	: 14	: 82	: 0	: 0	: 1	: 0	: 0	: 36	: 84	: 71	: 37	: 2	: 19	: 37	: 2	: 19	: 389		
Public administration and defence; compulsory social security	: 13	: 16	: 1	: 108	: 37	: 0	: 0	: 1	: 0	: 0	: 309	: 6	: 80	: 7	: 4	: 9	: 2	: 0	: 0	: 0	: 16	: 79	: 92	: 66	: 9	: 0	: 9	: 0	: 0	: 233		
Education	: 2	: 6	: 5	: 8	: 0	: 0	: 0	: 1	: 0	: 98	: 17	: 72	: 0	: 0	: 3	: 0	: 0	: 0	: 0	: 16	: 90	: 5	: 4	: 3	: 11	: 0	: 3	: 11	: 0	: 299		
Human health and social work activities	: 7	: 1	: 101	: 6	: 0	: 0	: 57	: 1	: 45	: 124	: 5	: 144	: 0	: 95	: 263	: 0	: 1	: 0	: 68	: 48	: 66	: 21	: 13	: 6	: 13	: 9	: 6	: 13	: 9	: 461		
Arts, entertainment and recreation	: 1	: 1	: 10	: 3	: 0	: 0	: 0	: 2	: 0	: 0	: 11	: 197	: 0	: 1	: 18	: 0	: 0	: 0	: 0	: 0	: 12	: 4	: 9	: 2	: 6	: 0	: 2	: 6	: 0	: 105		
Other service activities	: 1	: 1	: 27	: 5	: 261	: 0	: 0	: 2	: 0	: 16	: 3	: 375	: 25	: 8	: 4	: 0	: 0	: 0	: 0	: 41	: 61	: 5	: 12	: 3	: 4	: 0	: 3	: 4	: 0	: 144		
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0		
Activities of extraterritorial organisations and bodies	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0		
Total activities by households	: 444	: 327	: 309	: 296	: 0	: 0	: 97	: 34	: 0	: 2 517	: 278	: 4 803	: 0	: 497	: 1 851	: 108	: 39	: 43	: 406	: 260	: 418	: 923	: 0	: 241	: 139	: 18	: 241	: 139	: 18	: 4 890		

Source: Eurostat. Air emissions accounts by industry and households (NACE Rev. 2) [env_ac_aiah_r2] Last update 14.03.16

Table 10. Reported emissions of Perfluorocarbons 2013 in air emission accounts 2015, by country. (Kilotonne CO2 equivalent)

	AT	BE	BG	CH	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	TR	UK			
Total - All NACE activities	: 429	0	52	: 6	264	11	0	173	40	6	655	: 2	8	1705	: :	: :	114	182	13	0	6	: 51	15	10	: 253										
Agriculture, forestry and fishing	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Mining and quarrying	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Manufacturing	: 428	0	7	: 3	247	5	0	173	40	6	539	: 0	8	1705	: :	: :	114	182	4	0	6	: 49	15	10	: 249										
Electricity, gas, steam and air conditioning supply	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Water supply; sewerage, waste management and remediation activities	: 0	0	0	: 0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
Wholesale and retail trade; repair of motor vehicles and motorcycles	: 0	0	1	: 0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	
Transportation and storage	: 0	0	0	: 0	0	0	0	0	0	0	113	: 0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Accommodation and food service activities	: 0	0	0	: 0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Information and communication	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Financial and insurance activities	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Real estate activities	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Professional, scientific and technical activities	: 0	0	35	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Administrative and support service activities	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Public administration and defence; compulsory social security	: 0	0	4	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Education	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Human health and social work activities	: 0	0	1	: 0	0	1	0	0	0	0	2	: 0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Arts, entertainment and recreation	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other service activities	: 0	0	0	: 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Activities of extraterritorial organisations and bodies	: 0	0	0	: 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total activities by households	: 0	0	0	: 0	0	0	0	0	2	0	3	: 0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0

Source: Eurostat. Air emissions accounts by industry and households (NACE Rev. 2) [env_ac_ainah_r2] Last update

14.03.16

Table 11. Reported emissions of Sulphur hexafluoride 2013 in air emission accounts 2015, by country. (Kilotonne CO2 equivalent)

	AT	BE	BG	CH	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HR	HU	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	TR	UK	
Total - All NACE activities	: 116	: 20	: 253	: 0	: 101	: 3	: 768	: 131	: 2	: 5	: 223	: 31	: 580	: 7	: 123	: 41	: 417	: 6	: 8	: 9	: :	: 51	: 39	: 42	: 57	: 50	: 13	: 22	: :	: 602			
Agriculture, forestry and fishing	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0		
Mining and quarrying	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Manufacturing	: 3	: 20	: 107	: 0	: 101	: 3	: 660	: 77	: 0	: 223	: :	: 288	: 0	: 121	: 22	: 111	: 6	: 0	: 0	: 0	: 0	: 0	: 1	: 10	: 0	: 29	: 50	: 0	: 22	: :	: 218		
Electricity, gas, steam and air conditioning supply	266	13	0	1	0	0	0	10	2	5	0	:	220	7	0	19	193	0	1	9	:	:	47	29	42	23	:	0	13	0	:	238	
Water supply; sewerage, waste management and remediation activities	: 0	: 0	: 102	: 0	: 0	: 0	: 107	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 19	
Wholesale and retail trade; repair of motor vehicles and motorcycles	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 6	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 3	: 0	: 0	: 0	: 0	: 0	: 0	
Transportation and storage	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 4	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 2	: 0	: 0	: 0	: 0	: 0	: 0	
Accommodation and food service activities	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Information and communication	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Financial and insurance activities	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Real estate activities	: 6	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Professional, scientific and technical activities	: 0	: 0	: 25	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	:	20	0	0	0	101	0	0	0	:	:	0	0	0	0	:	0	0	0	0	0	7
Administrative and support service activities	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Public administration and defence; compulsory social security	: 0	: 0	: 3	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 41	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 118	
Education	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Human health and social work activities	: 0	: 0	: 6	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 11	: 0	: 1	: 2	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 1	
Arts, entertainment and recreation	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Other service activities	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Activities of extraterritorial organisations and bodies	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	
Total activities by households	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 0	: 2	: 0	: 0	: 0	: 0	: 0	: 0	: 9	: 0	: 0	: 0	: 0	: 1	: 0	: 0	: 0	: 0	

Source: Eurostat. Air emissions accounts by industry and households (NACE Rev. 2) [env_ac_aiah_r2] Last update

14.03.16

Table 12. Emissions of HFCs 2013 in greenhouse gas inventories submission 2015, by CRF category and country

Country	CRF category																	
	2.B.9	2.B.10	2.C.3	2.C.4	2.C.7	2.E.1	2.E.2	2.E.3	2.E.4	2.E.5	2.F.1	2.F.2	2.F.3	2.F.4	2.F.5	2.F.6	2.G	2.H
AT						2					1 619	17	13	24				
BE						1		0			2 371	61	12	83				
BG											863	20	5	11				
CY											537	4	4					
CZ	0										2 607	3	41	12	4			
DE			33			14					9 301	597	49	567	0		7	
DK											704	61		18				
EE	225										195	2	3	3				
ES											7 081	112	1 248	33				
FI	129					0					1 477	12	0	66				2
FR	46					6					16 516	616	166	1 910	121	241	0	
GB			3			14					13 048	493	268	2 146	22	110		
GR											5 373	191	36	45				
HR											564		4	9				
HU											1 072	146	7	55				
IE						3					1 124		35	115				
IS	1																	
IT			6			8					10 172	594	225	512				
LT											292	13	2	7				
LU											55	1	2	2				3
LV											103	0	0	4				2
MT	277					1					209	0	2	3				
NL											1 805					211		
PL											9 279	141	61	125	0			
PT											1 673	41	7	7				
RO											1 265	0	4	29				
SE											769	35	17	31				
SI											269	2	1	5				
SK											505	2	19	9				

Source: EEA website 2016-06-07.

www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-10

Germany, Finland, France, United Kingdom and Netherlands have reported some emissions as classified (C) or included elsewhere (IE). Finland reports emissions in category 2.H due to confidentiality. Germany have also reported some emissions as "Unspecified mix of HFCs and PFCs".

Table 13. Emissions of PFCs 2013 in greenhouse gas inventories submission 2015, by CRF category and country

Country	CRF category																	
	2.B.9	2.B.10	2.C.3	2.C.4	2.C.7	2.E.1	2.E.2	2.E.3	2.E.4	2.E.5	2.F.1	2.F.2	2.F.3	2.F.4	2.F.5	2.F.6	2.G	2.H
AT						49												
BE	422					4					2							0
BG											0							
CY											6		0					
CZ			108			140					9				0			0
DE										4	7							
DK																		
EE			44										3					
ES						0					4							3
FI	3	98	79															478
FR	112	7																134
GB		83									90							
GR											0							
HR											2							
HU						8												
IE		88																
IS	1 574					131												
IT																		
LT																		
LU																		
LV																		0
MT	15	11				101												
NL													15					
PL											0							
PT			6															
RO			49								2							2
SE			15															
SI			10															
SK						49												

Source: EEA website 2016-06-07.

www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-10

Germany, Finland, France, United Kingdom and Netherlands have reported some emissions as classified (C) or Included elsewhere (IE). Finland reports emissions in category 2.H due to confidentiality. Germany have also reported some emissions as "Unspecified mix of HFCs and PFCs".

Table 14. Emissions of SF6 2013 in greenhouse gas inventories submission 2015, by CRF category and country

Country	CRF category																	2.G	2.H
	2.B.9	2.B.10	2.C.3	2.C.4	2.C.7	2.E.1	2.E.2	2.E.3	2.E.4	2.E.5	2.F.1	2.F.2	2.F.3	2.F.4	2.F.5	2.F.6			
AT				0	9	29											266		
BE						2											113		
BG																	20		
CY																	0		
CZ						13											16		
DE	101		14	20		17	2										3 108		
DK																	131		
EE																	2		
ES																	213		
FI				0		0											10		
FR					92	5											483		
GB				146													455		
GR																	5		
HR																	7		
HU																	123		
IE						22											22		
IS																			
IT						44											373		
LT						6											0		
LU																	8		
LV																	9		
MT																	3		
NL																	132		
PL				4													35		
PT																	55		
RO																	57		
SE				11													40		
SI																	13		
SK																	22		

Source: EEA website 2016-06-07.

www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-10

Germany, Finland, France, United Kingdom and Netherlands have reported some emissions as classified (C) or Included elsewhere (IE). Finland reports emissions in category 2.H due to confidentiality. Germany have also reported some emissions as "Unspecified mix of HFCs and PFCs".